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COLLECTIVE BELIEFS AND THE NATURE OF SCIENTIFIC KNOWLEDGE[1]

Ediovani Antonio Gaboardi[2,3]
gaboardi42@gmail.com

Abstract: The aim of this article is to understand the relationship between collective beliefs and science. The article brings together Margaret Gilbert's non-summative conception of collective beliefs and Thomas Kuhn's notion of disciplinary matrix. Gilbert argues that members of a scientific community can collectively accept certain beliefs that they do not hold individually. This occurs due to the joint commitments assumed by group members, which make scientific communities resistant to change. This phenomenon aligns with Kuhn's description of normal science, in which members of a scientific community adhere to a disciplinary matrix composed of symbolic generalizations, metaphysical assumptions, values, and exemplary cases. These elements can be considered collective beliefs that constrain researchers' critical attitudes, reducing their work to puzzle-solving. However, Kuhn also asserts that the disciplinary matrix, although inherently conservative, is fundamental to the development of science, as it itself fosters the emergence of anomalies that can stimulate scientific revolutions.

Keywords: Collective beliefs, disciplinary matrix, scientific revolution, Gilbert, Kuhn.

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[2] É professor na Universidade Federal da Fronteira Sul (UFFS), Chapecó, Santa Catarina, Brasil.
[3] ORCID: https://orcid.org/0000-0002-5156-627X.

Introduction

Ideally, scientific inquiry aspires to uncover the truth beyond prejudices, superstitions, personal biases, and irrational beliefs. Research should employ rigorous methodologies and recognize as factual only that which has been demonstrated through the most refined and critical procedures.

Yet science is a human enterprise, and as such, it must also be understood as a collective human activity. The dynamics of this activity are, to a significant extent, shaped by the beliefs of the individuals who partake in it. One may argue that it is individual beliefs that impel scientists to engage in inquiry, to commit themselves to certain presuppositions, and to advance novel contributions to scientific knowledge. In this regard, the beliefs maintained by a scientific community may be seen as the collective expression of the convictions held by its members.

On the other hand, Margareth Gilbert (2000) suggests that sometimes the beliefs attributed to a scientific community do not result from the mere sum of the beliefs of its members. It is possible that even the majority of its members do not share these beliefs. Nevertheless, they attribute these beliefs to the community of which they are part, as they are, in some sense, collectively committed to them. A collateral effect of this collective dynamic is that scientific communities tend to be conservative, resisting change. Even when individual members may be inclined to alter their beliefs, their collective commitment to these beliefs can present an insurmountable obstacle, preventing change.

The general aim of this text is to discuss the phenomenon of non-summative collective belief, as proposed by Gilbert, in connection with the theme of scientific changes.

One of the most important authors to address scientific change is Thomas Kuhn (1996). Through his historical analysis, he develops key concepts for understanding how scientific communities emerge, how they are able to engage new members, and how they persist even in the face of their explanatory limitations. Kuhn also illustrates how science, constituted by intrinsically conservative scientific communities, is capable not only of developing consolidated research lines, expanding scientific knowledge, but also of promoting changes (revolutions).

In order to better understand the notion of non-summative belief in the context of scientific change, an attempt is made to align it with the concept of disciplinary matrix, as presented by Kuhn. Two main hypotheses are proposed: first, that non-summative collective beliefs refer to an aspect of what Kuhn conceived with the notion of the disciplinary matrix; second, that the view which holds non-summative collective beliefs as obstructing or even preventing the growth of scientific knowledge is false, when we consider more broadly the role they play in science, as seen through Kuhn's lens.

1. Collective beliefs and resistance to scientific change

Margaret Gilbert advocates a non-summative conception of collective beliefs. That is, her conception "does not state or imply that in order for a group G to believe that p, most members of G must believe that p" (2000, p. 20).

According to her, "there is a *collective belief that p* if some persons are jointly committed to believe as a body that *p*" (Gilbert, 2000, p. 39). This joint commitment creates a bond of obligations among the members towards the group, such that statements or behaviors contrary to the collective beliefs come to deserve punishment, ranging from mild reproach to complete ostracism. Because of this, in some situations, even if the majority of the members do not believe that *p*, they may still feel jointly committed to believing that *p*, and this will be the group's position.

With this non-summative conception of collective belief, Gilbert aims to highlight the fact that scientific communities resist change. This occurs because individuals, when organizing themselves into groups, establish a joint commitment that cannot be easily abandoned. Thus, in certain situations, even if the majority of the members of a group do not believe that p, the joint commitment obliges them to uphold the belief that p as the belief of the group.

A central issue here is that the existence of the group and belonging to it are considered valuable by the individual. For this reason, they maintain their commitment. The individual may consider that their personal projects depend on the group and that making a statement contrary to the collective beliefs could have not only personal consequences but also lead to a crisis or even the disintegration of the group (Gilbert, 2000, p. 44). If members find themselves in this situation, for some time, the beliefs attributed to the group will not correspond to what they individually believe. Furthermore, the commitment may hinder the growth of human knowledge, preventing researchers from proposing new approaches (Gilbert, 2000, p. 45).

The notion of collective belief, in its most problematic aspect – its non-summative configuration – is proposed by Gilbert in response to certain phenomena in the dynamics of scientific development. For her, "collective belief, rather than a belief that all members of a community personally hold, has a title to be considered both the end point of scientific change and its beginning" (Gilbert, 2000, p. 43). Collective beliefs establish certain points of consensus around which scientific communities are organized. They are both at the beginning and the end of scientific changes because "new ideas are ideas new in relation to a certain consensus. The process of change ends with a new consensus" (Gilbert, 2000, p. 42).

2. The Disciplinary Matrix as Collective Belief

To analyze the dynamics of scientific development, we will use Thomas Kuhn's work, *The Structure of Scientific Revolutions*, as a basic reference. His most well-known and perhaps most central concept is that of the paradigm. In his words, paradigms "I take to be universally recognized scientific achievements that for a time provide model problems and solutions to a community of practitioners" (Kuhn, 1996, p. x). In other words, at some point, a particular field of research becomes established by following a given model. This model determines which problems are scientifically relevant and what kinds of solutions are considered acceptable.

In the 1969 postscript, Kuhn clarifies that multiple meanings of the concept of paradigm can be identified in his work. For this reason, he suggests adopting a broader concept: the “disciplinary matrix”. This encompasses various “objects of group commitment” (Kuhn, 1996, p. 182). Among the main ones, he highlights the following:

a) Symbolic generalizations: generally accepted formal expressions that allow the group to apply “the powerful techniques of logical and mathematical manipulation in their puzzle-solving enterprise” (Kuhn, 1996, p. 183).
b) Metaphysical assumptions: these involve heuristic and ontological models that “help to determine what will be accepted as an explanation and as a puzzle-solution; conversely, they assist in the determination of the roster of unsolved puzzles and in the evaluation of the importance of each” (Kuhn, 1996, p. 184).
c) Values: these include elements such as the degree of accuracy of a prediction considered legitimate, simplicity, coherence, plausibility, and the utility of theories, among other similar factors (Kuhn, 1996, p. 185-186).
d) Exemplars: a set of past achievements that serve as a model for research in a particular scientific field (Kuhn, 1996, p. 187). This last object of group commitment is the paradigm in the strict sense (equivalent to the formulation presented in the previous paragraph).

What is important in all of this is to recognize that Kuhn conditions the development of science upon the establishment of a joint commitment to the belief in certain elements which, taken together, constitute what he designates as the disciplinary matrix. From this, what Kuhn calls normal science is constituted.

Referring to the paradigm – perhaps the most significant object of group commitment within the disciplinary matrix – Kuhn states: “Men whose research is based on shared paradigms are committed to the same rules and standards for scientific practice. That commitment and the apparent consensus it produces are prerequisites for normal science, i.e., for the genesis and continuation of a particular research tradition” (1996, p. 11). In normal science, the work of scientists is reduced to solving puzzles – that is, problems selected according to the criteria established by the paradigm, whose rules for solutions are, to a large extent, already anticipated within it. In this activity, scientists focus on contributing to the increase in the scope and precision of the paradigm’s application (Kuhn, 1996, p. 35). However, “it is no criterion of goodness in a puzzle that its outcome be intrinsically interesting or important” (Kuhn, 1996, p. 36). Phenomena for which the paradigm does not seem to anticipate a solution “are rejected as metaphysical, as the concern of another discipline, or sometimes as just too problematic to be worth the time” (Kuhn, 1996, p. 37). The criteria for selecting puzzles to solve, therefore, are provided by the paradigm itself and relate to the possibilities of its consolidation or expansion.

I would like to bring Kuhn’s concept of disciplinary matrix closer to Gilbert’s notion of collective belief. The disciplinary matrix is a collective belief insofar as there is a joint commitment around it that determines the “rules and standards of scientific practice”. Belonging to a scientific community means committing to its disciplinary matrix. The role of formal education, “that prepares and licenses the student for professional practice" (Kuhn, 1996, p. 5), would precisely be to instill this commitment in individuals.

As outlined in the introduction, according to Gilbert, "there is a *collective belief that p* if some persons are jointly committed to believe as a body that *p*" (2000, p. 39). Within the framework of normal science, as proposed by Kuhn, *p* encompasses the various "objects of group commitment" (Kuhn, 1996, p. 182) previously discussed. The community of scientific practitioners collectively believes that: a) certain symbolic generalizations are the most suitable for the logical and mathematical treatment of their objects of study; b) specific metaphysical presuppositions serve as valid starting points for evaluating the legitimacy and significance of problems and solutions; c) a given degree of precision, simplicity, coherence, plausibility, usefulness, etc., is considered sufficient for the scientific validity of their practices; d) certain past scientific achievements serve as exemplary models to guide current research.

Thus, the disciplinary matrix is not, in itself, a set of collective beliefs. It comprises logical-linguistic procedures, metaphysical concepts, values, expectations, methodological frameworks, historical facts, among other elements. However, insofar as these elements are "objects of group commitment", they constitute the content of the beliefs held by the community of scientific practitioners. That is, the community is defined by its collective belief in this specific constellation of elements.

3. The Disciplinary Matrix as a Fundamental Constituent of Scientific Communities

One concept worth explaining here is that of the scientific community. The way these communities are formed significantly reflects the role of the disciplinary matrix in the development of science, as it constitutes a set of beliefs that generates the joint commitment necessary for the practice of research.

For Kuhn, the defining elements of scientific communities, in general, are as follows (1996, p. 176-178):

e) their members have similar professional training;
f) they were educated using the same literature, interpreted in essentially the same way;
g) this literature defines a specific object of study;
h) "the members [...] see themselves and are seen by others as the sole individuals responsible for pursuing a set of common goals, which include the training of their successors";
i) there is extensive communication among them; and
j) "professional judgments" are "relatively unanimous".

These characteristics can be attributed to scientific groups at varying degrees of generality. Thus, for Kuhn, scientific communities exist at different levels. "The most global is the community of all natural scientists". At a more specific level, we have "physicists, chemists, astronomers, zoologists, and the like". More specifically still, we find "organic chemists, and perhaps protein chemists among them, solid-state and high-energy physicists, radio astronomers, and so on" (Kuhn, 1996, p. 177). These levels indicate the degree of specificity of collective beliefs to which members commit jointly. More general communities share broader beliefs, underlying a wide range of investigations. Conversely, in more specialized communities, beliefs become increasingly specific and are not applicable to other groups. These beliefs involve defining objects of study, research objectives, methodologies, and other elements that delineate scientific practice. Ultimately, scientific communities, at any level, can only form through a common commitment to specific collective beliefs[4].

4. Non-Summative Beliefs as Elements of the Disciplinary Matrix

A scientific community engaged in normal science, by emphasizing its commitment to its foundational disciplinary matrix, becomes conservative. As Kuhn states, it "often suppresses fundamental novelties because they are necessarily subversive of its basic commitments" (1996, p. 5).

More than that, the very critical discussion of collective beliefs – that is, of the disciplinary matrix – is rendered unfeasible. For Kuhn, this is evidenced by the relationship between science and philosophy itself: "Scientists have not generally needed or wanted to be philosophers. Indeed, normal science usually holds creative philosophy at arm's length, and probably for good reasons. To the extent that normal

[4] This does not imply that joint commitment is what gives rise to beliefs, nor that belief and joint commitment are synonymous. Joint commitment does not generate the content of collective beliefs; rather, it enables the members of a group to recognize that a given belief ought to be attributed to the group, regardless of whether its individual members personally hold it. In Gilbert's account, joint commitment is not an explanation for the origin of beliefs, but for the non-summative nature of collective belief.

research work can be conducted by using the paradigm as a model, rules and assumptions need not be made explicit" (1996, p. 88). In other words, for Kuhn normal science involves philosophical commitments but is not interested in the examination of them. First, because the scientific community believes it possesses sufficient clarity and justification of its assumptions. Second, because the critical nature of philosophical analysis may prove to be "an effective way to weaken the grip of a tradition upon the mind and to suggest the basis for a new one" (Kuhn, 1996, p. 88). This is because the search for the foundations of a tradition may end up revealing its limitations and proposing, directly or indirectly, the need to go beyond them.

This phenomenon is similar to the one described by Gilbert when referring to collective beliefs that are the object of a joint commitment. The commitment acts upon individuals by restricting their capacity for criticism and free opinion. Adopting certain beliefs becomes a condition for belonging to the scientific community.

What type of collective belief could give rise to a joint commitment with such a conservative effect? This question is not sufficiently examined in Gilbert's account. It appears that any proposition accepted by the scientific community could generate such a commitment. However, drawing on Kuhn's analysis of the dynamics underlying the constitution of scientific communities, it is more plausible to suggest that this form of commitment emerges specifically in relation to elements intrinsic to the disciplinary matrix or directly implicated by it. One might further propose that certain elements generate a stronger joint commitment than others, depending on the extent to which the objectives of the scientific community are bound to them. This distinction is crucial for understanding non-summative collective beliefs: such beliefs arise precisely because the very existence of the group is contingent upon adherence to specific propositions. When disagreement concerning these propositions arises among members – yet the advantages of group membership are still recognized – the beliefs attributed to the group as a whole will not necessarily reflect the individual beliefs of its members.

5. Disciplinary Matrix and Scientific Change

For Kuhn, on the other hand, the joint commitment that generates the conservatism of normal science does not prevent change. According to him, "so long as those commitments retain an element of the arbitrary, the very nature of normal research ensures that novelty shall not be suppressed for very long" (1996, p. 5). Since normal science aims to maximize the validity of its foundational disciplinary matrix, the possibility of the emergence of an anomaly is always present.

Initially, the anomaly may simply be overlooked. However, the effort to consolidate the research tradition leads to the necessity of reducing it to what can be predicted by the disciplinary matrix. If this proves unfeasible, it can trigger a crisis in normal science, paving the way for a scientific revolution.

Kuhn evidently agrees with Gilbert that "scientific change is essential to the progress of science" (Gilbert, 2000, p. 37). However, he also considers the conservatism of normal science equally essential, even if it involves arbitrary choices:

> The areas investigated by normal science are, of course, minuscule; the enterprise now under discussion has drastically restricted vision. But those restrictions, born from confidence in a paradigm, turn out to be essential to the development of science. By focusing attention upon a small range of relatively esoteric problems, the paradigm forces scientists to investigate some part of nature in a detail and depth that would otherwise be unimaginable. And normal science possesses a built-in mechanism that ensures the relaxation of the restrictions that bound research whenever the paradigm from which they derive ceases to function effectively. At that point scientists begin to behave differently, and the nature of their research problems changes. In the interim, however, during the period when the paradigm is successful, the profession will have solved problems that its members could scarcely have imagined and would never have undertaken without commitment to the paradigm. And at least part of that achievement always proves to be permanent (Kuhn, 1996, p. 24-25).

In Kuhn's assessment, commitment to a disciplinary matrix fosters the growth of human knowledge. It is true that it generates a tendency to reject novelties, understood as anything new in relation to the disciplinary matrix. Still, without adherence to it, the degree of specialization and sophistication that characterizes modern science would not be possible.

On the other hand, this attitude of rejecting novelties is not permanent. When anomalies persistently arise, space opens for extraordinary research – that is, investigations not based on the prevailing disciplinary matrix. At this point, for instance, scientists themselves turn to philosophy, seeking to reconsider the assumptions they have been adopting. Kuhn, a physicist by training, mentions examples of this phenomenon, stating that "the emergence of Newtonian physics in the seventeenth century and of relativity and quantum mechanics in the twentieth should have been both preceded and accompanied by fundamental philosophical analyses of the contemporary research tradition" (1996, p. 88).

6. Joint Commitment and the Nature of Scientific Knowledge

The phenomenon that is most relevant here for understanding the emergence of collective beliefs is the formation of a research tradition. How does adherence to a disciplinary matrix occur? How is the joint commitment to certain collective beliefs generated?

For Kuhn, change begins with the failure of normal science's approaches: "Failure of existing rules is the prelude to a search for new ones" (Kuhn, 1996, p. 68). However, the mere existence of anomalies does not necessarily lead to a new disciplinary matrix, as they can simply be interpreted by normal science as challenges to be overcome precisely through its research. Moreover, Kuhn notes in his historical study that "once it has achieved the status of paradigm, a scientific theory is declared invalid only if an alternate candidate is available to take its place" (1996, p. 77).

This can be understood by taking into account the importance Kuhn assigns to the disciplinary matrix in the development of science. Without an available alternative, a scientist would be forced to abandon their profession if they were to reject their commitment to normal science. This aspect is particularly decisive for understanding situations where the beliefs of individual members do not align with the beliefs attributed to the group.

In the face of anomalies, it is possible that a significant portion of the members suspends their belief in proposition *p*. However, if this proposition is crucial to that research tradition (i.e., if it is part of its disciplinary matrix), publicly acknowledging disbelief would imply leaving the group, which is only practically feasible if an alternative perspective exists. Until such an alternative emerges, members may prefer to remain faithful to the beliefs traditionally attributed to the group. This is also because, as Kuhn demonstrates, one can never be entirely certain about the meaning of an anomaly – that is, whether it truly necessitates abandoning normal science or if it is merely another puzzle to be solved.

In this way, scientific change is only possible if a new disciplinary matrix is proposed – one that creatively articulates solutions to problems that normal science seems unable to solve. The question now arises: how is the scientist to decide between remaining faithful to normal science or embracing (or proposing) a new disciplinary matrix in the making?

For Kuhn, the dispute between disciplinary matrix can result in a true "dialogue of the deaf". Since each disciplinary matrix proves effective in solving certain problems, but not all, the issue becomes determining which problems are the most significant. Thus, it can only be answered "in terms of criteria that lie outside of normal science altogether" (Kuhn, 1996, p. 110).

Among those most committed to a tradition of normal science, the most common attitude is resistance to change. This is based on the "assurance that the older paradigm will ultimately solve all its problems, that nature can be shoved into the box the paradigm provides" (Kuhn, 1996, p. 151-152). On the other hand, among those proposing a new disciplinary matrix – often outsiders and novices – the claim is that "they can solve the problems that have led the old one to a crisis" (Kuhn, 1996, p. 153).

A key issue is that justification, in a scientific sense, is only possible by adopting certain assumptions. Consequently, "there is no neutral algorithm for theory-choice" (Kuhn, 1996, p. 200). Furthermore, "debates over theory-choice cannot be cast in a form that fully resembles logical or mathematical proof" (Kuhn, 1996, p. 199). This is the thesis of the incommensurability between disciplinary matrices. Seemingly, competing theories appear to oppose arguments with the goal of rationally resolving their disagreements. However, according to Kuhn, even though these theories might use the same terms, they connect them differently to nature (1996, p. 198), based on the paradigmatic assumptions they adopt. Since none of the theories can fully demonstrate the validity of its disciplinary matrix, offering only the expectation that this might be achieved someday, the dispute can only be resolved through strategies of persuasion.

For Kuhn, this fact is not foreign to science, even though it contradicts the traditional image held of it. For him, "That debate is about premises, and its recourse is to persuasion as a prelude to the possibility of proof" (Kuhn, 1996, p. 199). For scientific proof to be produced, it is necessary to mobilize a group of investigators toward this purpose: "[...] if a paradigm is ever to triumph it must gain some first supporters, men who will develop it to the point where hardheaded arguments can be produced and multiplied"

(Kuhn, 1996, p. 158). In other words, the beliefs conveyed by the disciplinary matrix can only be justified after a process of investigation. The attempt to go beyond what is known, implicit in science, always involves some methodological challenges (observational or experimental techniques, the development of definitions, theories, and formal systems, etc.). Only after the development of several of these elements – which may prove to be an extremely arduous task – will it be possible to critically evaluate the degree of justification a scientific approach possesses. For Kuhn,

> in this sense it is the community of specialists rather than its individual members that makes the effective decision. To understand why science develops as it does, one need not unravel the details of biography and personality that lead each individual to a particular choice, though that topic has vast fascination. What one must understand, however, is the manner in which a particular set of shared values interacts with the particular experiences shared by a community of specialists to ensure that most members of the group will ultimately find one set of arguments rather than another decisive (1996, p. 200).

Here, collective beliefs can be associated with two other elements that precede the emergence of a disciplinary matrix: "shared values" and "particular experiences shared by a community of specialists". For a joint commitment to be generated, most of the group must draw similar conclusions from these two elements regarding the disciplinary matrices in dispute. However, what Kuhn seeks to emphasize here is that this decision-making process is not under the control of the individual.

For scientific activity to be possible, it is necessary to establish a joint commitment around certain beliefs. Due to incommensurability, the choice of one approach over another cannot be justified in a neutral or absolute sense but only relative to each disciplinary matrix. Worse still, when disciplinary matrices are in their early stages of development, they cannot offer many arguments in their favor beyond expectations and promises. Adherence to a disciplinary matrix could thus be seen as arbitrary. However, since science can only be conducted within a research community where members establish a joint commitment to certain collective beliefs, what "acts" is not the arbitrariness of individual decisions but the dynamics of interaction between shared values and common experiences. It is the outcome of this dynamic that persuades individuals to adhere to a particular proposal.

As can be seen, Kuhn presents science as an eminently social activity, to the extent that scientific communities effectively function as doxastic agents. However, what Kuhn proposes with this is simply the idea that individuals, in practicing science, find themselves embedded in scientific communities that presuppose certain collective beliefs with which they must align. These beliefs are, to some extent, dogmatic (because they are not entirely justified) but not absolutely rigid. Nevertheless, changing or simply abandoning them, in ways that are significant for scientific development, is not a task that an individual can undertake alone. As he states:

> if all members of a community responded to each anomaly as a source of crisis or embraced each new theory advanced by a colleague, science would cease. If, on the other hand, no one reacted to anomalies or tt' brand-new theories in high-risk ways, there would

> be few or no revolutions. In matters like these the resort to shared values rather than to shared rules governing individual choice may be the community's way of distributing risk and assuring the long-term success of its enterprise (Kuhn, 1996, p. 186).

It is obviously possible for an individual to change their views and stop sharing the beliefs of their scientific community. However, this will have no significance for science unless their proposal can be accepted by others and inspire a new scientific approach. The dynamics of this change within science are what Kuhn refers to as a scientific revolution. However, the conservatism of science prevents any anomaly from being immediately used as a justification for a revolution. This is positive, as it avoids abandoning a particular model of investigation before its heuristic potential has been fully exhausted.

Conclusion

As can be seen, with the introduction of the concept of non-summative collective beliefs, Margaret Gilbert raises a problem concerning scientific communities: they are viewed as inherently conservative, resistant to the changes that occur in the beliefs of their individual members. That is, even if the majority of members change their beliefs, their participation in a joint commitment to certain beliefs ascribed to the group prevents the group as such from altering its stance. For Gilbert, this constitutes an obstacle to innovation and scientific progress.

In Thomas Kuhn’s work, we can identify within the disciplinary matrix a set of beliefs shared by the members of a scientific community. These beliefs encompass formalized ways of representing phenomena, metaphysical assumptions, scientific values, and paradigmatic examples of past scientific achievements. A joint commitment to the acceptance of these beliefs is what enables the formation and continuity of a scientific community, fostering the development of a research tradition within normal science.

Kuhn, too, acknowledges that this joint commitment often results in the suppression of fundamental novelties. Elements most central to the disciplinary matrix are safeguarded from criticism – even when some, or even most, members no longer firmly believe in their validity.

Yet, Kuhn maintains that this very collective commitment to the disciplinary matrix does not preclude change. Quite the contrary: it is a condition for change. And this for two reasons. First, such commitment allows for the specialization of research aims and the refinement of methods. Second, the pursuit of extending the disciplinary matrix inevitably leads to the emergence of anomalies.

However, not every anomaly necessarily engenders scientific change. An anomaly may be interpreted simply as another puzzle to be solved within the prevailing framework of the disciplinary matrix. For Kuhn, this conservatism also has a positive function. It prevents a research community from disintegrating at the first sign of an explanatory challenge, thereby allowing it to fully explore the heuristic potential of its matrix.

Based on the arguments presented, it is possible to establish the following relations between Gilbert's concept of non-summative collective belief and Kuhn's concept of disciplinary matrix. The issue is that, for Kuhn, it is only within the framework of normal science that one can formulate arguments capable of critically evaluating and even scientifically justifying theories. This is because, prior to the establishment of such framework, theses lack the necessary clarity and objectivity to be subjected to testing, nor are there sufficiently accepted reference points by which such tests could attain any validity. This implies that, for Kuhn, collective beliefs are presuppositions of any procedure of verification or justification that science might propose. Only when the members of the scientific community accept the constitutive elements of a disciplinary matrix do such processes become possible.

In this way, Kuhn highlights the fact that scientific knowledge, by its very nature, is not merely the product or expression of individual beliefs. There exists a range of social factors, intrinsic to the constitution of scientific communities, that serve as parameters for the production of knowledge. Individuals, of course, form their own beliefs and are the agents of scientific knowledge, but it is essential to science that it not to be subjected to the volatility, subjectivity, and diversity of individual beliefs. Collective beliefs – even in the non-summative sense – embedded in disciplinary matrix, mobilize individuals and enable the systematic, methodical, and to a certain extent, critical development of specific sets of epistemic expectations which could not otherwise be explored. And it is this very process that is also responsible for scientific change.

Resumo: O objetivo deste artigo é compreender a relação entre crenças coletivas e ciência. O artigo aproxima a concepção não somativa sobre crenças coletivas, desenvolvida por Margaret Gilbert, da noção de matriz disciplinar, proposta por Thomas Kuhn. Gilbert defende que os membros de uma comunidade científica podem aceitar coletivamente determinadas crenças que não possuem individualmente. Isso ocorre devido aos compromissos conjuntos assumidos pelos membros do grupo, que tornam as comunidades científicas resistentes a mudanças. Esse fenômeno está de acordo com o que Kuhn afirma acerca da ciência normal, em que os membros de uma comunidade científica aderem a uma matriz disciplinar, composta por generalizações simbólicas, pressupostos metafísicos, valores e casos exemplares. Esses elementos podem ser considerados crenças coletivas que restringem a atitude crítica dos pesquisadores, reduzindo seu trabalho à resolução de quebra-cabeças. Entretanto, Kuhn também afirma que a matriz disciplinar, embora seja a princípio conservadora, é fundamental para o desenvolvimento da ciência, pois ela mesma enseja o aparecimento de anomalias que poderão estimular revoluções científicas.

Palavras-chave: crenças coletivas, matriz disciplinar, revolução científica, Gilbert, Kuhn.

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