MODELS OF CRITICAL THINKING:
ANALYSIS, CLASSIFICATION, AND PHILOSOPHICAL FOUNDATIONS

Análisis, clasificación y fundamentos filosóficos de los modelos de pensamiento crítico

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Abstract

Today, there are many conceptualizations on critical thinking, and most of them focus on cognitive skills, problem solving, decision-making and action, while others integrate all these aspects. In view of these multiple conceptualizations, a need to classify models arises to better understand their approaches and the scope of the constituent elements that compose the supporting philosophical currents, so teachers know what each of these models contributes to their classroom practices. Objective: To identify the constituent elements of the conceptual foundations of critical thinking for classification into models according to their purposes. Methodology: A conceptual analysis, based on analytical philosophy, was used to review the main theoretical concepts of 44 theorists. Analysis matrices were designed with 12 constituents that aided in evidencing the elements of each model and determining which philosophical currents supported them. Results: Four models were identified: the logical-rational model, the cognitive-emotive model, the cognitive-scientist model, and the sociopragmatic model. These models show the influence of great philosophers' contributions that, based on their epistemic content, have linked criticality as a main element in the construction of knowledge. Conclusions: These models will help teachers train critical thinkers to question and transform their social environment in the classroom.

Keywords

Critical thinking, rationality, cognition, pragmatism, science, philosophy.

Resumen

Actualmente abundan conceptualizaciones sobre pensamiento crítico. Gran parte de estas se enfocan en habilidades cognitivas, otras en resolución de problemas; algunas más, en toma de decisiones y acción; y otras, que integran todos los elementos nombrados. Ante la proliferación de concepciones surge la necesidad de hacer una clasificación de estos modelos en aras de comprender mejor sus enfoques y, en especial, la incidencia de las corrientes filosóficas en los elementos constituyentes que los sustentan para que los maestros tengan claridad sobre qué aporta cada uno de ellos en sus prácticas de aula. Objetivo: identificar elementos constituyentes de los fundamentos conceptuales sobre pensamiento crítico para clasificarlos en modelos según sus finalidades. Metodología: análisis conceptual, realizado desde la filosofía analítica para revisar los conceptos esenciales expuestos por 44 autores en sus teorías. Se diseñaron matrices de análisis con 12 constituyentes que permitieron evidenciar los elementos de cada modelo y determinar qué corrientes filosóficas los fundamentan. Resultados: se evidenciaron cuatro modelos: lógico-racional, cognitivo-emotivo, cognitivo-cientificista y sociopragmático, en los cuales han incidido los aportes de grandes filósofos, quienes en su interés epistémico han vinculado la criticidad y la racionalidad como elementos esenciales en la construcción del conocimiento. Conclusiones: estos modelos aportarán claridad a los docentes, quienes pretenden con su trabajo en el aula formar pensadores críticos que cuestionen y transformen su entorno social.

Palabras clave

Pensamiento crítico, racionalidad, cognición, pragmatismo, ciencia, filosofía.

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Introduction

Education has been a phenomenon that has demanded from its surrounding theories (pedagogy, didactics, philosophy of education, cognitive sciences, etc.) contributions that allow to form a humanity capable of responding to the demands of its time due to its dizzying changes. As Ador-

no (1998) showed, the ravages of the world wars made education theorists speculate on the need to train thinkers to reflect, problematize and act critically in their diverse environments (school, scientific and social).

Accordingly, UNESCO (2009) also calls for the teaching of philosophy to be oriented towards strengthening criticality. However, as mentioned by Rodríguez (2018) and Hernández (2019), in recent years there has been discourses about the concept of 'critical thinking'. These concepts have led to a lack of understanding of it, as well as a reduction of critical thinking and its complexity by measuring only a few elements of it from psychological tests that account for some skills of scientific thinking. Thus, this would not only be problematic at the theoretical level, since it would lose meaning and value when used indiscriminately, but also at the practical level, since there are no clear definitions or characterizations of what critical thinking is, there would be a discordance or gap between the pedagogical discourse and the teaching practices of teachers (Shulman, 2005).

In line with the above, the position supported here is that, to a large extent, this misunderstanding is due to the little knowledge that certain teachers and theorists have of the philosophical foundation of this concept, as well as the development that has had throughout the history of philosophy. Therefore, the objective of this study was to identify the constituent elements of the conceptual foundations on critical thinking to classify them in models according to their purposes, to understand the essential elements underlying each model and the foundations that philosophy has made to them to evidence the convergences that occur among some theorists for affinity with philosophical-based guidelines that have adopted in their speeches.

To achieve this goal, the selected methodology consisted of a conceptual analysis, from the analytical philosophy. First, the central concepts exposed by 44 theorists in each of their theories were reviewed, as well the meanings and uses assigned to them; subsequently, matrices of analysis with 12 constituents were designed that allowed to evidence, in addition to the elements of each model, the convergences existing between theories and, with it, determine which philosophical currents founded them.

In response to this call to clarify concepts demanded by analytical philosophy, especially as proposed by Wittgenstein (2009a; 2009b), a metatatheoretical analysis of the systematization and conceptual developments that have been made around the term 'critical thinking' is carried out in this text.

In this sense, initially, a brief theoretical framework is presented, which shows the general philosophical guidelines that have served as the

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basis for the different theoretical perspectives on critical thinking. In the second moment, the methodology used for the analysis is presented in detail. The third section presents the results of the analysis and classification of the four models found. Subsequently, the discussion and the philosophical analysis to each model are presented, especially, the contributions of Socrates, Plato, Aristotle, Stoics, Nāgārjuna, Śaṅkara, Sexto Empírico,, Descartes, Locke, Hume, Kant (with a special emphasis on him), Hegel, Adorno, Horkeimer, Habermas, Marx, Dewey (another great mention), circle of Vienna, Frege, Russell, Wittgenstein, Davidson, Popper, Kuhn, Searle, among others, are supported as essential, since these are the ones that allow to understand in what is thought, criticality and, more properly, critical thinking. Finally, the conclusion, which shows that, although over the last years the cognitive sciences have been essential to understand what is and how critical thinking works, these theories have supported their constructions in the contributions of philosophy throughout history.

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Theoretical framework

Discourses have emerged in the last decades around the importance of thinking and acting critically. These discourses have been adopted by the institutions in charge of setting educational policies at the national and international levels to make them an important part of their curriculum guidelines. One of the most representative speeches has been the report presented by the Association of American Philosophers Delphi-APA in 1990, in which a little over 40 experts participated, worldwide, to discuss and reach consensus on how to understand critical thinking.

In this exercise, authors such as Paul and Elder (2003) argued that critical thinking can be expressed in a variety of definitions, depending on the objective pursued. However, the most useful definition to assess the ability to think critically leads to consider that:

> Critical thinking is the process of analyzing and evaluating thought with a view to improving it. Critical thinking presupposes knowledge of the most basic structures of thought (the elements of thought) and the most basic intellectual norms for thinking (universal intellectual norms). The key to the creative side of critical thinking (real improvement of thinking) is to restructure thinking as a result of analyzing and evaluating it effectively (Paul and Elder, 2003, p. 6).

For the authors, this type of thinking has three components:

- · Elements of thought (reasoning).
- · Intellectual standards to be applied to elements of reasoning.
- · Intellectual traits associated with critically thinking. These are the result of a process in which intellectual norms are applied consistently and disciplined to elements of thought.

In these semantic consensuses, the classical principles exposed by Aristotle in his treatise on logic, and by Kant (2011 [*KrV*]) in his *Critique of Pure Reason* are taken up to give foundation to the theory. Facione (1990) and Paul and Elder (2003), representative theorists on this topic, agree with the other theorists in the Delphi-APA report to conceive that all reasoning contains inferences and interpretations that account for conclusions and these give meaning to the data. The issues that refer to the principles on intellectual norms are those that allow a critical thinker to achieve clarity, seek conceptual accuracy, preeminence, and depth always based on logical principles, since these give universal standards that must be used to evaluate and check the capacity of reasoning when a human being faces a problem or situation of conflict (intellectual and social) and without neglecting creativity to give solution to problems (Paul and Elder, 2003, pp. 10-11).

It is important to note that after this first attempt to unify meanings around how to understand 'critical thinking', there have been new definitions; while most of them take as a starting point the statements made by Facione (1990; 2007) and Paul and Elder (2003) as well as the agreements of the Delphi-APA report, they start again to propose alternative perspectives to understand what is critical thinking. Some of them go beyond thinking skills at higher levels and link important elements such as emotions and metacognition (Tamayo *et al.*, 2014, 2015). Likewise, to achieve criticality, they also link language, mental states, strategic decision-making and action (Rodríguez, 2018) when thinking and acting critically. In other cases, beliefs and skepticism are linked (Hernández, 2019) as essential elements of criticism. With this, new paths are opened that outline the work routes in the institutions in charge of education to train critical citizens who can carry out analyzes, reflections, understandings and transformations in the social reality in which they live; proposing solutions, based on reasoning, to the problems they face in their daily lives.

It is important to note that despite the fact that several authors as representative as those previously mentioned in this field of knowledge, have chosen other underlying elements to understand critical thinking, including Bailin (1987), Nickerson (1994), Perkins *et al.* (1993), Saiz

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(2002), Villarini (2003), Freire (2005), McPeck (2017), Saiz and Rivas (2008), Valenzuela and Saiz (2010) and more, it is evident a coincidence in posing as essential in their theories *to judgment, reason and evaluation* as substantial elements of criticism.

When analyzing these elements in their theories, it is observed that all of them, like the authors of the Delphi report say, agree that Kant (2011 [*KrV*]) introduces the concept of criticality and Dewey (1989) the concept of critical reflection coupled with Kantian good judgment. However, when reviewing the history of philosophy, it is observed that although the concept 'critical thinking' is recent, this concern has been latent for centuries, not only in Greek philosophy, but in the philosophy of the Vithandins in India.

Therefore, some theoretical guidelines of philosophy that have served as a theoretical magnifying glass to understand criticality will be shown, i.e., theories that have served for the various authors who currently account for critical thinking, in the field of education, to base their positions from the different perspectives and models that surround this phenomenon.

Classical traditions and criticism: discernment as the foundation of thought

Even though classical philosophers they did not speak of 'critical thinking' as the term is known today, it is possible to find expressions about its use or descriptions about related concepts (such as *the critique*) that allow us to outline some characteristics that a critical thinker must accomplish.

It is likely that the first Western reference can be found in Parmenides, showing that the one who thinks correctly is the one who chooses the path of truth or "of being", with passages like this:

> Well then, I will tell you, listen carefully to my word, which are the only research paths that can be thought; one: what is and what is not possible not to be; it is the way of persuasion (accompanies, indeed, the Truth); the other: what is not and what is necessary not to be. I will show you that this path is completely inscrutable; you will not know what is not (because it is inaccessible) nor will you show it (Eggers Lan and Julià, 1981, DK 28B2).

In this sense, thinking critically would consist in the discernment of what is true with respect to what is not, what is apparent. Plato (2014 [*Taet.*]) says:

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Soc. — That is certainly the task of midwives, and yet it is less than mine. It is not proper for women to give birth sometimes to imaginary beings and other times to true beings, which would not be easy to distinguish. If so, the most important and beautiful work of midwives would be to *discern* [κρίνειν] the truth from the truth. Don't you think?
Teet. — Yes, I think so. (Plato, 2014 [*Taet.*], 150a-b [italics are proper]).

Even going a little further, Aristotle himself (2011 [*DA*]) explains what this discernment consists of between what is true and what is not: "The soul of animals is defined by two powers, that of discerning—this activity which corresponds to thought and sensation—and that of moving with local movement" (432a16).

For Greek philosophers, criticism -we would say today, *thinking critically*- consists in acquiring criteria to discern the real from the merely apparent; in this sense, in discerning credible judgments or concepts from those that are not, an element that is undoubtedly present in each of the contemporary authors mentioned above.

Similarly, Indian *Vietnamese* philosophers used the term *vikalpa* to refer to this distinction, no longer between judgments and statements, but between perceptions. For example, in his commentary to the *Māḍūkya upaniτ ad* the philosopher Śaṅkara tells us: "Moreover, if the rope appears as a serpent, no cause is necessary to explain the illusion, only ignorance" (Anónimo, 1998, *Māxenophobia ḍ. kār., § 9, com. Śaṅ.*).

Thus, as Arnau (2011) explains: "It is worth dwelling on the term vikalpa, from the root *kḷp*: "discern", "separate", "doubt", "uncertainty", "alternative", "error", "distinction". It is the Indo-European root of "cutting", "separating"; closely linked to the idea of thinking as a power to distinguish" (p. 73, note 29).

It can therefore be inferred that the distinction of perceptions or judgments in classical philosophical traditions is the fundamental characteristic for thinking critically. In fact, going even further, even in Amerindian traditions such as Náhuatl can be found in fragments such as:

Did we really talk here...?
It's just like a dream, we just get up from sleep,
We only say it here about the earth... (León-Portilla, 2017, p. 184).

In all three contexts, the critical thinker should be able to discern the real from the merely apparent—even if *perhaps* they differ in how each author or tradition understands these terms. In this sense, for an-

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cient traditions, critical thinking was characterized by distinction, clarification and recognition of truth in judgments and sensations.

Now, if for classical traditions critical thinking was based on the distinction of ideas, in the Modernity Kant (2011 [*KrV*]) focuses its efforts on two key points: reflexivity and decision-making. On the one hand, on the theoretical level, criticism would consist in the study that reason would do on itself to recognize its limits (B23); but, on the other hand, on the practical level, it would consist in that autonomous regulation of the reason of moral actions through universal principles (the categorical imperative). He says:

> That morality is not a phantasmagoria—which follows if the categorical imperative, and with it the autonomy of the will, exists in truth and in an absolutely necessary way as an *a priori* principle—requires a *possible synthetic use of pure practical reason*, which we cannot venture without anticipating a *critique* of that same rational capacity (Kant, 2012, Ak.proved, IV, 445).

Kant thus introduces a fundamental element in describing what we would now call "critical thinking": determining criteria for decision-making (if any, determined by practical reason). It seems that a human being who thinks critically should not only be able to make judgments about his own thoughts and discriminate against them which ones he can take for true or false; it is also essential that such reflexivity turns into action as soon as his decision-making is consistent with those criteria. In short, a concordance between discourse and action is required, taking rationality as a bridge.

However, other philosophical currents that have also contributed to the understanding of critical thinking and its conceptualization have been analytical philosophy and pragmatic perspectives. Linguistics turned attention again on the ways of seeing, understanding, and explaining thought and the world, taking back the logical and ontological principles that were essential in the philosophical tradition when building knowledge and acting in the world.

Studies in language philosophy by authors such as Peirce (1998), Wittgenstein (2009a and 2009b), Ayer (1961), Austin (1962), Russell (1966), Searle (1969), Popper (1977a and 1977b), Brandom (2004) and others, which will be shown in detail in the discussion of this study, have allowed to relate language, especially from its meaning and use, as well as the a rules and reasons for acting as important elements when thinking critically.

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Thus, analysis appears as a basic skill for criticality, but also new conceptions of rationality in which action and experience play an important role to achieve the development of thinking skills at a higher level, required to think, feel, speak and act in a reasonable and coherent way, according to the requirements of the situation faced by an individual (Rodríguez, 2018). Thus, even though in all models appear as essential elements: *rationality, logic, judgment, argumentation and decision-making*, it must be said that the pragmatic perspective provides essential supports to the new perspectives by fixing attention to language and social action as vital elements in the social transformation of which a critical thinker participates.

In this sense, the discussion of the results will show in detail the impact that philosophy has had, from different authors, in each of the models of critical thinking that were found from the review of the definitions of the most outstanding authors in this field.

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Methodology

The methodological design of this research, whose method was the conceptual analysis, carried out from the analytical philosophy, consisted of three phases: 1) review of scientific articles on critical thinking; 2) selection of 44 theorists that had clearly structured a conception of critical thinking; and 3) analysis and classification in four models from the constituents of critical thinking and the incidence of philosophical currents in the 44 selected theorists.

For the theoretical review 135 articles were selected in Scopus and Web of Science from the following descriptors: 'Critical thinking', 'reflective thinking' and 'criticality'. For selecting the theories, those whose authors had their own definitions of 'critical thinking' were used, which made explicit or allowed inferring in their discourse the philosophical currents on which they built their conceptual structures around 'critical thinking' and that these theories were cited by other authors in their studies. Finally, for the analysis and classification of the four resulting models, a matrix was designed to identify the incidence of the various philosophers in the conceptual construction of the analyzed theories (see Table 1).

Table 1
Analysis matrix. Philosophical
currents that affect the constituents of critical thinking

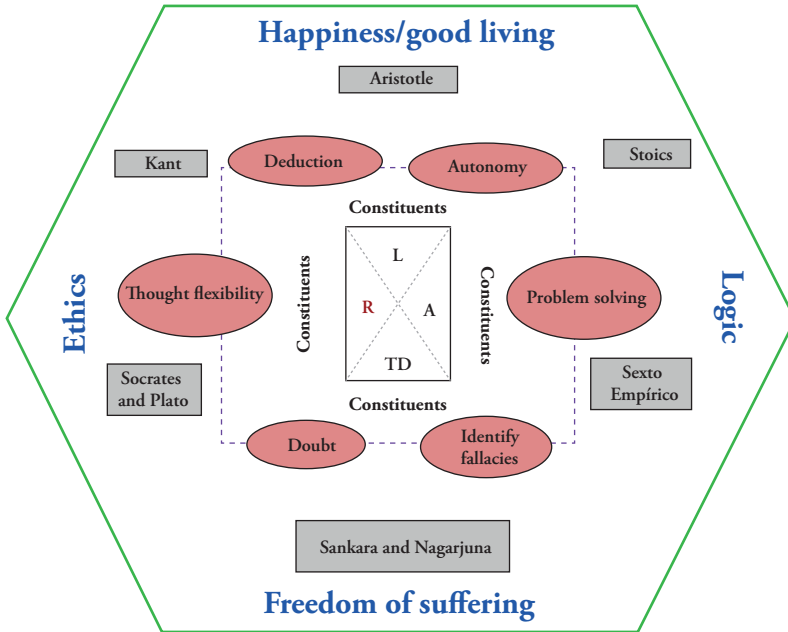| Theories of critical thinking	Constituents of critical thinking	Yes	No	How it is evidenced (quote)	Philosophical current that affects it
	Abilities				
	Aptitudes				
	Emotions				
	Willingness				
	Action				
	Decision-making				
	Axiology				
	Social interaction and cooperation				
	Language, rationality and logic				
	Knowledge				
	Skepticism				
	Mental states (beliefs, intention and consciousness)				

Source: own production.

Results

Once conducted the meta-theoretical analysis, a categorization and classification of the revised theorists was made, with which four resulting models were achieved: logical-rational model; cognitive-emotional model; scientific cognitive model and socio-pragmatic model. In turn, the transversal constituents to the four models were found.

The following four models are shown with their characteristics, authors and philosophers who influenced their theoretical constructs:

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Ana Milena López-Rúa and Valentina Cadavid-Alzate

Figure 1
Theories linked to the logical-rational model of critical thinking
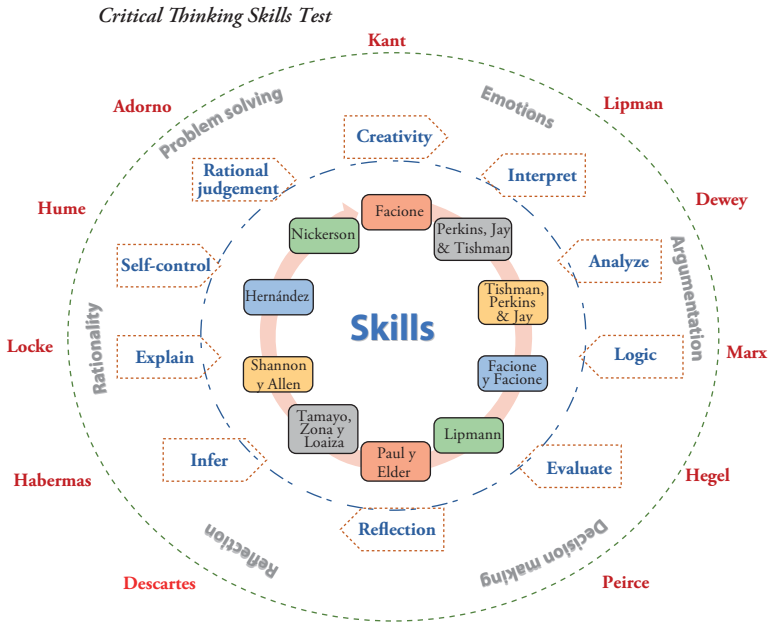

Source: own production.

L= logic, A= argumentation, R= rationality, TD= decision-making; these are precisely the constituent elements of the logical-rational model. This is perhaps the first model and is directly imbedded in philosophy. It has as main elements those that appear in the center of the model, highlighting rationality as the central axis of its conceptual gear. In the periphery are the constituents of the model, within which the critique, defined by several authors (see figure 1) is highlighted and on which it is concluded that a critical thinker should be autonomous (free) in his thinking and acting, as will be shown in the discussion.

The second model found is the cognitive-emotional model. This axis of its conceptual gear is based on thinking skills at the higher level and emotions are linked when making decisions and solving problems (see Figure 2).
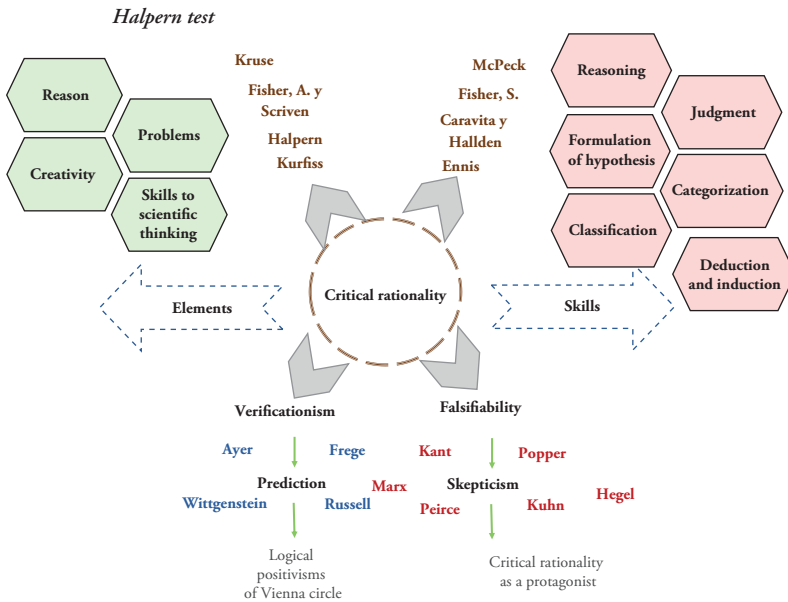
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Figure 2
Theories linked to the cognitive-emotional
model of critical thinking

Source: own production.

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For this second model, the theorists that presented in the periphery of the figure base their contributions on the strengthening of thinking skills in the higher levels that appear in the next level of the image, prioritizing the elements that "flood" the larger circle and on which there seems to be consensus among the different authors. Finally, in the outer periphery of the previous image, the philosophers who have influenced the structuring of the model stand out. It is worth clarifying that, although for this study the contributions of philosophy are highlighted, the conceptual constructions that underpin them are also based on the contributions of cognitive sciences. The design of the *Critical Thinking Skills Test*, an instrument that allows evaluating the development achieved in thinking skills, is highlighted.

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Figure 3
Theories linked to the cognitive-scientific model of critical thinking

Source: own production.

In the third model found, critical rationality appears as a foundation. From this, abilities and elements such as the constituents of this work are displayed. In this model, it is worth highlighting the priority given to scientific skills that can be measured, as proposed by Halpern. In the lower part of the model image, two aspects are highlighted: 1) a falsifiability perspective of science in which skepticism confronts dogmatism and 2) a verificationism bet in its conception of science that develops more rigid measurement models from both formal and informal logics. The representative authors of this model are trained in neuroscience and psychology, and appear at the top of the figure and the philosophers on which these theorists are based are shown at the bottom.

Figure 4
Theories linked to the socio-pragmatic model of critical thinking
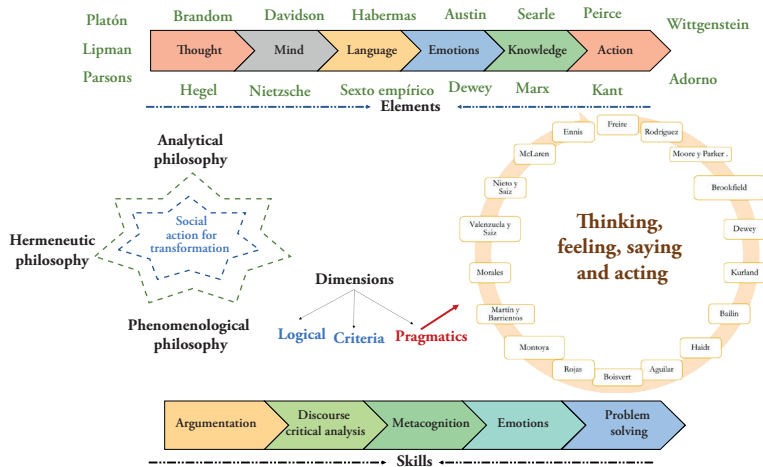
Source: own production.

This is a complex model that integrates constituents of the cognitive-emotional model with elements that favor the interaction of the critical thinker in the social world. In the upper part, there are elements related to the socio-pragmatic theory and the philosophers who have influenced the structuring of the model and who also influenced previous models.

However, considering the social perspective of the model, there is an essential element that has to do with transformation and emancipatory criticality, it is presented in the form of a star. This is how this constituent supports the link of action as an essential principle, since problem solving is not left in a reflection or in decision-making, but is passed to action itself and its impact on the social world, i.e., feeling, thinking, speaking and acting are always present in the critical subject.

The skills are at the bottom of the model, which seem to be shared with other models, but linked to social interaction and without the intention of being measured, since the goal is emancipation and transformation of the world.

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Discussion and Philosophical Analysis

Logical–rational model: what does it mean
to 'think critically' in a philosophical sense?

While the concept of 'critical thinking' has been developed widely by theories in didactics and learning psychology, it is not new and has its roots in the discussions that philosophers have developed around their predecessor concepts: 'reason', 'judgment' and 'criticism'. Following is a brief explanation of only five of them.

Perhaps the best way to approach the concept was to refer to its definitions. On the one hand, the concept of 'reason' comes from the Latin *ratio*: '[...] calculation, proportion, computation, relation, measure, order' (Lewis *et al.*, 1956, voice *ratio*). To a large extent, the term 'thinking' was taking on greater meaning and importance in the 18th century and, above all, the 19th, since authors such as Frege (2016), directed this analysis, not from the field of mental or representations, but from logic and language. In any case, the thought —or better, *the proper use of it*— would consist in knowing how to relate in a truthful and valid way (logically) an idea of another in such a way that "follow" or *infer* one from another (as for Frege, the latter would be the object of study of logic [2016]).

However, the concept of 'criticism' comes from the Greek *krínomai* (κρίνομαι), which means 'to distinguish, separate, distinguish, decide, judge, interpret' (Lydell and Scott, 1996, voice κρίνω). Aristotle (2011 [*DA*]) explains: "The soul of animals is defined by two powers, that of discerning —this activity corresponds to thought and sensation— and that of moving with local movement" (432a16), something that later the school of the Stoic-megarics systematize in their philosophy; for example, Zenon of Citio: "Speculations of the philosopher... those that Zenon says: know the elements of reasoning [λόγος][1], what quality they have, how they harmonize with each other and what are the consequences thereof" (Capelleti, ed., 1996, § 57 / *SVF*,I, 51).

But what is it about discerning thoughts or feelings? Two examples of ancient philosophy allow us to clarify what these distinctions refer to. On the one hand, Plato, in his first writing or treatise on the epistemology of the history of Western philosophy, uses it to explain what Socrates' Mathematical Method consisted of:

> Soc. — That is certainly the task of midwives, and yet it is less than mine. Because it is not proper for women to give birth sometimes to imaginary beings and other times to true beings, which would not be easy to

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distinguish. If so, midwives' most important and beautiful work would be to *discern* what is true from what is not. Don't you think?

Teet. — Yes, I think so.

Soc. — My parting art has the same characteristics as theirs, but it differs in the fact that it assists men and not women, and examines the souls of those who give birth, but not their bodies (Plato, 2014 [*Taet.*], 150a-b [italics are proper]).

Thus, criticism is understood as the ability to distinguish the true from the false, among those beliefs with more scientific validity (Gutiérrez-Pozo, 2023). Something similar is indicated by a classic example by the Indian philosopher of the *advaita* school *vedānta* Śaṅkara: "Moreover, if the rope appears as a snake, no cause is necessary to explain the illusion, only ignorance" (Anónimo, 1998, *Māḍ. kār*. § 9, com. Śaṅ.), metaphor also used by Nāgārjuna (2011 [*MK*]). The term '*vikalpa*' was therefore used in the Indian tradition to refer to the distinction of perceptions (Monier-Williams, 1960, voice विकल्प). As Arnau (2011) explains: "It is worth stopping at the term *vikalpa*, from the root *klp*: "discern", "separate", "doubt", "uncertainty", "alternative", "error", "distinction". It is the Indo-European root of "cutting", "separating"; closely linked to the idea of thinking as a power to distinguish" (p. 73, note 29). This type of skeptical and analytical attitudes to differentiate the real from the illusory, as Arnau (2008) indicates, is typical of the Vithandine philosophers (as the two mentioned): philosophers who with "negative argumentation" sought to refute deceptive or illusory beliefs to achieve the liberation of suffering (*nirvāτ/duḥkha*).

Either as in the Greek case, where false concepts, definitions and statements are distinguished from the true; or, in the Indian case, where false perceptions are distinguished from plausible ones, *criticism consists in differentiating what is real from what is not*. Criticizing, in the original sense of the word, consisted of analyzing the parts of a speech or a perception/representation to recognize whether it is false or not.

Accordingly, Sexto Empírico also offers elements about critical reasoning, naturally linked to skepticism. He defines it:

Skepticism is the ability to establish antitheses in phenomena and theoretical considerations, according to any of the tropes; thanks to which we go - by virtue of the equivalence between things and opposing propositions - towards the suspension of judgment and then towards ataraxy (Sexto Empírico, 1996 [*PH*], IV, 8).

While it is true that radical skepticism leads to the suspension of judgment (and, in that sense, is far from the purpose of the scientific

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model), the ethical and pragmatic element of this theory is sometimes relegated to the background. However, the analysis of judgments is essential for this school to oppose them and thus avoid suffering by the multiple beliefs that disturb the spirit:

> We certainly do not think that the skeptic is completely immune to disturbance, but we recognize that he is disturbed by needs; we agree that he also sometimes experiences cold, as well as thirst and so on. But even in such things ordinary people are tormented twice: by their suffering and - no less - by the fact that they believe that such situations are objectively bad; while the skeptic, by avoiding to think that each of those things is objectively bad, even in them is handled more restrainfully. Therefore, of course, we say that the objective of the skeptic is the serenity of spirit in things that depend on one's opinion and the control of suffering in those who suffer for anything (*PH*, XII, 29-30).

On the other hand, beliefs when supported and reliable, as explained by Gutiérrez-Pozo (2023), not only support knowledge from the method of discovery when making judgments but are required when making criticism. However, the term was rarely used in the tradition. It starts being used from the work of the German philosopher Immanuel Kant, known for cementing his system of thought in "criticism". Kant clarifies how he conceives criticism as follows:

> Criticism of reason, therefore, necessarily leads ultimately to science; on the other hand, the use of the dogmatic of reason without criticism [leads] to unsubstantiated claims, which can be opposed [others] equally plausible, and therefore leads to skepticism (Kant, 2011 [*KrV*], B 23).

Thus, in a context in which science and philosophy were in crisis due to the proliferation of pseudo-scientific and anti-scientific discourses, criticism appears as a method by which it is possible to study the reason —today we would say *the thought itself*— to investigate what are its limits and try to regulate them (today, in the field of didactics, we would call that "metacognition").

In the practical field, however, Kant provides a second element for criticism: besides the reflection of thought —i.e., that reason studies itself— a fundamental element to speak of a "critical spirit" is autonomy. When asked about what it meant to be enlightened, Kant (2013 [*WA*]) decided to answer deliberately:

> *Illustration means the abandonment by a man of a minority whose responsibility is himself.* This *minority* means the inability to use their un-

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derstanding without being guided by someone else. *One is guilty* of this minority when its cause is not a lack of understanding, but a lack of resolve and courage to use one's own without the guidance of someone else. *Sapere aude*! Have courage to use your own understanding! Such is the motto of the Enlightenment (*Ak.*, VIII, 35).

Seen in this way, a critical thinker must be autonomous in his thinking and acting. This not only implies that he must act according to the criteria dictated by his reason, but also that he must be aware that this freedom is responsible for those choices and, therefore, cannot be excused from third parties when answering for them.

Taking up these five authors it can be concluded that:

· *First*, critical thinking is strongly linked to logical analysis and inferences (today we would say argumentation), i.e., *that one idea does follow another* (Frege, 2016).
· *Second*, criticism consists in distinguishing perceptions and judgments that are real and true from those that are not (Aristotle, 2011[*DA*]; Capelleti, ed., 1996).
· *Third,* critical thinking involves the constant reflection of reason on itself to (self)regulate it and thus avoid falling into confusion or fallacies (Kant, 2011 [*KrV*]).
· *Fourth*, thinking critically is linked to doubt and negative analysis of one's beliefs to lead a serene life and avoid making mistakes in decision-making because of wrong opinions (Sexto Empírico, 1996 [*PH*]).
· *And fifth*, the critical thinker should be autonomous and free. Therefore, it must be able to recognize from itself the criteria of thought and action to interact with the world around it and, in that order of ideas, he must be responsible for them without excusing itself in third parties.

Philosophical incidence in the cognitive–emotional model

Although the origins of the concept 'critical thinking' come from philosophy since Antiquity, and the judgment for criticality is accentuated with Kant, it is only until the beginning of the 20th century that Dewey (1989) speaks of 'reflective thinking'; a term closer to the current and with which, later, authors such as Sternberg (1986), Ennis (1985, 1987, 1994 and 1996), Facione (1990); Facione Facione (1996a and 1996b), Fisher and Scriven (1997), Bailin *et al.* (1999), among others, base their studies around 'cri-

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tical thinking'. The theories on this concept are supported, in addition to philosophy, by the contributions of neurophysiology and psychology.

Thus, in the second half of the twentieth century the term 'critical thinking' became more prolific in the literature and began to consolidate two cognitive models in which different authors contributed, in large part, from their definitions: *cognitive-emotional model and cognitive-scientific model.* The theorists of both models converged by paying greater attention in their theoretical constructs to the development of higher-level thinking skills (Paul and Elder, 2003). However, some of them work on critical thinking around scientific thinking skills (Ennis and Wier, 1985).

When reviewing the conceptual views of different authors, it can be observed that the studies of Facione (1990 and 1992), Perkins *et al.* (1993), Tishman *et al.* (1994), Facione and Facione (1996a and 1996b), Lipman (1998), Paul and Elder (2003 and 2005), Tamayo *et al.* (2014 and 2 015), Shannon and Allen (2001), Hernández (2019) and Nickerson (1994) agree on giving priority to rationality and relate it to cognitive processes. They focus on the development of higher-level thinking skills and problem-solving.

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Even if some theorists are closer in their epistemic foundations than others, in the cognitive-emotional model it is possible to observe the priority that is given to the development of skills for logic, argumentation, suspension of judgment, reflection, analysis, evaluation, creativity, self-control, emotional regulation, metacognitive reflection, strategic decision-making and problem-solving approach.

This conceptual commitment to the development of thinking skills (Facione, 1990; Paul and Elder, 2003) led more than forty-six experts to discuss between 1988 and 1989 around reaching a consensus on critical thinking. In this space, six skills were determined by joint assent, which were presented in the results published in the Delphi Report in 1990; among them: *interpret, analyze, evaluate, infer, explain and self-control* (Facione, 1990). Therefore, in accordance with these results, the *California Critical Thinking Skills Test* was designed to evaluate the development of these skills. However, in subsequent analyzes other skills such as creativity and reflection were linked, recovering logic and rational judgment (Lipman, 1998) and contextualizing the exercise of criticality to solve problems (Nickerson, 1994; Tamayo *et al.*, 2015). However, when analyzing the theoretical structure of these authors it is observed that, for the most part, they have taken as a reference Kant's philosophy (2004 [*KA*] and 2011 [*KrV*]) to substantiate the origins of their theories, especially the statements about understanding, knowledge and judgment or discernment.

Judgment in a critical thinker must be rational and knowledge-based. This is assumed by the various authors who share these conceptual guidelines. From Kantian philosophy, elements of the conception presented by the German philosopher about rationality are taken up to support logical and argumentation skills and, in turn, they are distanced from the assumption of constitutive principles *a priori* attributed to the faculty of knowing that mediate between understanding and reason itself.

Reflective or critical judgment is an indication of Kant's proposed autonomy. It is an autonomy that gives an essential role to the freedom to make decisions when solving problems, as Nickerson (1994) and Tamayo *et al.* (2015) say. Seen in this way, a critical thinker is able to make judgments based on the knowledge he possesses; a process that he does in a free and autonomous way, since he has the reasons that support the judgment, the valuation of it and the decision made.

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Based on Kant's approaches, as well as on the studies on the nature of critical judgment by Evans (2008) and various contributions of cognitive sciences -especially cognitive psychology- the authors of the cognitive-emotional model define the concept of 'critical thinking' and provide tools for teachers to work in the classroom around the development of higher-level thinking skills. Thus, freedom, rational consciousness and will are essential elements, not only for Kantian theory of judgment, but also for this model. However, although in the early days for these theorists pure rationality and logic became constitutive elements of much of the theories that support the model, later some of them began to take contributions from Dewey (1989), Adorno (1920) and Hume (1986 and 2012) to understand reason, not as a dominant and transcendental faculty, but as an essential means for problem solving, without neglecting the role of experience as a constant flow for life itself (Dewey, 1948; Locke, 1999). Emotions and feelings in this process (Hume, 2012) and the role of language for a proposal from the communicative rationality (Habermas, 1987a and 1987b) are determinant. It is a rationality that enables criteria in the issuance of value judgments and links elements of dialogue and critical logic, as well as abduction as a proposal for the construction of knowledge (Peirce, 1992 and 1998), as Lipman does (1998). Many others relate in their theories elements of dialectical argumentation (Hegel, 2010 [*PdG*]) and skepticism (Descartes, 2014 [*Med.*]; Dewey, 1989), as well as elements of the critical theory of Horkheimer and Adorno (1998); in addition to the critical historicity, consciousness and the historical context worked by Marx (2014) in his materialism.

Thus, the incidence of various philosophical currents in this model determines the assumption of the theoretical positions adopted by each of the authors and provide the basis for the conceptual gear that sustain cognition and emotions as constituent elements for problem solving. However, the model itself is not enough for the demands of today's world, since only a few of these theorists link action and social interaction in the development of skills and dispositions. However, it is important to note that authors such as Lipman (1998), Nickerson (1994), Tamayo *et al.* (2015) and Hernández (2019) enunciate it, even if they do not give a greater emphasis and sometimes assume as equals 'action' and 'decision-making'. In short, something that stands out in this model is that the different authors remain in a definition of 'critical thinking' focused on the subject and the cognitive processes (rational and emotional) that support the reasons to make judgments and evaluate alternatives to solve problems. It does not consider elements that link collective mental states and neither does social practice to act and transform the world in which they live.

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Incidence of Philosophy in the Cognitive–Scientific Model

However, another model that has been influenced by the logical-rational model -especially, in the theoretical assumptions that support it- is the cognitive-scientific model. By 1882, the *U.S. Army Research Institute for the Behavioral and Social Sciences* launched four investigations into the critical thinking of members of the navy. In 2009, Susan Fisher and her team reported on a model whose construct was based *on analytical rationality*. From the contributions of the knowledge built in the cognitive sciences from neuroscience and psychology, Fisher *et al.* (2009) presented the results of these investigations in which tests were designed and validated to measure cognitive processes. Taking contributions from different philosophers and theoreticians of education, they constructed a model that accounts for thinking skills such as classifications, categorizations, hypothesis formulation, judgments and reasoning that the critical thinker must have when faced with problem solving.

The scientific vision of Fisher *et al.* (2009) is very close to that of Ennis (1962 and 1985), McPeck (2017) and that of Caravita and Hallden (1994), who also make a bet towards the search for the truth and in their theories, there is a position of science from a falsifiability perspective, as Fisher herself says. It is shown the incidence, not only of Kuhn (2004), but also of Peirce (1992) and Popper around the conception of science and

the construction of knowledge, not from verificationism, but from falsifiability (Popper, 1967, 1997a, 1977b). As for problems, the rational and creative capacity to solve them, as well as the skills of scientific thinking are essential elements for this model. In terms of Gutiérrez-Pozo (2023), being creative is being critical when it comes to discerning the beliefs that underpin the knowledge one possesses. Thus, the rationality proposed by Kant (2004 [*KU*] and 2011 [*KrV*]) and the doubt and analysis of Sexto Empírico (1996 [*PH*]) come into play, especially to use dogmatism, from skepticism, when refuting and falsifying assumptions that have no clear and reliable basis. Dogmatism is not acceptable in science, nor can it be acceptable in critical thinking.

On the other hand, Kurfiss (1988), Alec Fisher (2001), Fisher and Scriven (1997), Halpern (2003) and Otto Kruse (2017) also work on critical thinking from the development of cognitive skills of scientific thought, linking - as the two authors mentioned - rationality, logic (from a formal conception) and dialectics from the contributions of Platonic and Hegelian theory. As in the previous model, these authors resume the contributions of Marxist theory on historical materialism, especially, they assume historical consciousness to read the problems in context. However, they give priority to skills that can be measured, as proposed by Halpern (1998 and 2006) in his test, model in which the development of five specific skills can be measured: 1) verbal reasoning; 2) hypothesis formulation; 3) argument analysis; 4) decision making; and 5) probability and uncertainty and problem solving. In this model the bet is verificationism and elements of prediction, which allow to evidence elements of analytical philosophy, especially the philosophy of logical positivism, in its conception of science (Ayer, 1961). Therefore, authors such as Frege (2016), Ayer (1991), Russell (1966) and, of course, Wittgenstein's first contributions (2009b) in his *Tractatus*, for whom language and logic delimited thought and the world.

Incidence of philosophy in the socio-pragmatic model

On the other hand, taking up some of the contributions presented by the theorists of the cognitive-emotional model, a group of scholars conceive new elements to understand critical thinking from a socio-pragmatic perspective. In this model six elements are linked: 1) thought (cognitive processes), 2) mind (beliefs, intentionality and consciousness (individual and collective), 3) language (communicative processes and possibility condition of social reality), 4) emotions, 5) knowledge and 6) action, all

seen in interrelations and as possibility conditions for the interaction of the critical thinker in the social world. Critical capacity in this pragmatic perspective must be assumed in all situations and dimensions of life, but especially in the face of knowledge and culture, since being critical is essential when solving problems that appear in a context (Saharrea, 2022).

Now, perhaps Ennis (1962) is the first to link pragmatics in the processes of critical thinking by exposing three dimensions of this type of thinking: *logic, criteria and pragmatics*. However, these dimensions are exhausted in the issuance of critical judgments. In reality, pragmatics is enunciated, but it does not develop in relation to action and social experience, as theorists who place their bets on a critical thought in which the development of cognitive skills is evident in the actions performed by a critical thinker in the social world [2].

In reviews and analysis of theories by authors such as Freire (1965), Moore *et al.* (1985), Brookfield (1987), Ennis *et al.* (1987 and 1994), Dewey (1989), Moore and Parker (1991), Kurland (1995), Bailin *et al.* (1999), Bailin (2002), Aguilar 00), Haidt (2001), Boisvert (2004), Rojas (2006), Montoya (2007), Martín and Barrientos (2009), McLaren (2012), Morales (2012), Valenzuela and Saíz (2010), Nieto and Valenzuela (2013), Rodríguez (2018) and others, there is an emphasis on the pragmatic dimension of critical thinking, understood in the coherence that occurs between thinking, feeling, saying and acting.

Elements such as those exposed in the cognitive-emotional model continue in force, but the pragmatic component and the free and reflective experience in the social sphere are given priority. This is the reason why, in addition to the aforementioned philosophers who support the previous model, the incidence of authors of analytical philosophy, moral philosophy and political philosophy, both classical and contemporary, is also observed.

The incidence of Plato is found in the contributions about language, who from his conceptions of language (1987 [*Crat.*]) and around knowledge (2014 [*Taet.*]) turns out to be a fundamental construct, as is Russell (1966 and 1983) in terms of logical questions and knowledge. For the authors who constitute this model, language occupies a central place in the structure of their conceptions about critical thinking, but not only as a linguistic ability and as an argumentative ability, from its syntactic and semantic components, but from its pragmatic dimension, since with intentional discourses and their analysis it is possible to initiate social transformation processes. For this reason, the philosophy of Habermas (1987a and 1987b), Austin (1962), Searle (1969, 1998 and 2010), Peirce (1929 and 1998) and Wittgenstein (2009a) provide a large part of the

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model's references, since they not only allow to link a bridge between language, mind and action in the social world, but also to see discursive rationality from a more practical perspective.

It is also important to note that concepts relating to action are linked to the reasons for acting, making judgments and making decisions; therefore, Kant's contributions (2004 [*KU*], 2005 [*KpV*] and 2011 [*KrV*]) to rationality, freedom, judgment and autonomy are again essential. At the same time, the contributions of Searle (2001), Hume (1986) and Kellner *et al.* (2008) allow understanding this rationality as a construction made by subjects in social interaction using language. Likewise, in this socio-pragmatic perspective, intermediate points between reason and emotions are sought when sustaining the reasons to act, linking mental states as important elements for individual and collective decisions and actions in which beliefs, intentionality and consciousness are involved (Ospina *et al.*, 2022).

On the other hand, beliefs are not only based on scientific knowledge, but also on ethical and political knowledge when deciding and acting critically. As Kurland (1995) explains, knowledge, norms, values and principles turn out to be constituent for the foundation of action (Parsons, 1937) in critical thinking. Thus, the influence of authors such as Nussbaum (2005 and 2010), Lipman (1998), the Platonic Socrates (Plato, 2014), with their contributions from the majeutics, Hegel (2010 [*PdG*] and 2017 [*Enz.*]), from their dialectical proposal, Habermas (1985), with their moral conscience and communicative action, and Marx (1984), provide tools around historical consciousness for what some of these authors have raised around the citizenship that should exercise every critical thinker. Useful tools when assuming a reflective thought (conscious and self-conscious) and being skeptical, as proposed by Dewey (1989) and Sexto Empírico (1996; 1997), to reach emancipation (Adorno, 1998; McLaren, 2012; Freire, 1965).

In relation to the reflections on emancipatory criticality -and, especially, on the social transformation to which the critical thinker must commit- McLaren (2012) is perhaps one of the most relevant theorists, who together with Freire (1965) focus on the problems faced by the critical thinker. McLaren's theory emphasizes freedom and liberating action for social change. This thinker is supported by different philosophers and sociologists, thinkers such as Nietzsche (2002, 2006 and 2012), Marx (1984), Hegel (2010 [*PdG*]), Kant (2011 [*KrV*]), among others, and focuses his proposal on the relationship and coherence between thought and action, for which it is based on the general theory of action proposed by Parsons (1937).

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Criticality -understood in the coherence between *language, thought and action* that links the states of mind, emotions and historicity- takes knowledge as a central axis for beliefs with scientific support, since these beliefs are at the base, along with the norms, values and ethical principles of decision-making and the realization of actions in the social world and for change. Therefore, historical and creative thinking, as well as the norms to do what is explicit in the social world, as proposed by Brandom (1994) are central elements, especially considering that decisions and actions must be strategic for a real change in the social world. Thus, the development of higher-level skills such as argumentation, linked to logical and dialectical processes; critical discourse analysis; metacognition; especially for the management of emotions (Davidson, 1976, 1980) and for reflection around the regulation processes to actions and capacities for problem solving are constituents of this proposal.

Thus, no radical positions of philosophical currents are assumed in this conception of criticality, but elements of various currents of philosophy (analytical, hermeneutic and phenomenological) are taken up to support why critical thinking develops in the linguistic-social interaction and is evident in the action itself. In Agüero's (2022) terms, "the conceptual nature of the content of our thoughts and actions makes possible the critical rationality" (p. 96). Most authors understand the latter not only as the corporal movement, but as speech acts, as discourses and liberating actions that affect social transformation through the solution of problems faced by a critical thinker in the exercise of his autonomy and freedom.

Perhaps this is why it can be inferred that this is the model that best links the constituents of the previous models, supporting their contributions from philosophy and cognitive sciences, giving priority to social action for transformation and, although instruments of measurement are not yet available—as is the case with the cognitive-emotional and cognitive-scientific models—given its complexity, the socio-pragmatic model can provide various elements when thinking about forming critical beings capable of responding to the challenges and uncertainties of this changing world.

Common Constituents in the Four Models of Critical Thinking

After reviewing and classifying the theorists that are part of these four models, it can be observed that there are some transversal constituents to the models found. It is important to note that although some of them pre-

vail under the same term, the meanings vary according to the meanings and functionalities attributed to them.

An example of this is precisely the concept of 'rationality'. Although present in each of the authors, it is assumed especially in the cognitive-emotional and socio-pragmatic models, as well as in some theoreticians of the cognitive-scientific model, since this is not conceived as a finished faculty, nor is it granted the functions of judge, as a determining factor in decision making and actions, as intended in the logical-rational model.

Rationality, in the three remaining models, especially in the cognitive-emotional and socio-pragmatic models, is not a natural faculty; on the contrary, it develops and that development is presented in relation to thinking skills, i.e., it is achieved in a permanent and conscious exercise, and is evident in elucidation, analysis, reflection, judgment, decision-making and, for the case of the last model, in action.

In this sense, even if in the theoretical constructs there is no semantic unification to what the term calls for and varies the functionality attributed to it, as well as its origin (for some authors it is assumed as faculty, for others as disposition and others assume it as capacity), there is no doubt that being rational is an attribute of the critical thinker and, in most cases, this rationality is assumed in relation to capacities to argue, logical capabilities and the issuance of judgments.

Another common element in the four models is, precisely, the judgment. This is supported from different factors (knowledge, beliefs, logical propositions, axiological and normative issues, etc.), however, regardless of the meaning assumed, judgment turns out to be a constitutive element of critical thinking. A critically thinking being is in a position to make value judgments, not only about speeches and reasons to decide and act (socio-pragmatic model), but about the speeches and actions of other social agents.

Similarly, arguing is another essential constituent in these theories. Although some scholars enunciate it as an ability, others as a capacity and a few as a dimension of critical thinking, argumentation is present in every theory studied. Not only is it an essential element to achieve the desired autonomy through the assumption of own judgments and positions, but when it comes to elucidating and evidencing fallacies in the speeches of others. It is worth clarifying that in all four models, argumentation is essential for discussion, social interaction and problem solving, even if in some of the models characterized here is addressed in relation to logical issues, dialogic processes or dialectical exercises.

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Likewise, reflective thinking is present in the theoretical constructions that support these models. Although some authors refer directly to it, others make it clear in their speeches when they refer to self-awareness, self-control or under the concept 'metacognition'. The concept 'reflection' is present, with the above exposed, whenever the critical thinker faces the resolution of problems (logical, epistemic, scientific, social, etc.), to respond to the requirements of the social context.

Last but not least is freedom, which in most authors is present in relation to autonomy, linking ethical elements to criticality. In all four models, critical thinking accounts for freedom, and for the socio-pragmatic model, it is the foundation for emancipation and social transformation (see Figure 5).

Figure 5
General integration of the five models of critical thinking

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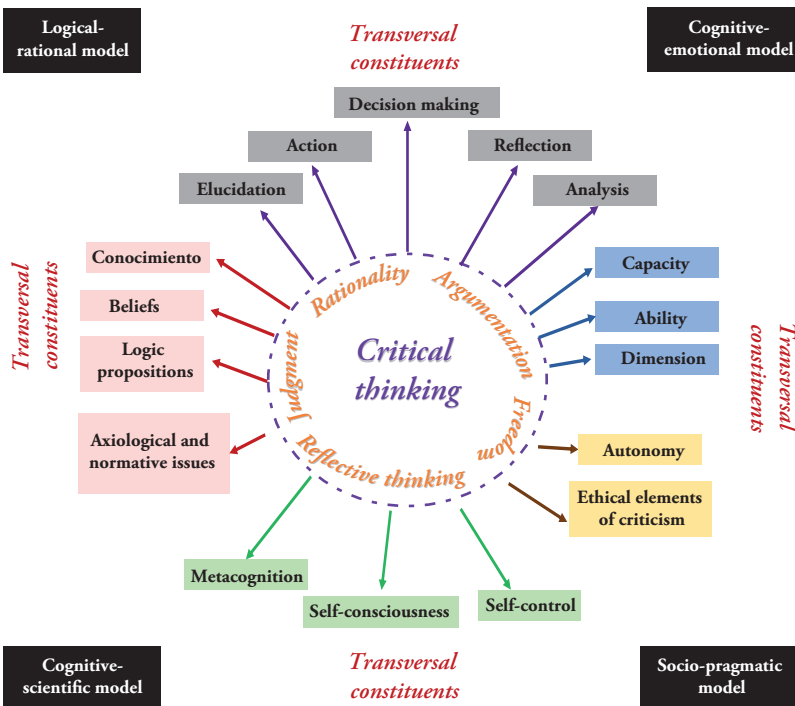
Source: own production.

Conclusions

Thinking about the world, the main issues of existence and social issues is something that concerns the human being, given his nature and ability to inquire and wonder. However, this thinking cannot be reduced to processes determined by purely biological functions, nor to those that are based on sociocultural traditions, since these two conditions of thinking are not sufficient to respond to the challenges imposed in a world where there is a lot of information and disinformation; therefore, in the twentieth century there is a particular interest in the field of education sciences to form critical beings capable of solving the problems that brings with social development. However, although the term 'critical thinking' appears in the 20th century, it had its origin in the theories of rationality and reflective thinking from philosophy. It is precisely that by its very nature, it demands in its action (*the philosophizing*) elements such as inquiry, logic, ethics, analysis, reflection, rationality and conceptual clarity in the construction of knowledge, among other elements required for criticality.

Since Antiquity, as this article attempts to show, various philosophers have expressed their concern to form critical beings with the capacity to respond to the challenges and problems of their environment; virtuous beings, who in their thoughts and actions account for their knowledge, their ways to understand, explain and live in the world (Plato, 2014 [*Taet.*]). As Wittgenstein explained (2009a; 2009b), philosophy fulfills the elucidatory function and the search for clarity to account for reliable knowledge and to solve the problems concerning the human being, processes in which criticality is present. In this sense, *critical thinking is not a matter of fashion, but a necessity that has been present in every era throughout history.*

It can be concluded that while the term 'critical thinking' is a construct that has current foundations in its base provided by cognitive sciences and is used with greater emphasis in reflective discourses around the purpose and requirements of education (pedagogy and didactics), it is undeniable the impact that different currents of philosophy have had on the structuring of it and on the constituents that the different authors mention in their theories.

Hopefully, both teachers -from different sciences and arts in general- as well as philosophers can reflect on the strong theoretical and didactic commitments of this concept and how eventually there could be in the classroom a critical way of thinking, living, and feeling the world.

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Notes

1   In Boeri and Salles (eds.) (2014) it is translated by 'speech'. Considering the polysemy of the term and the link that Stoics have with both logic and dialectics and rhetoric, the analysis of thought seems not only to be reduced to reasoning, but also to discourses in general.

2   Early studies by Ennis fail to clearly see the role of social interaction and action in his conceptions of critical thinking. Therefore, these first contributions have been mostly used when designing tests that measure scientific thinking skills. However, Ennis *et al.* (1987) and subsequent studies allow us to see the socio-pragmatic emphasis that it gives to its model.

Support and financial support of research

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