

# Argumentation: criticality and contribution in scientific discourse

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## Science and society: advances drive the dialogue

With its own method, science gained social credibility by expressing truths about the origin of the universe and man himself competently. This reputation was built in contexts of revolutions that rejected theories and established new paradigms, greatly modifying scientific practice. We can affirm that the succession of revolutions, described in Kuhn (2011), confirms the relevance of scientific metamorphosis and the experiences arising from the path followed, paying attention to the volatility of their contributions when detailed in time and space.

In "The structure of Scientific Revolutions", Kuhn (2011, p.27) points out that "a scientist's world is qualitatively transformed [and] quantitatively enriched by fundamental novelties of either fact or theory". The author evidences that the twentieth century is marked by the transition from an individualistic (metaphysical) natural science, linked to areas of significant technological and economic impact, to an apolitical science practiced by specialized communities that sustain the primacy of methodological rigor. Fuller (2003) reports that social scientists felt relieved and welcomed when they noted that the title "science" assumes this new conception in this context.

The scientific authority, preserved with Kuhn, rests on the reliability attributed to its method. The results of the investigations carried out exert power over society, transforming it and favoring the emergence of new demands – dialectical movement resulting from this continuous interaction. In the 21st century, science is conceived as culturally constructed and situated, incorporating local and universal knowledge – increasingly inclusive contours of the human and social areas that bring together scientific agents and those interested in science -, a concept diffused by scholars such as Miller (1983) and Latour (2005).

It is inferred that, as science generates knowledge and explanations for the phenomena and situations investigated, the social reality is transformed and starts to generate scientific justifications to understand this modified reality. In this context, the scientific revolution highlights the role of the researcher-interlocutor, as this subject uses his socio-cultural repertoire, without neglecting the specificity of the scientific language, to produce a discourse imperatively clear, cohesive, free from subjective contamination and impartial (Targino, 2010). According to Minayo (2002, p.14), "it is not only the researcher who gives meaning to his intellectual work, but human beings, groups and societies grant meaning and intentionality to their actions and their constructions". Hedges (2002, p.118) argues that "text is the materialization of language in a certain social environment, in which this language performs a specific function". The conceptions these authors present meet the sense of science in the current century: a science concerned with the well-being of humanity, which focuses on socially relevant phenomena, not limited to the economic and technological, and which needs to communicate its contributions to those who yearn for them.

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In the following sections, we will focus on the discourse presented in the text of scientific articles that, although the production is inseparable from the researcher, need to obey production standards intrinsic to the genre they belong to in order not to compromise the conception of what is scientific and, therefore, the methodological effort undertaken.

## Specifics of the scientific text

The discourse expressed in the scientific text is guided by rules that seek to ensure its objectivity and impersonality. According to Targino, the scientific text should be linguistically concise, accurate, objective and formal, using the verb in the 3<sup>rd</sup> person singular or in the 1<sup>st</sup> person plural (Targino, 2010). The peculiarities presented do not draw inferences about the superstructure of the scientific text (introduction, theoretical framework, method, results and conclusion), but concern intrinsic aspects that guide the textual production.

By disseminating the scientific discourse through its definitive publication in journals, the researcher agrees to the established rules, both with regard to the format of the document and the lexicon used to express the ideas and findings of the research. The authority of the scientific discourse is confused with the institutional authority. There is a tacit agreement between those who produce the scientific discourse and the parties involved in the evaluation and validation process of this discourse, as the academic environment is controlled and monitored by rules.

Based on a socio-constructivist vision, Ivanič (1998) considers the academic text as a reflection of standards and conventions drawn up by a group of subjects who define themselves, among other things, by their discursive practices. According to Koch (2010), the subject-organizer-planner builds the text based on complex factors, such as his/her expectations, convictions and beliefs, cultural and social rules and conventions, his/her interrelationship with other subjects and shared knowledge, which give meaning to the text. This critical capacity and rationality support the argumentation: fertile ground for innovation and effective contributions.

We need to understand that the fact of observing the rules of formal writing for the production of scientific discourse should not imply textual non-criticality. We agree with the idea that there is no fully exempt science (Fiorin, 1993; Minayo, 2002; Franco, 2004; Morin, 2005; André, Henriques & Alves, 2005; Cardoso, 2006 and Campos, 2012) and this does not imply that we disagree with the methodological rules linked to “scientific doing”, nor do we disagree with those inherent to textual structuring. We merely believe that these rules are not entirely effective for the purposes they are intended for: to make the scientific text exempt from its own authorship. This belief results from the fact that the text produced is historically and socially detailed, and therefore expresses the conception of its author at the moment when (s)he conceives the first ideas about the object (s)he intends to investigate.

The efficiency of the communication established between science and society is evidenced when the application of the rules inherent in this scientific genre does not “mute” its authors, compromising the contribution of the study. What is inadmissible to the discourse of a scientific article is not an element of “censorship”, which restrains criticality and the establishment of explanations/justifications for the object or phenomenon under study. The modesty and limitations, evidenced by the excess of citations, sometimes used in spaces that should rest on the results of the study and the researcher’s capacity of inference, may signal that there are greater problems linked to his/her educational background or acceptance in a certain hegemonic group.

Koch (2002, p. 83) points out that the ideological relationships of discourse involve subjectivity intrinsic to the power of argumentation; for the author “there are no neutral statements and, as a result, argumentativeness is an inherent feature of human language”. When disseminating research results, science uses linguistic precepts capable of constituting, through discourse, the integrity and security of its findings.

## Argumentation in scientific discourse

Before discussing argumentation, we emphasize that discourse is conceived here as a way to establish power, in the contemporary context, which is profoundly related with cognition and with the social, one of the important conditions of the “minds” that all individuals in society enjoy (Van Dijk, 2008). Understanding the discourse involves understanding its production conditions (Pêcheux, 1990), that is, the circumstances that led to its elaboration and the historical conjuncture in which it was generated. According to Coracini (1991) the scientific discourse, like all others, is constructed socially and historically and its meaning is consolidated anchored in several previous texts.

Reading and writing practice are essential foundations to develop argumentative skills. According to Mazière (2007), reading feeds the work of memory and the resumption of the already-said in the construction of meanings. The quality of the explanations that constitute the arguments elaborated and the grammatical competence to write them, however - cohesion, coherence, semantic aspects, phrasal structuring, among others -, make the act of arguing complex and challenging. Ducrot (2009) synthesizes these skills in two classifications: rhetorical argumentation and linguistic argumentation.

According to Ducrot (2009), rhetorical argumentation is the verbal activity that expresses the ability to persuade, that is, to make an individual believe in someone or something (what we understand as quality of explanation); on the other hand, linguistic argumentation refers to the logical organization of discourse segments woven by the chain of propositions linked by argumentative operators, in which one proposition is an argument and the other a conclusion, extending this logic to the sequential chains of paragraphs.

Jiménez-Aleixandre and Erduran (2007) present argumentation as justification, persuasion, and controversy. Argumentation as justification is similar to what Ducrot points out as linguistic argumentation and concerns lines of reasoning, empirical evidence and theoretical ideas that justify a statement. In the same way as Ducrot, Jiménez-Aleixandre and Erduran (2007) understand argumentation as persuasion when its basic foundation is to convince, such as the conviction of the scientific community. These authors present the argumentation by controversy as that resulting from different positions in relation to the same theme.

Resuming the discussion of the discourse in scientific articles, we understand that this textual genre provides opportunities for the researcher to establish contributions based on argumentative critical positioning presented here, or rather, much more than opportunity, the findings of a research carried out in a scientific article enforce the social function of science. We argue that the weaving of discourse in scientific texts requires extra attention, because the authority and power exercised by this type of text can make it socially lethal.

The dissemination of rhetoric based on justifications that go beyond the results or even on explanations resulting from decontextualized studies without scientific rigor can flaw the credibility of science. In addition, the communication noises resulting from an impaired interpretation render the scientific knowledge deriving from research that originally has significant social relevance useless.

According to Koch (2002, p. 17) “as a being endowed with reason and will, man constantly evaluates, judges, criticizes, that is, forms value judgments”. This statement leads us to believe that the rules for the construction of scientific discourse, cited in the previous section, seek to confer “truth” and avoid dubious interpretations of scientific findings. One example is the incoherence of rhetorical arguments in descriptive research analyses, published as articles, whose relative frequency comparisons do not rest on a baseline reference period - we commonly call this mistake “meaningless elevator analyses”; as well as in analyses without criteria that logically sustain the analogy the author makes: to compare Brazilian and American companies’ financial recovery capacity in the post-pandemic period of Covid-19 for example.

We could expand with a series of examples of common mistakes and argumentative opportunities detected in scientific article reviews. That would go beyond our objective though - any attempt to exhaust those examples would be an innocent effort in view of the countless opportunities to articulate ideas and human creativity. The reality experienced in the 21<sup>st</sup> century reveals the possibility of turning research into an opportunity for development and social well-being, but there is no point in faithfully and rigorously complying with the scientific method, or even focusing efforts on the search for social emergencies, if we are anchored in critical and argumentative incapacity.

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