

The use of the fleckiano framework in the brazilian context: analysis of the circulation of ideas category

ABSTRACT

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The present work aims to point out how the category "circulation of ideas (and practices)" has been addressed in academic works (theses) from the most different areas of knowledge. Using the State of Knowledge type research, the survey was carried out through the Catalog of Dissertations and Theses of the Coordination for the Improvement of Higher Education Personnel and, in the Brazilian Digital Library of Theses and Dissertations, using descriptors related to the theme of study. In total, 33 studies were located, which after descriptive-interpretative analysis revealed: emergence of groups that comprise the intra- and inter-collective circulation of dissonant forms; displacements of meaning in relation to: collective and collective thought and, transformation of the style of thought without evidencing the presence of complications. Finally, this investigation leads us to consider the possibility of a new displacement: that the circulation of ideas between esoteric and exoteric circles of the same collective of thought is of the intra-collective circulation type. Therefore, further investigations are needed over time to identify whether such displacements will unfold in the emergence of a new collective of thought whose object of study is Fleck's own work.

KEYWORDS: Ludwik Fleck; Circulation of ideas; Epistemology.

O uso do referencial fleckiano no contexto brasileiro: uma análise da categoria circulação de ideias

RESUMO

O presente trabalho objetiva apontar como a categoria “circulação de ideias (e práticas)” tem sido abordada nos trabalhos acadêmicos (teses) das mais diferentes áreas do conhecimento. Recorrendo à pesquisa do tipo Estado do Conhecimento, o levantamento foi realizado por meio do Catálogo de Dissertações e Teses da Coordenação de Aperfeiçoamento de Pessoal de Nível Superior e na Biblioteca Digital Brasileira de Teses e Dissertações, utilizando descritores relativos ao tema de estudo. No total, foram localizados 33 trabalhos, que após análise descritivo-interpretativa revelaram: emergência de grupos que compreendem a circulação intra e intercoletiva de formas dissonantes; deslocamentos de significados em relação a: coletivo e coletivo de pensamento e transformação do estilo de pensamento sem evidenciar a presença de complicações. Por fim, esta investigação nos leva a considerar a possibilidade de um novo deslocamento de significado: a de que a circulação de ideias entre círculos esotérico e exotérico de um mesmo coletivo de pensamento é do tipo circulação intracoletiva. Portanto, ser faz necessária realizar novas investigações ao longo do tempo para identificar se tais deslocamentos se desdobrarão na emergência de um novo coletivo de pensamento cujo objeto de estudo é a própria obra de Fleck.

PALAVRAS-CHAVE: *Ludwik Fleck; Circulação de ideias; Epistemologia.*

INTRODUCTION

Studies analyzing Brazilian academic production show that, in the last decade, the use of the Fleckian framework has expanded in the area of Science Education. We observed that the research objects of the productions that find support in this framework are multiple, among them: teacher training in its various dimensions; the historical analysis of the consolidation of postgraduate programs (Barbosa, Saavedra & Miquelin, 2021); inclusive education, university teaching, work in Youth and Adult Education (Gonçalves, 2009; Lambach, 2013; Oda, 2012); the role of journals in the circulation of knowledge (Lambach, 2017). Beyond the area of Science Education, there is representation in research that emphasizes the relationship between neuroscience and education (Amaral, 2016); the understanding of discursive practices, palliative care and euthanasia (Galvis, 2017), among others.

In this context, some concerns are beginning to emerge that use Fleck as a theoretical guideline and consider the heterogeneity of productions, with unique objects of investigation linked to different areas of knowledge. Is it possible to say that there is a consonance in the way the authors of these studies understand the Fleckian framework? If the reference in question sheds light on how an idea, a concept, can undergo modifications and reinterpretations as it circulates from one group to another, could it be that the understanding of the Fleckian categories themselves is subjugated to this assumption?

Although Ludwik Fleck's ideas are widely used in the national literature, there is little mapping of how his categories have been interpreted. Carneiro (2019) reflects on the understanding of the categories Thinking Style and Thinking Collective, citing authors such as Cutolo (2001), Castilho-Delizoicov *et al.* (2004), but not on the possible dissonance in the use of these categories. There is also the work by Souza and Martins (2021) which evaluates the use of Fleckian categories (style of thought, thought collective, esoteric and exoteric circle, circulation of ideas, and active and passive connections) in articles in the area of science teaching. The authors highlight the existence of divergent interpretations of the category inter- and intra-collective circulation of ideas, but do not delve into the potential causes.

Given this divergence in articles in the field of science teaching, this study aims to point out how the category "circulation of ideas and practices" has been approached in academic works (theses) from the most different areas of knowledge. This category plays a fundamental role in the ontological and gnoseological perspective that underpins Fleck's theory of knowledge, as it allows for the establishment, expansion and transformation of a style of thought. The latter is subsidized by the category complications.

We have limited the analysis to the interval 2016 to 2021, because the aim is not to map the works that use the Fleckian framework in the Brazilian context, as Queirós and Nardi (2008), Santos (2017), Lorenzetti *et al.* (2018), Carneiro (2019) and Nobre-Silva and Silva (2021) have already done. The specificity of this work is to locate and deepen the understanding(s) and meaning(s) attributed to the category circulation of ideas and practices. Therefore, it was important for us to

choose a period whose number of productions was significant in terms of quantity and plurality for our analysis. Hence the choice of the 2016-2021 interval.

The articulation of our initial concerns with the objective of this article directs this study towards the following question: How is the category Circulation of Ideas and Practices being conceptually appropriated by Brazilian researchers? The centrality of the analysis of theses is due to the fact that these are the most extensive discussions, with the greatest theoretical depth, and that only at this level is there a requirement for novelty in the research.

FLECKIAN EPISTEMOLOGY

Fleckian epistemology presupposes that the process of knowledge is mediated by three elements: subject, object, and the state of knowledge. The state of knowledge means the context and the historical, social, cultural, economic and political influences and logical elements of knowledge. In other words, knowledge is not the result of a binary and linear system between subject and object but is mediated by socio-cultural relations. The enormous potential of this epistemology lies in providing a basis for analyzing the genesis of a knowledge/fact, and how it is established, expanded and modified as it circulates within and between thought collectives.

The thought collective is therefore one of the main Fleckian categories and can be defined as "the community of people who exchange thoughts or find themselves in a situation of reciprocal influence of thoughts" (Fleck, 2010, page 82). This community shares the same style of thinking, i.e., a set of ideas, beliefs, knowledge, and practices related to a particular object of knowledge. The stable thought collective has a universal structure consisting of a small esoteric circle and larger exoteric circles.

Therefore, in the esoteric circle we have the specialists in a particular field of knowledge and in the exoteric circles we have those who are supplied with certain knowledge: the laypeople or trained laypeople. These occupy different positions in the collective of thought, because the greater their mastery of terminology, concepts, ideas, techniques, and practices, the closer they are to the esoteric circle. We would point out that an individual participates in countless thought collectives during their lifetime, whether they are scientific or non-scientific. Therefore, the subject's positions in the esoteric and exoteric circles are relative to each other, i.e., an individual can at the same time participate in an esoteric circle of one thought collective and an exoteric circle of another thought collective. In short, the composition of the esoteric and exoteric circles is relative, depending on the object of knowledge being analyzed.

It is worth pointing out that there is a relationship of trust and dependence between the experts and the laypeople who have been trained, which enables communication between the different members of the thought collective. This communication Fleck (2010) called the circulation of ideas can occur intra-collectively or inter-collectively.

With regard to the intra-collective and inter-collective circulation of ideas, we would like to highlight Fleck's comments below:

All intra-collective thought traffic is therefore dominated by a specific feeling of dependence. The general structure of the thought collective means that intra-collective thought traffic leads to the strengthening of thought formations. [...] The greater the temporal and spatial distance from the esoteric circle, the longer the mediation of a thought *within the same thought collective*, the more secure it becomes. [...] When there are inter-collective relationships, they have common traits, regardless of the particularities of the respective collectives. [...] any inter-collective traffic of thoughts brings with it a displacement or alteration of the values of thoughts (Fleck, 2010, p. 158-160-161).

Based on these general characteristics, we understand that intra-collective circulation occurs between members of the esoteric circle, where there is cohesion and equivalence of thought. This is in line with the understanding of Brazilian researchers who have studied Fleck in depth, such as Queirós *et. al.* (2014). For example, the dialog about atomic models between specialists in Quantum Chemistry is endowed with terminologies, techniques and practices specific to the field of knowledge and contributes to strengthening the formations of thought among the members. This extends to the scientific articles produced by these specialists, whose main consumers are other specialists or researchers/students in the field. On the other hand, we can have Physical Chemistry and Particle Physics professionals sharing, to a certain degree, the concepts and practices of this collective of thought. In this case, we cannot say that they share the same or different styles of thinking in relation to physical-chemical systems. We could then presuppose the existence of nuances. Nuances are understood as "small varieties, degrees of distinction of the same EP" (Lorenzetti, 2008, page 374) and can indicate both distances and proximities between the knowledge and practices of the members of the same thought collective.

In continuity, we understand that inter-collective circulation occurs between two or more thought collectives, or even between the esoteric and exoteric circles of the same thought collective. This is because, as we have already pointed out, inter-collective circulation "brings with it a displacement or alteration of values" (Fleck, 2010, page 161) and communication between esoteric and exoteric circles occurs precisely through the translation and/or simplification of concepts and terminologies. This understanding is echoed by Gonçalves *et. al.* (2007) and Gonçalves and Marques (2012).

The categories highlighted above (thought collective, thought style, circulation of ideas) will be revisited in our discussions and are linked to the definitions presented by Fleck (2010). Other Fleckian categories less explored in this work are proto-ideas, harmony of illusions, and complication, found in the writings of Gonçalves (2009), Lambach (2013), Lorenzetti (2008), Oda (2012) and others.

METHODOLOGICAL ASPECTS

This work follows the principles of bibliographical research of the State of Knowledge type, with qualitative characteristics. State-of-the-art research is characterized by systematizing a particular field of knowledge. Based on a defined time frame, it is possible to sketch out a theoretical framework of the research

already conducted, identify the main topics covered and the results achieved. Above all, the aim is to get to know what has already been done in order to then focus on what has not yet been done (Ferreira, 2002).

This work went through four stages:

a) **definition of keywords:** choice of descriptors related to the research field of interest. We prioritized those descriptors directly linked to Fleck's theory: "Ludwik Fleck", "style of thought", "thought collectives", and "intra- and inter-collective circulation".

b) **defining the scope:** determining the variables, namely the type of document, time interval and fields of the documents to be analyzed. In this way, the object of investigation was theses published between 2016 and 2021, and the descriptors were searched throughout the document.

c) **Selection of the corpus:** in order to find the theses, we searched the platforms that make these documents available, namely the Catalog of dissertations and theses of the Coordination for the Improvement of Higher Education Personnel (CAPES), on the website <https://catalogodeteses.capes.gov.br/catalogo-teses/#/> and the Brazilian Digital Library of Theses and Dissertations, at <http://bdtd.ibict.br/vufind/>. We used the descriptors indicated in the keyword definition stage. The survey was conducted in January 2019 and updated in June 2021. In total, thirty-three theses were found. The list can be consulted via the link: <https://docs.google.com/document/d/1vzAZbDPJvG7EVPv3O-d6XLYorGsczk6-DbitZ2NuMSo/edit?usp=sharing>.

The 33 theses that make up our *corpus* were coded according to the following criteria: **T** (thesis) + ascending cardinal numeral + initial **Hum**, **Mult**, **Exa**, **CSA**, and **Sau**, to refer respectively to the major areas¹ of CAPES, Human Sciences, Multidisciplinary, Exact and Earth Sciences, Applied Social Sciences, and Health Sciences.

d) **Analysis:** the theses were subjected to a thorough reading guided by the research question. The excerpts related to the Circulation of Ideas category were extracted. Subsequently, these excerpts were interpreted in the light of the framework under study by means of descriptive-interpretive analysis, which made it possible to characterize the understandings and meanings attributed, as presented in the following section.

THE FLECKIAN REFERENTIAL: encounters and disagreements in academic productions

Approach to the category circulation of ideas and practices

Here we intend to indicate how researchers who make up the Brazilian group of scholars and disseminators of Fleckian epistemology have appropriated and

used the category "circulation of ideas and practices", demonstrating the possible meanings attributed to it, without pretending to exhaust the subject.

We would point out that among the theses analyzed, there is an alignment regarding the concept of the structure of a collective of thought. There is a consensus that the esoteric circle is made up of specialists in a particular field of knowledge, who deal directly with the production of knowledge. The exoteric circle is made up of laypeople who have been trained/instructed in the knowledge investigated by the esoteric circle.

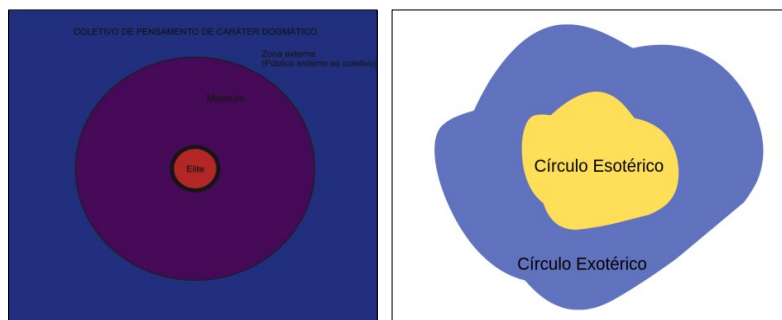
Fleck (2010) points out that regardless of the objective-formal organization of a stable collective, some characteristics are structural and therefore common to all stable thought collectives: a small esoteric circle and several overlapping exoteric circles. This conception has been expressed in the works of Brazilian scholars who have dedicated themselves to deepening and disseminating Fleckian epistemology, such as Gonçalves *et. al.* (2007). These authors add that belonging to an esoteric or exoteric circle is a relative question. For example, a group of Geography teachers may constitute an esoteric circle when the object of knowledge is the pedagogical knowledge of the culture of the humanities, and a group of Physics teachers may constitute an esoteric circle when the object of knowledge is the pedagogical knowledge of the culture of scientificity. However, one group of teachers becomes exoteric in relation to the other. Queirós (2012) also points out that the relationship between these circles does not always occur between groups from different specialties:

We can have exoteric circles formed by lay people, an example would be high school students (exoteric circle of laypeople) interacting with high school physics teachers (exoteric in relation to a group of nuclear physics researchers) (Queirós, 2012, page 84).

We present some representations used to characterize the structure of a thought collective (Figure 1 and 2). The first representation, T24Mult, emphasizes that the esoteric circle (elite) (Fleck, 2010) is much smaller than the exoteric circle (masses) (Fleck, 2010), since it is made up of a select group of specialists. T28Mult justifies the proposed model based on the idea that a collective of thought, due to its heterogeneity and the fact that it suffers deformations from internal and external pressures, can hardly be represented by a symmetrical shape such as a circle.

Figure 1 and 2

Proposals for representing a collective of thought.



Source: T24Mult and T28Mult.

Next, the category "circulation of ideas and practices" was not mentioned in four papers: T11Mult, T12Mult, T18Hum, and T23Hum. In the others, it either appeared as a category of analysis or was mentioned only as an element of the theory of knowledge proposed by Fleck. In works such as T6Hum, T7Hum, T9Hum, T10Hum, T17Hum, T21Mult, T25Sau, and T27Hum, there was a recurrence of a generalized exposition of the intra- and inter-collective circulation of ideas and practices, with no in-depth discussion. We found that of the thirty-three theses, the majority highlighted the importance of a historical characterization of the object of analysis, the constitution of the collective of thought and its circles (esoteric and exoteric), to only then presuppose the existence of intra and/or inter-collective circulation. That way we do not lose sight of the fact that a generic analysis is a simplification, as it leaves the characterization of the thought collectives under investigation in the background.

Regarding the characterization of the category "circulation of ideas and practices", the works were unique in highlighting it as a means by which knowledge circulates within and between thought collectives. Some papers used the term "circulation" to refer to the category, as in the Spanish version (Fleck, 1986), while others used the term "traffic", as in the Portuguese version (Fleck, 2010). We adopted the term circulation and kept the term traffic when the works cited did so.

Next, we will mention how the intra-collective and inter-collective circulation of ideas has been approached by works that have delved into the study and characterization of these categories. We emphasize that our object of analysis was textual records and that the receiver does not always capture the message in the way the sender wants it to be understood (Fleck, 2010). We emphasize that the analyses are built on our interpretations and, as the category was often presented briefly, these may be simplifications.

In addition, it should be considered that for Martins (2020) Fleck's work has the character of an "open work", due to the way in which the categories style of thought and active and passive connections are presented, as well as the role of education in the constitution of thought collectives and the political stance in the work. This open-ended nature of the work allows scholars of Fleckian epistemology

to broaden their discussions of Fleck's categories. This broadening, in turn, can provoke the divergences already highlighted by Souza and Martins (2021).

Intra- and inter-collective circulation of ideas

Fleck (2010) emphasizes that the intra-collective circulation of ideas presupposes communication with specific and technical terms, with rigor between the practices developed. It therefore takes place between specialists, i.e., between members of the esoteric circle of the same thought collective. These members share a common atmosphere, a feeling of solidarity and intellectual dependence. Thus, the intra-collective circulation of ideas encourages the strengthening of the style of thought, exerting coercion on the members.

The inter-collective circulation of ideas is that which occurs between members of two or more thought collectives and between members of the esoteric and exoteric circles of the same thought collective and its nuances. Its characteristic is the dissemination of knowledge to laypeople/trained laypeople, which can lead to transformations and changes in the style of thought when the style of thought to be transformed is faced with the **solution to a complication**.

Among the different works, we observed the adoption of the general rules of the circulation of ideas discussed by Fleck (2010) to support the characteristics of the intra-collective and inter-collective circulation of ideas. However, we noticed among the works that the use of these categories is agglutinated around two interpretations: **one group (Group I)**, which addresses the intra-collective circulation of ideas within the collective of thought in its different dimensions, that is, between the esoteric circle and the exoteric circle. And the inter-collective circulation of ideas between members of two or more thought collectives (nuanced or with compatibility of ideas), as highlighted in the excerpts below:

Fleck conceives of the existence of a traffic of ideas within a thought collective and between different thought collectives. In the first case, the traffic is called intra-collective and in the second, inter-collective. **Intra-collective traffic in ideas tends to strengthen a collective's style of thinking. It can happen, for example, between esoteric and exoteric circles. (...)** Intra-collective traffic of ideas is a defining characteristic of esoteric and exoteric circles. It reinforces and sustains the cohesiveness of a collective's style of thought. On the one hand, it enables dialog and the exchange of ideas between those who articulate evolutionary thought, for example, in the esoteric circle. And, on the other hand, it **promotes the dissemination of evolutionary knowledge, produced in the esoteric circle, to the exoteric circle**, whether through the teaching of evolution in schools or through works of scientific dissemination. (T9Hum - emphasis added)

The traffic of ideas that takes place within the esoteric circle has the role of reinforcing the specificities that identify and characterize the respective thought collective. This circulation of ideas occurs in such a way that the terms used have very specific definitions within a given collective of thought and are shared and understood in a consensual way by its members. **The intra-collective circulation of ideas from the esoteric circle to the exoteric circle mainly aims to legitimize the processes and knowledge produced by specialists.** (T15Mult - emphasis added).

In these two excerpts, we highlight two aspects that we have raised for reflection: collective and intra-collective circulation of ideas. The work T9Hum explains that intra-collective traffic strengthens the thinking style of a "collective".

At this point, the work points out that the use of the term "collective" refers to a group of people in which there can be both distinct thought collectives and shades of a thought style or more than one thought style, since "collective" does not have the same meaning as a thought collective. By assuming that a collective of people, aggregated by some affinity, would be the same as a collective of thought that shares ideas, knowledge and practices, the work presents a simplification. For in a collective of people there may be present several collectives of thought and these people may be located in different gradations of the respective exoteric circles. Thus, it is not just any interaction within these groupings/collectives (confused as a collective of thought) that characterizes a circulation of ideas in the Fleckian sense.

T15Mult points out that the means of legitimizing the knowledge produced by experts (esoteric circle) for the lay public (exoteric circle) is the inter-collective circulation of ideas. However, based on the general rules of the circulation of ideas (Fleck, 2010), we understand that the circulation that legitimizes, albeit with a certain simplification, the style of thought created by the esoteric circle and conveyed to the exoteric circle is called the inter-collective circulation of ideas. It is true that the legitimization of the style of thought can occur through the intra-collective circulation of ideas, for example, through the science of periodicals. However, because it comes from the intra-collective circulation of ideas, it will occur among the members of the esoteric circle. In addition, T15Mult has a unidirectional interpretation that the knowledge produced by experts (esoteric circle) is legitimized by the exoteric circle, but for Fleck this relationship between the esoteric and exoteric circles is dialectical:

We begin our description of these circles with popular science. Given that popular science supplies most of the areas of knowledge of every person, and that even the most meticulous professional owes it many concepts, many comparisons and their general points of view, it represents a generic impact factor of any knowledge and must be considered as an epistemological problem. When an economist speaks of an economic organism, or a philosopher of substance, or a biologist of the state of cells, they all use concepts from the popular repertoire of knowledge in their own specialty. It is around these concepts that they build their specialized sciences and, later on, we will have the opportunity to permanently observe, in the depths of these sciences, elements of popular knowledge from other areas. These elements have often been decisive for the content of specialized knowledge, predetermining its development for decades (Fleck, p. 165).

Thus, in addition to the scientific knowledge produced in the esoteric circle being legitimized by the components of the exoteric circle (popular knowledge), for Fleck the circulation of ideas between esoteric circles (specialists) and exoteric circles (for example, members of popular knowledge) interact with each other in a dialectical way, while one (specialists) can carry elements of the other (members of popular knowledge). Other fragments that apparently represent a shift in meanings are found in works T16Mult and T24Mult:

Communication between members of a PC and between collectives was also studied by Fleck, who identified intra-collective circulation as the sharing of ideas within a PC, and inter-collective circulation as that which occurs outside it. Intra-collective circulation **contributes to the insertion of the individual into the PC** and in the formation of peers because it is the vehicle for transmitting the knowledge and practices of the PC, while inter-collective circulation acts to extend the PC, in other words, its dissemination and popularization to different groups that do not share the ideas, which is the most important epistemological significance of the processes of circulation of ideas. (T16Mult - emphasis added)

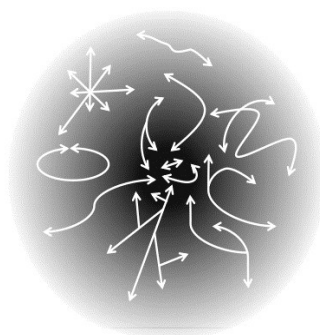
Intra-collective circulation can occur in several ways, the first of which is **through education**, or the didactic introduction of a newcomer to the thought collective. It acts as a kind of blessing of initiation... Thus, the intra-collective circulation of knowledge, whether through education, the exchange of ideas between specialists or through the **interdependent relationship between esoteric and exoteric circles**, has the role of strengthening the knowledge produced by the style of thought. (T24Mult - emphasis added)

By stating that the intra-collective circulation of ideas contributes to the individual's insertion into the collective of thought, the works disregard an essential premise for understanding the circulation of ideas category: there are distinctions in the effectiveness of intra- and inter-collective circulation. The production of (new) knowledge takes place within the esoteric circle of the thought collective, in which the intra-collective circulation of ideas takes place, which has, among other things, the potential to establish a style of thought, as well as the exchange of ideas between people with similar understandings of the thought collective's object of knowledge. Educational processes, in which an initiated person acquires new knowledge, as a rule, occur through the intercollective circulation of ideas, mediated by a complication. Through this process, the student can come to have new knowledge and can transform the style of thinking that underpins their initial ideas. Based on Fleck (2010), we can say that learning does not occur effectively when the concepts taught by the teacher are anchored in a style of thinking that is incompatible with the student's style of thinking. Hence the need for problematization, so that students become aware of the limitations of their knowledge in order to solve the problem in question.

We would like to point out two representations present in the works analyzed that help us understand how the authors belonging to group I perceive the intra (Figure 3) and intra and inter-collective circulation of ideas (Figure 4). They were taken respectively from works T15Mult and T22Hum.

Figure 3

Scheme for the intra-collective circulation of ideas.



Source: T15Mult

The paper T15Mult discusses the interaction between basic education teachers (Brazilians) and scientists (from CERN in Geneva) in a continuing education course called the CERN School of Physics. It uses figure 3 to illustrate the different layers that make up a particle physics thought collective. The exoteric

circles (lighter regions occupied by teachers), and the esoteric circle (darker core, occupied by researchers). Regarding the composition of the esoteric circle, we point out that as the thought collective is about particle physics, only particle physics researchers can make up the esoteric circle. In order to presuppose the participation of researchers from other fields of physics in this esoteric circle, a more detailed investigation into their conceptions and practices would be necessary.

With regard to interactions between members, the following stand out:

As they belong to the same collective of thought, the interaction between teachers (exoteric circle) and researchers (esoteric circle) within the CERN School of Physics occurs via the intra-collective circulation of ideas. [...] We would point out that the intra-collective circulation of ideas can also occur internally within the esoteric circle (between researchers) and can be referred to as intra-esoteric traffic (OLIVEIRA, 2012). [...] In addition, it is also possible for ideas to circulate between teachers (intra-exoteric traffic) about this scientific knowledge. This discussion will be presented later, with the knowledge that Fleck did not go into much detail about this circulation of ideas, as Oliveira (2012, p. 128) points out. [...] The lines with double arrows in the figure represent the intra-collective circulation of ideas, which can be intra-eso, intra-exo and between eso and exoteric circles. (...) we will use the term **intra-collective circulation of ideas to refer to the interaction between different circles of the same thought collective (i.e., exo-eso, between teachers and researchers)**. Intra-esoteric and intra-exoteric traffic will be used to refer to interactions between peers in the same circle. (T15Mult - emphasis added)

As a result, the arrows illustrate the intra-collective interactions that take place between members located at the center of the thought collective (specialists) and at its different levels; between specialists and members closer to or further away from their point. It should be noted that when talking about the interaction between teachers (exoteric circle) and researchers (esoteric circle), the paper refers to the intra-collective circulation of ideas. However, is it possible to assume that they consistently share the same knowledge, beliefs, and practices about particle physics? Does communication between them occur without the need to simplify the specific, technical, and scientific terms of particle physics? Both groups (basic education teachers and CERN researchers) may have had the same initial training (a degree in physics), but their academic and professional trajectories indicate that they followed different paths. Consequently, their knowledge of the subject may have been acquired differently, since the problems they faced required solutions that mobilized different fields of physics. It should be added that some do research in Physics and train more researchers (often using the intra-collective circulation of ideas), while others teach Physics through the inter-collective circulation of ideas. Therefore, the dialog between basic education teachers and CERN researchers mostly takes place through problems with different knowledge, which is characteristic of an inter-collective circulation of ideas.

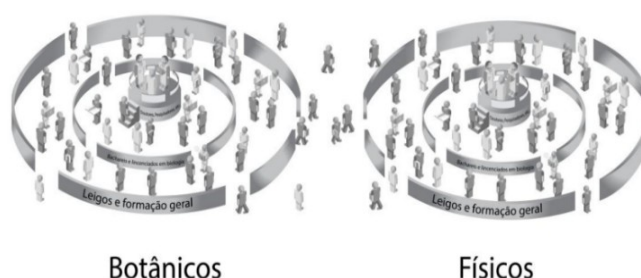
Still on Figure 3, the shape of the arrows allows us to infer that these communications are not direct and simple, but change along the way, indicating modifications and shifts in meaning. Although there seems to be an inappropriateness between what the work characterizes as intra-self and intra-self circulation (terms absent from Fleck's analysis - see item Displacements of meanings, discussion in this article) in the collective of thought analyzed, he is assertive in highlighting that communications occur with deviations, caused by the meaning that each individual attributes to the message communicated. The meaning, in this case, is mediated by the experiences, formative paths, and groups

with which they have interacted. As Fleck (2010, page 161) rightly points out, "the word as such represents a peculiar inter-collective asset: since all words are given a nuance more or less marked by the style of thought, which changes in the inter-collective migration, they always circulate among collectives with a certain alteration".

The work T22Hum represents, in Figure 4, the intra- and inter-collective circulation of ideas between two collectives of thought in the field of natural sciences: botanists and physicists. Within each thinking group there are different circles, whose participants have different levels of knowledge.

Figure 4

Scheme for the intra- and inter-collective circulation of ideas.



Source: T22Hum

In the case of the botanical thinking collective, at the far end there are laypeople and people with a general education, then bachelors and graduates in Biology, and in the middle there are doctors and researchers in Biology. However, a weakness to be pointed out is that the scheme constructed leads to the understanding that all doctors and researchers in Biology will share the same style of thinking about Botany and, given the specificities of the different areas of Biology, it is not possible to say that this will happen. In particular, the practices of Botany researchers are not the same as those in other areas of Biology, such as Human Anatomy. For better elucidation and to avoid shifting meanings, it would be appropriate to highlight doctors and researchers with specific studies in Botany in a generic schema of the Botany thought collective, which belongs to the esoteric circle. When explaining the circulation of ideas between the different circles (esoteric and exoteric), the paper argues, based on the "intra-collective traffic of thought" that:

(...) The most faithful followers of the ideas of specialized knowledge, as a rule, find themselves on the periphery of the esoteric circle, having no direct contact with the components of the core of this circle. The relationship between the two is mediated by some instruments of intra-collective communication, which promote the so-called intra-collective traffic of thought. (...) From this intra-collective circulation arises a dependency between the initiates (esoteric circle) and public opinion (exoteric circle), so that if the components of the exoteric have a stronger relationship, this character takes on a democratic bias and the development of new ideas occurs. (...) intra-collective traffic also takes place between individuals who are at the same intersection of the collective, so that they have the same mental level at the service of a super-personal idea, which causes individuals to be intellectually dependent on each other, through the use of a common

attitude and certain specific, technical terms, which dominate all communication of thought within the collective. (T22Hum - emphasis added)

Figure 4 also shows the inter-collective circulation of ideas between the collective of botanists and physicists. This circulation occurs because of the proximity between them, because of the individuals who act as conduits and because of the different sources of dissemination of knowledge and practices. For example, manuals, periodicals, lectures and congresses:

With regard to inter-collective traffic, it can be seen that what stands out in this case are the common traits between the collectives, so that the greater the difference between styles of thought, the less the inter-collective traffic of ideas (...) generally, the inter-collective traffic of ideas generates a transformation of the values of thought, that is, it promotes an exchange of style of thought (...) By belonging to different thought collectives, the individual contributes to this inter-collective traffic of ideas. By belonging to different thought collectives, the individual contributes to this inter-collective traffic of ideas. (...) In summary, then, it can be said that intra- and inter-collective traffic never occurs without transformation and without a reshaping according to the style of thought, which intra-collectively translates into reinforcement and inter-collectively into a fundamental exchange of communicated thought. (T23Hum)

The structure of modern society means that thought collectives intersect and one individual participates in several thought collectives. Fleck (2010) explains that the individual who acts as a vehicle for the inter-collective circulation of thought holds within him or herself various contradictory elements of thought. However, these elements do not cause psychological conflicts, as they are internally separated from each other. In short, "the uniformity of thought according to a style, as a social phenomenon, is much stronger than the logical structure of thought in the individual" (Fleck, 2010, p. 162).

The **second group (Group II)** explains that in a thought collective, the intra-collective circulation of ideas takes place between members of the esoteric circle, since they share ideas and practices at a certain level of cohesion. The inter-collective circulation of ideas is that which occurs between members of two or more thought collectives and between members of the esoteric and exoteric circles of the same thought collective. The members of the exoteric circle, although part of the collective of thought, have limited participation in the formation of new knowledge, thus depending on their trust in the initiates. In line with this understanding, we can cite the work of Gonçalves and Marques (2012), who use the dynamics of the circulation of ideas to interpret the interaction within the esoteric circle and **between** it and the exoteric circle.

The excerpts below illustrate how the category is taken up by researchers in their investigations:

While intra-collective circulations favor the strengthening of thought formations, inter-collective exchanges enable cohesion between the esoteric circle of the collective thought style and its exoteric circles. (T14Exa)

Intra-collective circulation occurs within the esoteric circle, the same collective of thought, in other words, between peers, and it is from this communication/circulation that a fact emerges that can give rise to a style of thought. In other words, in Fleck's (2010) view, intra-collective communication takes place within the esoteric circle, i.e., within a certain collective of thought, and takes place between specialists of the same style of thought. Intercollective circulation, on the other hand, becomes responsible for "the

dissemination, popularization and vulgarization of the style(s) of thought to other collectives of non-specialists". (...) In this study, mainly the self-described "green chemists" (forerunners of QoL) **constitute the collective of specialists (esoteric circle), since the intra-collective circulation of QoL thought and practices takes place within them. On the other hand, the members of the community of chemists, made up of chemical collectives that do not yet work with the QoL perspective, are situated in the exoteric circle, while the circulation with the QoL chemical specialist collectives would be of an inter-collective nature.** (T5Mult - emphasis added)

In these works, we see an alignment in emphasizing that the interaction between esoteric and exoteric circles, through the inter-collective circulation of ideas, fosters the extension of the style of thought. For Fleck (2010), the development of a style of thought can take place in three ways: a) instauration: a confused and disorganized stage in which concepts are being formed and there is no consensus established among the group. The directed perception that guides seeing and feeling is still being formed; b) extension: the system of ideas, now stylized, allows the subject to adapt to consolidated knowledge, provoking acceptance and strengthening the style of thought (harmony of illusions) or problematizing it (complication); c) transformation: complications lead the subject to perceive a limitation of the style of thought in force for solving a certain problem or question. Therefore, through the inter-collective circulation of ideas and practices, they seek new knowledge. We can also mention the excerpt from work T26Hum:

Intra-collective Circulation of Ideas - **This is the communication that takes place within the Esoteric Center** and is responsible for the formation of pairs who will share the same Style of Thought, which will be maintained through the use of coercive processes by the collective... *Intercollective Circulation of Ideas* - This is the interaction that takes place between different Styles of Thought and different collectives, by introducing new ideas from one collective to another, through the **dissemination of the Style of Thought produced by the Esoteric Circle to the Exoteric Circle**. For this reason, it is difficult to systematize, due to its complexity and heterogeneity. (T26Hum - emphasis added)

From the fragments of the T5Mult work, we can see characteristics of an inter-collective circulation of ideas between shades of the same style of thinking, in which the members are specialists in Green Chemistry and chemists who don't work with Green Chemistry, but have an affinity with the area of training. In T26Hum, it is possible to transpose the considerations to the sphere of communication between members who share incongruous thinking styles. In the latter case, interaction is interrupted because the greater the distance between the thinking styles, the less ideas circulate between them (Fleck, 2010). In order to better illustrate the conceptions of the Group II researchers, we turn to the scheme presented by T5Mult (Figure 5).

Figure 5

Scheme for the circulation of ideas (intra and inter-collective)



Source: T5Mult

When we move on to a synthesis of the aspects presented, we realize that the works grouped together in Group I and II, although they have divergent conceptions of the circulation of ideas and practices, rely on similar arguments (in many respects) to defend their approaches. For example, both cite that the intra-collective circulation of ideas is associated with a feeling of trust and dependence and aims to strengthen thinking styles. In addition, the inter-collective circulation of ideas allows for dialog between members of different thought collectives, as long as they are congruent; it can bring about change and transformation of thought style; dissemination of knowledge and, consequently, a simplification of the knowledge conveyed. Slongo (2004), when discussing intercollective communication, points out that it implies a retranslation of the scientific fact, which leads to a new mental content. It is in this regard that the inter-collective circulation of ideas offers the possibility of transforming thinking styles.

We note the divergent understanding of the papers in Group I, which point out that the intra-collective circulation of ideas is responsible for disseminating knowledge from the esoteric circle to the exoteric circle. Similarly, the papers in Group II argue that this is one of the purposes of the inter-collective circulation of ideas. Furthermore, none of the groups mentioned the dialectic that exists between esoteric and exoteric circles. We consider it important to point out that Fleck's (2010) work underlies the dialectical relationship between esoteric and exoteric circles, overcoming the rigid idea of dependence or power of one over the other. As an example of this dialectical structure, we can highlight the fact that specialized science is not constituted in a singular way but compared to popular science. There is a retroactive effect between the two sciences: "Popular knowledge forms the specific public opinion and worldview, thus having a retroactive effect on the specialist" (Fleck, 2010, page 166).

Next, the works analyzed, when exemplifying the occurrence of the circulation of ideas, mention participation in scientific events and the publication of journals and cite articles from the magazines "Química Nova na Escola" and "Química Nova"; the materialization of experiences through the writing of scientific articles; cultural activities; training courses; lectures and short courses:

The **publication of papers in events and journals** related to the program² is a possibility for the intra- and inter-collective circulation of ideas, as already pointed out. However, the quality of the work needs more attention so as not to disseminate in the literature possible understandings that "anything goes" in the program, because its importance does not lie in the high number of publications, but in their quality, and also in their contributions to the area of teaching and teacher training. (Emphasis added - T2Mult)

The analysis made it possible to present and argue that, over the period investigated, different characteristics guided academic production in QL (Green Chemistry). (...) **The circulation of ideas**, provided by the selected proposals, **can favor the process of teacher training**, influencing teaching performance in the classroom. After all, it is possible to consider that the readers of these productions can constitute different thought collectives, influenced by different styles of thought, while **reading the publications can help to establish, extend and even transform their EPs**. (emphasis added - T5Mult)

Delizoicov (2019), when dealing with the production and dissemination of knowledge, discusses the types of scientific texts and their relationship with the intra- and inter-collective circulation of ideas and practices. He points out that texts written for peers in a particular specialty are formal, rigorous with technical and scientific terms, and are aimed at members of the esoteric circle. They therefore contribute to both the establishment and extension of the style of thought. Texts aimed at the exoteric circle, on the other hand, have the characteristic of presenting knowledge through simplified language and, in general, omitting details. This is because they are conveyed to non-specialists or even laypeople.

Gonçalves and Marques (2012) analyzed the circulation of ideas on the subject of experimentation through publications in the field of chemistry teaching. The authors note that journals such as "Química Nova na Escola" and "Química Nova" contribute to both the intra- and inter-collective circulation of ideas. However, the former is primarily aimed at teachers and researchers, and those who are new to or interested in the area. That is why it needs to be careful with its textual production, so that it is not in too erudite a language. "Química Nova", on the other hand, is mainly aimed at chemistry researchers and higher education teachers. However, the authors have found through previous studies that the articles published in the journal are predominantly centered on the intra-collective circulation of ideas. Thus, higher education chemistry teachers have produced proposals for experimental activities and disseminated them to chemistry teachers working at the same level of education.

SHIFTING OF MEANINGS: discussion

As a result of the previous descriptions, we would like to point out that Fleck's work does not impose a conceptualization with the category "inter- and intra-collective circulation of ideas and practices". His interpretation becomes more flexible, as he presents "general rules" and not closed concepts.

The presence of different approaches among the Brazilian group studying Fleck is typical of the circulation of ideas and practices, which in their flow create modifications, simplifications, and deviations of meaning. This movement does not go unnoticed by Fleck (2010), as already discussed. Let us add that his theory is used by researchers from different areas, whose object of analysis is very peculiar, and the collectives of thought investigated (when they are) have varied

characteristics. This encourages researchers to come up with new terms that are not explored by all areas, such as intra-esoteric and extra-esoteric circulation, as mentioned in the T15Mult paper. Thus, we emphasize two aspects that emerge in the works analyzed and that present themselves as possible shifts in meaning:

1) **Collective of thought and collective as a group of people are used interchangeably:** it should be noted that the former is a category of Fleckian epistemology, and its attribution to a group needs theoretical and empirical investigation. Furthermore, an individual can belong to one or more collectives of thought that can be congruent or incongruent, shades or not of the same style of thought. On the other hand, a group of people corresponds to a collective that does not necessarily correspond to a single collective of thought.

2) **Transformations of thinking styles through inter-collective circulation, without considering the complications:** inter-collective circulation, in certain situations, can promote the deviation and/or displacement of meanings. On the other hand, in isolation, it does not promote the transformation of thinking styles. We need to consider another factor explored by Fleck: complications. Let us point out that the shifts in meaning caused by the inter-collective circulation of ideas contribute to adapting the use of ideas, concepts, and practices originating from a certain style of thinking and adapted by the style of thinking that has not yet solved the complication. When it does, the style of thinking is transformed and incorporates elements from the style of thinking with which it promoted the circulation of ideas, knowledge, and practices, in order to adapt them to the solution of the complication.

FINAL CONSIDERATIONS

In this article we set out to investigate the appropriation of the category "circulation of ideas and practices" by Brazilian researchers and, consequently, to identify possible shifts in meaning in the use of this category. At first, we pointed out that the appropriation of Fleck's theory by the Brazilian group occurred/occurs via inter-collective circulation, one of the characteristics of which is the alteration of values, from small nuanced changes to the annihilation of meaning (Fleck, 2010). We infer that the thought collective of researchers who study Fleck is going through a process of extension, since our data, when contrasted with that of Lorenzetti *et. al.* (2018), indicates its recent approach by new postgraduate programs. In the process of extension, the subjects are still adapting to consolidated knowledge. In short, we can say that there is a consolidated collective of thought about Fleckian thought and, possibly, a collective of thought in formation, resulting from the different understandings and uses of Fleckian categories.

Next, we noticed two central understandings that bring together ideas tangential to the category under analysis, which we call Group I and Group II. Although there is consensus that knowledge is produced within the esoteric circle, there are differences between the groups in the way they understand intra- and inter-collective circulation. For the first group, since the thought collective has an esoteric circle and numerous exoteric circles as its structure, all the circulation of ideas between these circles is seen as intra-collective circulation of ideas, i.e.,

circulation within the thought collective. Intercollective circulation is the circulation of ideas that occurs between two or more thought collectives, or different shades of thought style, whose shared knowledge is different from each other. However, this interpretation misses the point that the intra-collective circulation of ideas occurs between individuals who share the same understanding of the objects of knowledge that the esoteric circle is challenged to know and is dominated by a feeling of dependence. The members of the exoteric circles do not participate directly in the production of knowledge, and there is a relationship of trust between them and the esoteric circle. It should be noted that interaction between people does not necessarily characterize a circulation of ideas in the Fleckian sense. Fleckian circulation presupposes the existence of thought collectives which, in turn, are not reduced to groups of people.

The second group, on the other hand, understands that the intra-collective circulation of ideas occurs between members of the esoteric circle, since they use and understand terminology, techniques, and practices specific to the field of knowledge. It is responsible for the establishment and extension (among specialists) of a new style of thought. In turn, the inter-collective circulation of ideas occurs through the interaction of the esoteric circle with its various exoteric circles, and between two or more thought collectives and their nuances. The characteristic of the inter-collective circulation of ideas is therefore the dissemination of the style of thought, as well as the dialog between individuals in order to deal with common situations and is therefore a key element in changing the style of thought. It should be remembered that the inter-collective circulation of ideas carries with it shifts or changes in values, because when knowledge is disseminated, the individual who receives it makes personal associations and interpretations. In addition, the change in thinking style is effected by two factors: awareness of a complication and the inter-collective circulation of ideas, since the simple transmission of ideas and knowledge is not enough for the individual/collective to mobilize themselves to migrate their thinking style. They need to be aware of the limitations of their current thinking style in order to solve the problem.

With regard to the similarities between the works linked to Group I and Group II, we can mention the references adopted to discuss Fleckian epistemology. If on the one hand this indicates similarities, on the other it reinforces the idea that references are used to strengthen each researcher's way of seeing and feeling. Lorenzetti *et al.* (2018) affirm the importance of looking at the references, as they explain the sharing of theoretical and methodological elements. Earlier, Slongo and Delizoicov (2006), when identifying and characterizing thought collectives in biology teaching, in the period between 1972 and 2000, paid attention to the references used by the group investigated. This is one of the elements the authors address in order to infer the existence of nuclei that share theoretical assumptions and investigative practices and to visualize the transition process of biology teaching thought collectives.

In light of the considerations presented above, we share the view that the characterization of a collective of thought does not happen in an isolated moment, because it is a historical construct and its establishment and, consequently, extension, through its esoteric and exoteric circles, are embedded in dynamic and

complex processes. We also noticed that the papers did not go into the dialectic between the esoteric and exoteric circles.

It is also worth emphasizing the shifts in meaning that arise from the inter-collective circulation of ideas. In the previous section, we pointed out two displacements that emerged from the works: the indistinct use of collective of thought and collective; and considering that the transformations of the style of thought occur unrelated to the presence of complications. The result of this investigation leads us to consider the possibility of a new shift: that the circulation of ideas between esoteric and exoteric circles of the same thought collective is of the intra-collective circulation type. It can also be understood that this process is due to the character of an open work attributed to Fleck's main work in the field of epistemology, "Genesis and Development of a Scientific Fact". With the growing use of this work in research in the most diverse areas of knowledge, there is also a broadening of the discussions originally made.

Finally, we believe that in order to be more aligned with Fleckian epistemology, we need to be careful when using the categories "thought collectives" and "intra- and inter-collective circulation of ideas and practices". The dissemination of works that use them inappropriately contributes to misinterpretations and epistemological distancing between researchers. In the meantime, it would be useful for new research to study these and other Fleckian categories. In addition, further research is needed over time to identify whether these shifts will lead to the emergence of a new collective of thought, whose object of study is Fleck's own work.

Far from exhausting the subject proposed here, we end this article with new questions: given that Fleckian epistemology is the protagonist of research in different areas of knowledge (Human Sciences, Exact and Earth Sciences, Health Sciences), is there a consensus within each area on how to interpret the category "circulation of ideas and practices"? Are there shifts in meaning in the way Brazilian researchers interpret the other Fleckian categories? Is there a collective of thought, nuances, or incongruent collectives of thought, in relation to how Fleckian epistemology is interpreted in the Brazilian context?

NOTES

1. We think it is important to point out that the works were allocated according to the major areas whose postgraduate programs are classified by CAPES. This does not mean that the content of the thesis or dissertation is classified in the same way. For example, a work classified in the Multidisciplinary major area does not indicate that the research object of the Thesis or Dissertation produced has multidisciplinary characteristics. In general, it is restricted to a specific field, such as Mathematics Teaching, Physics Teaching, or Chemistry Teaching.
2. The author is referring to the Institutional Program for Teaching Initiation Scholarships.

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