Journal of Systemics, Cybernetics and Informatics (2022) 20(1), 1-44
https://doi.org/10.54808/JSCI.20.01.1

# Trans-Disciplinary Communication

Including editorial notes related to the special issue on
Trans-Disciplinary Communication

Nagib Callaos

*International Institute of Informatica and Systemics (IIIS, www.iiis.org)*
*Editor-in-Chief of the Journal of Systemics, Cybernetics, and Informatics (JSCI)*

*n.callaos@iiis.org*

***Abstract***

*The purpose of this article is to provide a short description of what is Tran-Disciplinary Communication, why it is important, and how it may be achieved. The article will also insert editorial notes related to the special issue in which it is included. Consequently, we will try:*

1) *To describe the objective of this Special Issue FOR Trans-disciplinary Communication,*
2) *To provide a short description of the meaning in which "Trans-disciplinary Communications" is used here,*
3) *To describe the multi-methodical reviewing methodology used in this special issue, i.e.*
   a) *the Dual Peer-Review used, for the initial submissions, in the process for the acceptance for the presentation of the accepted papers at conferences organized by the International Institute of Informatics and Systemics, and*
   b) *the Participative Peer-to-Peer Reviewing (PPPR) used for the required additional reviewing for this special issue of the journal, and*
4) *To show the personal and the common goods that are (or, at least may be generated by and to both: a) the write, b) the potential readers, and 3) to academy, in general, and to Society at large*

## 1. Purpose of this Special Issue

The purpose for this article is to provide context to a special issue of the Journal of Systemics, Cybernetics, and Informatics (JSCI) oriented to fostering trans-disciplinary communication and to supply the reasoning and the required details for showing its importance.

Specifically, the purpose of this special issue is to support and foster Trans-Disciplinary Communication of articles that have already been accepted, for their publication, after their respective peer reviewing. To do so, the authors of the articles, included in this special issue, accepted to re-write the papers they presented at an IIIS's conference in order to make them understandable for academics, researchers, and professionals in other disciplines. This means that the papers published in this special issue were 1) peer-reviewed with regards 1) to their contents and 2) to their expressive form, by beta-readers, via 1) Participative Peer-to-Peer Reviewing, 1) non-authors, and by 3) the Editorial Board of this Special Issue and by its co-editors.

The meta-purpose or the teleological context of this Special Issue is the Program of the International Institute of Informatica and Systemics (IIIS) oriented to support ***intellectual development*** of both: authors and readers, my means of trans-disciplinary communication. In a coming article we are suggesting and trying to show the cybernetic relationships between trans-disciplinary communication and intellectual development, as roughly visualized in figure 1.

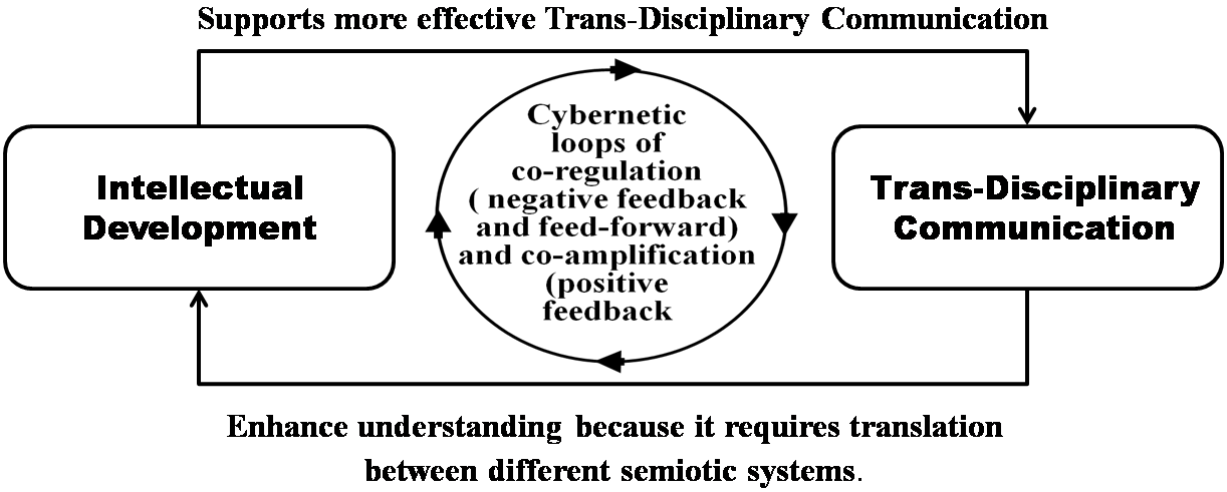


**Figure 1:** A general diagram oriented to show our suggested cybernetic relationships between Intellectual Development and Trans-Disciplinary Communication.

In the mentioned coming article, we will make explicit the implicit knowledge we have, regarding the cybernetic relationships that actually exist between Intellectual Development and Trans-Disciplinary Communication. Making explicit these relationships may accelerate the interacting processes and increase the generations of synergies usually generated by this kind of cybernetic relationships (figure 1). [1]

This special issue is a project in the context of the program oriented to the idea visually summarized in figure 1.

## 2. Meaning of Trans-disciplinary Communication

Inter- and Trans-disciplinary Communication have been used in different senses, denotations, and connotations. This is due to the different purposes and contexts in which they were and are used. This is why we prefer to use the one derived from the etymological meaning of prefix “pre”. The etymology of a term usually provides its general meaning; from which more specific senses emerge along the history of using the same term. The use of the same term in different context and/or with different purpose may create new denotations and connotations.

This why being the root of different senses or meanings, the etymological root frequently suggests a general concept or notion that would comprehend most of the others (if not all), while not being reduced to any of them.

The above paragraph is based on Russell Ackoff’s (Scientific Method: Optimizing Applied Research Decisions, 1962). He also emphasized, along with (Cherry, 1982) the importance of a historical analysis in order to identify the different senses included in the meaning of the term. Given the intended shortness of this article, we will not visit the different senses that these terms have had during their historical uses.

[1] Figure 1 one also represent a complex systems which, as such, have emergent properties that include synergies related to co-regulation, via negative feedback and co-amplification via positive feedback

Etymologically, “trans” is a

> “word-forming element meaning "across, beyond, through, on the other side of, to go beyond," from Latin trans (prep.)”across, over, beyond," (Online Etymological Dictionary)

Consequently, trans-disciplinary communication would mean to communicate 1) "across”, “through” disciplines and/or 2) “beyond”, “on the other side” of, disciplines, i.e. “to go beyond” disciplines. *In the first meaning, Inter-disciplinary Communication* ***relates academics*** *and in its second sense, it relates* ***Academy and Society***. (Figure 2)

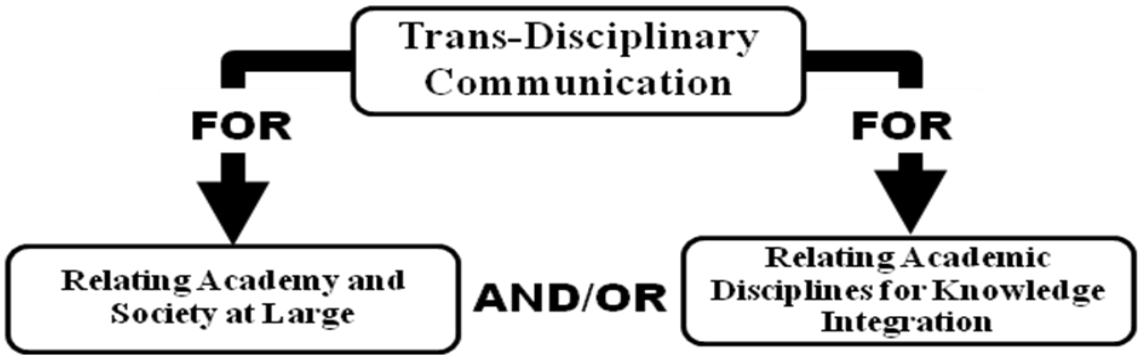


**Figure 2:** The notion of “Trans-disciplinary Communication” includes two general meanings: 1) one is associated to relating academic disciplines in order to support knowledge integration and effectiveness in the solution of real life problems which usually require multi-disciplinary teams and hence, inter- or trans-disciplinary communication, 2) the other is associated to relate Academy with Society at Large, which is necessary a) for the solution and/or the prevention, of social problems as well 2) for the educational responsibility that Academy has in educating, or at least, informing the actual and potential stakeholders.

It is important to notice that *Trans-Disciplinary Communication* is different than *Trans-Disciplinary Field*. For example, Mathematics, Operations Research (Mathematical Optimization), Informatics, etc. are trans-disciplinary fields, because they can be applied to most, if not all, disciplines. But, mathematical or computing

languages are not effective for inter-Disciplinary Communication.[2] (Figure 2) visualizes the meaning given above

## 3. Some Initial General Questions:

Based on Lonergan's[3] Epistemology, experience[4] generates understanding, as long as we make ***questions and try to answer them.*** "Trying" is necessary for getting, according Lonergan, the required *insight;* which, in turn, is required for transforming experience into understanding. This transformation is an important ingredient for intellectual development and since the purpose of academy is to support the intellectual development for educators, educands, and Society at Large, then making questions and trying to answer them would be a necessary condition for the intellectual development of the academic world and well as for its social environments.

Consequently, let us ask some general questions and, then, more specific ones.

What relates all academic disciplines is Natural Language; which also is what relates Academy with Society. This is why we may suggest that Scientific Journalism is a kind of trans-disciplinary communication. If this is true, then, at least one question emerges: why science journalists are able to translate from a Disciplinary Semiotic Systems to Natural Language Semiotic Systems, but a disciplinary scholar or researcher is not prepared for similar translations? ***Is it a matter of aptitude or attitude*****?** Is it a pragmatic issue because this translation would not contribute to the academic advancement in the respective academic

[2] Regarding this issue, John Coffey, via informal communication, made an important comment, regarding the use of natural language for describing algorithms and the potential of pseudo-code as a means to communicating with end-users of information systems. This is good example of making an effective effort to translate from disciplinary semiotic systems to trans-disciplinary semiotic systems. Our experience showed us that interfaces like screens design may also be effective ways of communication with end-users; which is a form of trans-disciplinary communication.

[3] Lonergan (Insight: A study of human understanding, 1992)

[4] According our interpretation, experience includes sense data and implicit/explicit information

promotional system? I am inclined to accept the last potential reason. But, even so, we may have more questions. Is it because some academics confuse the notions of "Precision" and "Rigor", while precision is one way, one means of being rigorous? If this is the case, then a means is being transformed into an end in itself which defies the Means-End Logic[5].

Are we sure that this may be the only reason that may explain why some academics seem to be reluctant to translate from their disciplinary semiotic system to their natural language semiotic systems. The following are examples of the many potential questions we may consider for plausible explanations:

1. Is it possible that, in some situations, an academic or researcher in a given discipline may not really *understand* what s/he teaches? The following two quotations may represent the thought that supported our thinking for making this question.

> ***"If you can't explain it simply, you don't understand it well enough."*** *(Attributed to) Albert Einstein*[6] [Italics and emphasis added]

> ***"I couldn't do it. I couldn't reduce it to the freshman level. That means we really don't understand it."*** *Richard Feynman*[7] [Italics and emphasis added]

[5] We will provide more detail on this issue in subsection 6.2.

[6] Since this is one of the several expressive forms with which this idea is attributed to Albert Einstein, we may infer that he repeated the essence of the idea at different occasions and in different contexts.

[7] Richard Feynman is earned the Albert Einstein Award in 1954 and the Nobel Prize in Physics, in 1965, the same year he published the book referenced by Leonid Perlovsky. He is a known physicist with huge achievements in his life. He is known for the Feynman diagrams, Feynman point, Feynman–Kac formula, Wheeler–Feynman absorber theory, Feynman sprinkler, Feynman Long Division Puzzles, Hellmann, Feynman theorem, Feynman slash notation, Feynman parameterization, Sticky bead argument, One-electron universe, Quantum cellular automata, One-electron universe, Quantum cellular automata, etc. Feynman is also a well known effective teacher, and "was once asked by a Caltech faculty member (David Goodstein) to explain why spin 1/2 particles obey Fermi-Dirac statistics. He gauged his audience perfectly and said, "***I'll prepare a freshman lecture on it." But a few days later he returned and said, "You know, I couldn't do it. I couldn't reduce it to the freshman level. That means we really don't understand it***." (Feynman, 1963) [Italics and emphasis added]

2. Does it require more relational thinking?

3. As we already have asked above, is it because some academics confuse the notions of "Precision" and "Rigor", while precision is one way, one means of being rigorous? If this is the case, then a means is being transformed into an end in itself which defies the Means-End Logic.

4. Is it a lack of intellectual interest in analogical or metaphorical thinking?

5. Is it a lack of interest in making an additional effort oriented to increase the communicational rigor? This question is made because:

    a. if an article has been peer-reviewed and (consequentially) accepted, has already an intra-disciplinary rigorousness because it achieved the ***objective*** of communicating with peers regarding the new original knowledge, while not violating the ***restrictions*** of the respective disciplinary semiotic systems (set of signs and syntactic, semantic and pragmatics rules)[8], then
    b. to translate it for the achievement of another objective (additional readers from other disciplines) in the context of a new set of restrictions enforced by the natural language semiotic system,
    c. then, if the translation between both semiotic systems is adequate and effective, then what has been translated is, by definition, more rigorous than the peer reviewed and accepted intra-disciplinary article

6. Is it a loss or a gain in rigor when a scientific article that has been 1) intra-disciplinarily peer reviewed and accepted, 2) translated by science journalist or communicator, and 3) which translation to natural language has been accepted by the author? The translation might be less precise and using less technical terms, but this does not mean that the related article has less rigor, on the

[8] In subsection 6.2 we will provide details regarding this affirmation.

contrary it has more rigor thanks to the rigor added by the science journalist; which is required to be understood in the context of another semiotic system, i.e., the journalists added at least one objective while also adding more restrictions, related to the syntactic, semantic, and pragmatics rules, hence restriction, of the natural language to which it was translated.

7. All of us know that to translate an academic article, or a book, from (for example) English to Spanish, is the translation is made by a peer, i.e., some who understand what has been written, the translation would be better understood by Spanish academics and their students, than the case of the translator has been made by a non-peer translator. So, why is it not the same situation of translating between disciplinary and natural languages, or semiotic systems?

8. Is it simply a lack of time or interest?

9. Is it a lack of motivation or incentives? Is it because of some academic counter-incentives, especially those related to the academic promotional systems or how the professor would be perceived by her/his colleagues?

10. Is it matter of academic priorities? If the answer is yes: is it related to the academics, as individual, to the academic establishment, or to both?

These kinds of questions are made to better understand the problem or to discard it, as an inexistent problem. In any case, it will certainly improve the academic work, via *reflections* and *reflexions* (or auto-communication, using the notion of Juru Lotman[9])

[9] (Lotman, 1977) referenced by Lei Han (Juri Lotman's autocommunication model and Roland Barthes's representations of Self and Other, 2014)

## 4. Triple Reviewing Methodology

> In a survey of members of the Scientific Research Society, **"only 8% agreed that 'peer review works well as it is'."** (Chubin & Hackett, 1990, p. 192) [Italics and emphasis added]

In section 5, below, we will provide a little bit of more details regarding the lack of effectiveness and weaknesses of the traditional double-blind peer[10]; which might be a necessary condition but, definitely and evidently, is not a sufficient one. This is why the International Institute of Informatics and systemic (IIIS) added the method of non-anonymous reviewers and, in the context of action-methodological-research; the IIIS has been adding more methods, depending on the nature of the publication. In this multi-methodical perspective it is a necessary condition to accept an article is to be accepted by all the methods applied to the article. This means that a full papers, has to be accepted by each method; which alone is ***a necessary condition, but not a sufficient one.*** To accept a final version of a full paper, in this special issue, the full paper had to be accepted necessarily by each one of the three methods.

In the case of this Special Issue, oriented FOR Trans-Disciplinary Communication, we applied the following three reviewing methods; which, as we will see, have different functions or objectives. These methods are two in parallel and one in series, after the two parallel methods are over (Figure 3). We can summarize them as follows:

1. Two methods were included in the first phase, which was oriented the (intra- and inter-disciplinary ***content*** of the paper, which is based on the respective disciplinary or inter-disciplinary fields. This first phase, in turn, included two different reviewing methods, made in parallel. Which are the following:

[10] A much more detailed and extended article may be found at (Callaos N. , Peer Reviewing: Weaknesses and Proposed Solutions, 2011).

a. Non-Anonymous reviewers whose objective was to improve the content of the paper (non-blind reviewing) and
b. 5-10 randomly selected anonymous reviewers in order to improve the decisions related to decision making (Double-Blind Reviewing)

2. The second phase was specifically oriented to the purpose of this special issue, i.e., to be understandable, or effective in conveying the content to academics, research, or professionals in other disciplines.

Figure 3 provide a diagram showing the parallel and sequential processes of the peer three kinds of reviewing processes that supported the quality assurance of the content and the form required by the objective of trans-disciplinary communication.

### 4.1. Content Reviewing Via two Parallel Methods

Figure 3 shows two methods were applied in parallel in the first phase. These two methods are a) the traditional double-blind reviewing for which the anonymous reviewers were selected at random and b) non anonymous reviewers recommended who are colleagues of the respective author, and who are need the approval of the editor(s) and whose emails is verified as belonging to the reviewers. The registered authors of accepted papers get access to both kinds of reviews in order to improve their final version. The two methods that are applied in parallel in the first phase are based on what was recommended by the highly cited author David Kaplan[11] in his article (How to Fix Peer Review: Separating its two functions - improving manuscripts and judging their scientific merit - would help., 2005)

Kaplan's article was published in 2005 and since 2006 the International Institute of Informatics and Systemics (IIIS) is applying a methodology based on his article. This is the methodology applied in the first phase on this special issue as it is shown in upper part of figure 3.

[11] David Kaplan is professor of pathology at the Case Western Reserve University School of Medicine in \

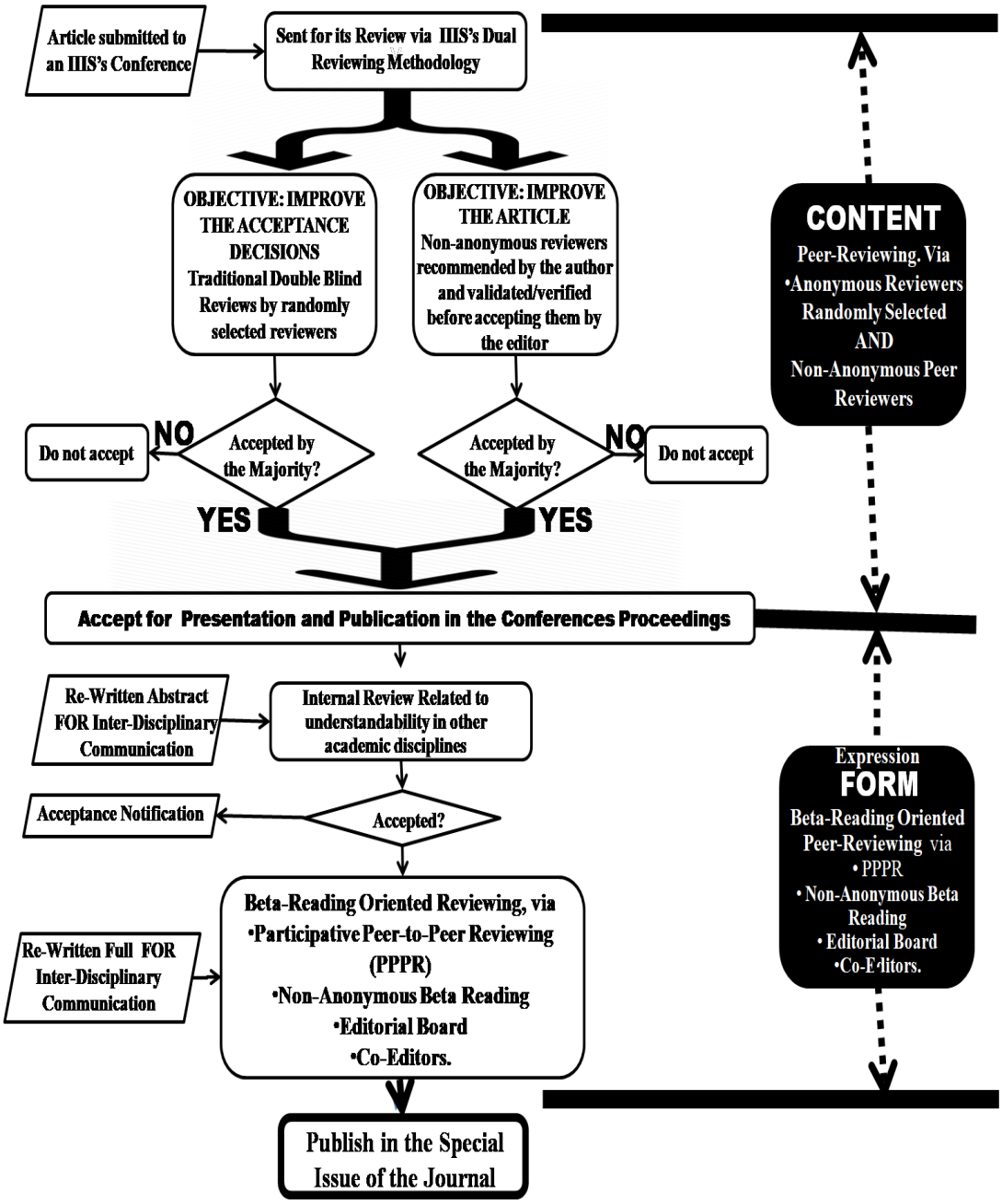


**Figure 3:** The two parallel and the sequential methods applied in the reviewing of this special issue.

Kaplan (2005) affirms that:

> "Peer review subsumes two functions. First, peer reviewers attempt to ***improve*** manuscripts by offering constructive criticisms about concrete elements such as the application of a technique, the strength of results, or the cogency of an argument. The second function of peer review is to render a ***decision*** about the … significance of the findings so that the manuscript can be prioritized for publication. I propose reforming peer review so that the two functions are independent." [Italics and emphasis added]

These two functions are represented by means the two parallel reviewing methods shown in the first phase of Figure 3

Kaplan (2005) continues writing that:

> Review of a manuscript would be solicited from ***colleagues by the authors.*** The first task of these reviewers would be to identify revisions that could be made to improve the manuscript. Second, the reviewers would be responsible for writing an evaluation of the revised work. This assessment would be mostly concerned with the significance of the findings, and the reviewers would sign it. [Italics and emphasis added]

Regarding this issue, the International Institute of Informatics and systemic added a quality assurance procedure, requiring for the respective author(s) the data of non-anonymous reviewer in order to:

1. Approve the non-anonymous reviewer and verify her/his emails address
2. To ask the non anonymous reviewer(s) to also make a quantitative evaluation according the same criteria, applied to everyone else who had submitted a paper for a conference or a journal.
3. To save in the conference, or journal, in the data base of supporting information system all non-anonymous reviews, using the same supporting system used for the 5-10 randomly selected anonymous reviewers.

Regarding the anonymous reviewing process (also represented in Figure 3), Kaplan (2005), suggests that it may not be necessary for the editors to do it. Regarding this issue, he writes:

> "The editors, carrying out the second function of peer review, would then ***decide*** to publish or not based solely on this material. The reviewers' identities would be revealed in the publication. I believe there would be several significant effects of this change in peer review. Moreover, the process would … ***be considerably streamlined***, since there would be no need to send the manuscript out for review. This revision of peer review would change the incentives for all involved. The authors would tend to publish results that represent more complete findings and be more satisfied with the outcome, because they could exert lots of control over the review process. The reviewers would tend to be more honest in their evaluations, not wanting to praise work they consider flawed, because their names would be attached to it. Reviewers would not give a cursory and will- fully negative evaluation, because the authors could simply not forward their comments. It would be in the reviewers' best interests to help improve manuscripts that have flaws but are potentially important. The editors would emphasize publication of manuscripts that have the broadest support among scientists in the relevant community or that have the greatest potential to influence the community. Their jobs would be easier because the number of manuscripts submitted would be fewer, although of more substance. This tendency would be facilitated by editors' publicizing the stringent acceptance requirements. For example, editors could request manuscripts with support from reviewers from the same institution and from other institutions. They could request reviewers in the same field and reviewers in related fields. Peer review is broken. It needs to be overhauled, not just tinkered with. The incentives should be changed so that: authors are more satisfied and more likely to produce better work, the reviewing is more transparent and honest, and journals do not have to manage an unwieldy and corrupt system that produces disaffection and misses out on innovation. [Italics and emphasis added]

We agree completely with the above quote of Kaplan (2005). Even so, we preferred to add an additional quality assurance procedure as it is the case of the Traditional Double-Blind reviewing method. In this way we would increase the certainty level regarding the quality of the decision related to accept (or not) the submitted paper. The parallel two methods in phase 1 (figure 3) represent the equivalent to two decision support systems, which should coincide in the recommended decision. This means that a majority of reviewers in each method should recommend the acceptance of the paper, not the majority of just one of them. In this way ***both methods validate each other regarding decision produced by each of the reviewing method***

*Both kinds of content reviewers (anonymous and non-anonymous) are listed in the page related to the Editorial Board of this special issue*

### 4.2. Quality Assurance for the Specific Purpose of this Special Issue Oriented to Trans-Disciplinary Communication

A protected web page was created as support for Participative Peer-to-Peer Reviewing (PPPR) and all authors, co-editors, and members of the Editorial had a password to access it, in order to review at least one paper via Beta-Reading, i.e., oriented to support and/or assure the legibility and understandability of the papers by academics and professionals from other disciplines. Since the authors of the published papers are from different disciplines in Science, Engineering, and the Humanities, then they would be effective beta-readers of papers written ***FOR*** Interdisciplinary Communication.

Let us provide context for the above paragraph, by means of, briefly, describing what we are meaning with Participative Peer-to-Peer Reviewing (PPPR)

**4.2.1 Participative Peer-to-Peer Reviewing (PPPR):** The notions[12] supporting this methodology are:

a) The notion of ***participation*** should be used in its two main senses: 1) ***to take active part <u>in</u> the process and 2) to take part <u>of</u> the product.*** It is evident that some 'participants' would like to take part ***of*** the product but minimizing her/his participation ***in*** the process. This kind of participants seems not to be aware that their passivity may diminish the quality of the whole product and this would impact them negatively. The best metaphor we can use here is the sport team. They would win or lose and any of these two products would be shared by each member of the team. The role of the coach is to notice when a player in not doing her/his best. So, no matter what is the cause, s/he should take some coaching decision and/or action, in the present game and/or in future games.

b) The notion of "***Intellectual Team"*** is used in order to trigger analogical thinking based on the metaphor "sport team". We may also use the metaphor "Intellectual Partners", but this may represent better the notion of co-authoring or co-editing. To describe explicitly the meaning of Intellectual team without the support of a metaphor, we suggest that it is an intellectual collaboration for the achievement of an intellectual product, to be shared by the members of the team. An intellectual team is not a set of authors or intellects, but an ***intellectual system,*** *i.e., a related and/or relatable set of intellectuals* (academics, researchers, professionals, etc.) An *Intellectual Team* includes interactive intellectual collaboration for the achievement of an intellectual product, which would be shared by the members of the team.

[12] Notice that we will try to make descriptions of the following notions, we are not defining them. A notion may include more than one definition related to different uses of the term. In a more detailed article (Callaos N. , The Notion of 'Notion', 2013) we provided a more detailed reasoning about this issue. Suffice it here to summarize a main conclusion made in mentioned article: a notion is a set, of related, or relationable, senses and uses (denotation and connotation) in which the respective word has mainly been used. This set may be fuzzy set.

(Amey & Brown (2005) affirmed that, in intellectual teams, both: process and product are important. In the specific case of an inter-disciplinary team, their

> "***disciplinary distinctions*** need to be addressed; typical faculty identity issues reconciled, and relationship and behavioral norms established … We believe they are typical of the way in which any interdisciplinary collaboration or intellectual team activity would unfold. Actively socializing people to the team, keeping them involved and their work interconnected, and dealing effectively with the varying range and style of interpersonal interactions are process factors that affect all kinds of collective work. Being aware of the potential need for and knowing how to interject or create the neutral space as well as understanding the interpersonal side of team development, especially when disciplinary boundaries need to be crossed, seems a valuable leadership process. All of this requires attention, regular communication, and ongoing maintenance. In some respects, these examples may be fairly common of any early team development struggles, and yet, especially in contractual situations like funded research and other kinds of outreach scholarship, sufficient time to develop the normative and cultural infrastructure to support team functioning is often minimized, if not eliminated altogether." (Amey & Brown, 2005, p. 32)

This applies even more to a multi-disciplinary team involved in Participative Peer-to-Peer Reviewing (PPPS) of articles written for trans-disciplinary communication, which is the case of this special issue.

c) The notion of **"pay it forward"** (generosity) has been important in many human organizations and pragmatically valuable in many intellectual and professional fields and endeavors. In software debugging and testing, for example, it proved to generate better codes, as measured by the quantity of errors per 100 lines of codes in software debugging and/or the number of errors per 100 lines that emerged in the first year of software maintenance. Ed Yourdon, creator of the Top-Down Methodology for software development

(Structured Analysis, Design, and Programming), in the 70s, shifted 180 degrees toward a Bottom-Up Methodology and used the notion of "pay it forward" in this new and opposite methodology, especially oriented for the phase of software debugging.

Yourdon used, at the 10th International Conference in Software quality, the phrase "Pay It Forward" to refer to what it is necessary in bottom-up quality. According to our experience, since 2007, the more authors participate in the PPPR of other articles, the higher the reliability of the respective acceptance (non-acceptance) process and the higher the quality of the final versions of the respective papers, as well as the quality of their presentation at the conference. Regretfully, the participation frequency in PPPR is not, up to the present, an adequate one

Interviewed by Carol Dekkers (Dekker, 2001) regarding the phrase "Pay It Forward" Yourdon affirmed

> "I want to point out a thought that is something that I picked up elsewhere[13]; I did not invent it at all. It is the title of a book and actually a movie…It is a very simple idea that if someone does you a favor rather than paying it back or ignoring it altogether, that you might reciprocate by paying it forward. You know, passing it on but in kind of an expanding chain. If somebody does you one favor, you pass on the favor forward to three other people and each of those three passes it on to three others and so on. The reason that I was suggesting it, ***particularly in the context of quality assurance in the computer field, that is a bottom-up grass roots approach*** to making things better as opposed to the top-down approach that you see in most business organizations, and frankly in many government and social movements as well. The idea that the president, or the boss, or the CEO is going to figure out how to make things better and then the issue

***13*** **Actual**ly, Catherine Ryan Hyde wrote the best book titled "Pay it Forward" and she is the creator of this notion, or idea. (Ryan Hyde, 2010)

> of edicts and orders that will ripple downward through the hierarchy to cause things to be done in a different fashion. Sometimes, that is important, particularly if you have a charismatic leader who can help break some kind of stalemate or paralysis in an organization. But I think in a lot of cases, it is going to have to come from the bottom upwards, and that was what I was trying to suggest in that conference and to help reinforce it. I made sure that everybody in the conference had a copy of the book. I also told them that I was prepared to follow my own advice by offering a "Pay It Forward" favor to two or three people in the conference". Carol Dekkers (Dekker, 2001) [Italics and emphasis added]

Participative Peer-to-Peer Reviewing (PPPR) requires a **Pay it Forward attitude** from the authors in order to be effective. Paraphrasing Yourdon we can say that each author receiving, or to receive, constructive comment for their article, would/should reciprocate and "pay it forward" by making constructive reviews for three articles. The authors of these the articles would "pay it forward" reviewing nine articles, and so on, in a kind of expanding chain that would generate a continuous quality increasing of each paper, and the quality of all the papers to be presented at the conference, as a whole.

### 4.2.2 Beta-Reading for the second Phase

Since the ***intellectual content*** of the papers published in this Special Issue of the Journal had already been peer-reviewed by the dual-reviewing methodology applied in the first phase (briefly described above in section 4.1.), then PPPR was applied to reviewing of the ***expressive form***, i.e., the rewriting of the content of an already reviewed article, FOR their Trans-Disciplinary Communication.

Consequently, the following is what was expected from the beta-readers who were of three kinds: 1) colleagues of the authors, 2) other authors of the same special issue, and 3) members of the Editorial Board.

1. To review at least one full paper in the sense of beta-reading it and making the suggestions that would required to generate a version more readable to more understandable by academics (and even students) form other disciplines.

   "A **beta reader** is usually a test reader of an unreleased … writing (similar to beta testing in software), who gives feedback from the point of view of an average reader to the author." (Wikipedia, 2022). In this case the beta-reader should be an academic, professional, or student from another disciplines and/or an average reader from the Society at Large (See figure 2)

2. In this special issue beta-reviewers were informed that they were expected to beta-read, at least, two abstracts and one full article and, hence, to provide the editor with the respective comments oriented to assess and/or to improve the trans-disciplinary legibility and/or understandability of the beta-read article. The editor, or co-editor, would provide this comment/advice as an anonymous or with the name of the reviewer. This would be decided by each reviewer, not by the editor, or co-editor.

3. Editorial Board's Members were expected to do the same support as beta-readers but, if possible, to also generate or advice on editorial alternatives that would make a given text more legible or understandable by a reader from any discipline. They may have a minimum of any kind of editorial experience, and/or project or thesis tutoring.

   All beta-readers have been listed in this special issue in the page of the Editorial Board.

## 5. Necessity of a More Reliable Peer Reviewing Methodology.

May the traditional peer reviewing continue to be used as a necessary and sufficient condition as quality assurance procedure for Intellectual Rigor?

We informed in (Callaos & Callaos, 2014) that:

> The International Weekly Journal of Science Nature reported on February 25th, 2014 that "Publishers withdraw more than 120 gibberish papers." Richard Van Noorden8 (2014) affirmed that "Conference proceedings removed from subscription databases after scientist reveals that they were computer- generated...The publishers Springer and IEEE are removing more than 120 papers from their subscription services after a French researcher discovered that the works were computer-generated nonsense... Ruth Francis, UK head of communications at Springer, says that the company has contacted editors, and is trying to contact authors, about the issues surrounding the articles that are coming down. The relevant conference proceedings were peer reviewed, she confirms — making it more mystifying that the papers were accepted….."
>
> "On July 13, 2014, in an op-ed of the Wall Street Journal, Hank Campbell (2014), founder of Science 2:0 website, in an article titled "The Corruption of Peer Review Is Harming Scientific Credibility," informed that the reputable SAGE Publications retracted 60 articles implicated in a peer review ring at the Journal of Vibration and Control. This peer review ring involved assumed and fabricated identities which were used to manipulate the online SAGE submission and reviewing system. Previously The Guardian reported this news with the title "Academic journal retracts articles over 'peer review ring' with bogus scholars." (Jon Swaine, 2014) Steven T. Physics Today reported this fact, on July 11, 2014, with the title "Peer-review fraud cited in retraction of 60 academic papers." S. T. Corneliussen, a media analyst for the American Institute of Physics, referring on other publications, affirms in a (Wall Street Journal op-ed: "Corruption of peer

> review is harming scientific credibility, 2014) "the penalties for scientific fraud are generally insufficient, with too little repayment of misused funding, with too little professional ostracism of offenders, and with resignations forced—and criminal charges filed—too rarely." (Callaos & Callaos, 2014, pp. 79-80)

All the above along, with an experience we had in the IIIS, in 2005[14], triggered research oriented to improve peer-reviewing methodology. The still ongoing research, showed different causes one of which was quickly identified. It is related to procedures, policies, rules, methods regarding a ***meta-ethical level*** that should generate awareness regarding potential lack of ethical behavior in some authors and some reviewers. The meta-ethical level is related to have the ethics of implementing what is required increase the assurance regarding a minimum of the required ethical behavior by authors and reviewers. This means the ***ethics of trying to assure ethical behavior from the stakeholders.***[15] In this phrase we can summarize the meta-ethical aspect related to, at least, editors and conferences organizers. More details regarding this issue may be found in our article (Callaos & Callaos, Academic Ethos, Pathos, and Logos: Research Ethos, 2014).

Research regarding ethical and meta-ethical issues and methodologies are an ongoing process in the IIIS, along with scholars and researchers who are members of the editorial boards of its journals. This is because we have a strong conviction that the responsibility of editors cannot be reduced to being ethical and to just announcing the kind of ethical behavior expected from the anonymous reviewers and the authors who submit articles and upload final versions of their papers. One

[14] This experience was presented as a case study at workshop, in the University of South Florida, **founded by the National Science Foundation**. It is a case study briefly described of that incident the a conference organized by the International Institute in Informatics and Systemics, regarding the ineffectiveness of the ***traditional double-blind peer review, which, may be a desirable and even necessary condition, but it should never be taken as a sufficient condition.*** At least, meta-ethically oriented methods should be added. Meta ethics is understood here as increasing the assurance of ethical behavior from both: authors and reviewers.

[15] This conclusion was immediately perceived but it was in 2012 that a consensus was also identified. This required about 3000 hours of work made by senior scholars and researchers, as well as collaborative thinking on Ethics. Since then, the research has continued, and will continue, by means of combining action-research, action-learning, and methodological action-design.

recent working short paper was recently written (Callaos N. , 2021), identifying the meta-ethical support that may be implemented by means of David Kaplan's (2005) suggestions, regarding how to fix peer review.

We suggest that, in general, peer reviewing methodologies may (or should) have to include means and methods in a systemic reviewing methodology; oriented to providing editorial support for the "enforcement" of ethical behavior in science. The Scientific Enterprise should also include stronger and more explicit rules and policies with regards to scientific misconduct and unethical behavior; i.e., it should be more involved and concerned at the meta-ethical level. In a comprehensive study (DuBois, 2013), after determining, the frequency and the kinds of wrongdoing, at leading research institutions in the United States, concluded in the following terms:

> "Wrongdoing in research is relatively common with nearly all research-intensive institutions confronting cases over the past 2 years. Only 13% of respondents indicated that a case involved termination, despite the fact that more than 50% of the cases reported by RIOs [research integrity officers] involved FFP [falsification, fabrication, or plagiarism]. This means that ***most investigators who engage in wrongdoing, even serious wrongdoing, continue to conduct research at their institutions.***" (DuBois, 2013), [Italics and emphasis added]

This seems not to have changed. It clearly shows that even leading research institutions need to address both: the meta-ethical and ethical levels in research. One possible way to do it is not to allow any paper submission not initially pre-reviewed by author's colleague(s) or via internal reviewing. This would be to accept Kaplan's suggestion; which the IIIS have implemented since 2006.

Is it ethical for authors to submit papers with the unique objective of using the volunteering work of conferences' and journals' reviewers in order make the job for them that they should be doing as authors? How this kind of behavior may be prevented? It is not fair that ethical and honest author would be paying the costs of such a flagrantly unethical behavior from some authors. There are informal statistics

that show an average of about 40% of submitting authors not registering in the conference or not sending the last version of their paper after being accepted. This is increasing the Article Processing cost by about 68%. Who is paying for these costs caused by unethical behavior? Regretfully, in most cases honest people submitting articles and volunteers. The volunteers are being cheated and the other authors are having an article processing charge that may have been much lower, if this kind of unethical behavior had not existed or existed in a lower degree. The unfairness of this kind of unethical behavior, from some authors, adds up to the Dubois' (Assessing the Need for a Research Ethics Remediation Program, 2013) conclusion given above, i.e. "***most investigators who engage in wrongdoing, even serious wrongdoing, continue to conduct research at their institutions***" and continue causing unfairness to ethical authors.

Actually, in our ***opinion***, the academic promotional policies may be contributing to (instead of lowering the probability of) the generation of unethical activities in both research and education. Academic who are unethical in the publications of their research, may be even more unethical in their educational activities and responsibilities. We might "guess" that there are at least two causes that may be generating unethical behavior in the educational activities: a) a promotional system oriented to research production that frequently undermines the educational activities of the academics, and b) educational misconduct is usually less visible than research publications.

The above referenced facts (which are a small set of examples regarding unethical behavior from authors and/or reviewers) are the reasons of the necessity of a *systemic multi-methodical reviewing process* as the one shortly describe in section 4 and visually summarized in figure 3.

## 6. Intellectual Rigor:

The general purpose of this section is to show that written Trans-Disciplinary Communication may have the same intellectual rigor, or even more, than disciplinary rigor. A more specific objective of this section is specifically related to this special issue of the journal; i.e., it is related is to provide a reasoning supporting that an article that has already been reviewed and accepted by peers in the same disciplinary or inter-disciplinary field; if it is re-written for trans-disciplinary communication may require more intellectual rigor.

### 6.1. Startling Issues

It is surprising to notice that the notion, concept, or phrase "Intellectual Rigor" was mentioned just three times in the Stanford Encyclopedia of Philosophy[16]. The three times that this phrase was mentioned was as part of texts related to three different philosophers. No meaning was provided for this phrase, but the implicit one that depended on the context in which it was used. So, its potential meaning is implicit and depending on the philosopher who was included in the Encyclopedia. In general, its meaning has been mostly implicit and depending on the text and context where it was uses.

This is a strong indication that "Intellectual Rigor" has been used, in Eugen Fink's[17] (1968) terms, as an operative concept and not as a thematic one. What Fink means by "operative concept is a shadow concept that stands behind what is being clarified

[16] This is easily verifiable using the link This is easily verifiable at https://plato.stanford.edu/searcfh/search?query=%22intellectual+rigor%22

[17] Fink affirms that "The enlightening force of a thought is nourished by what remains in the shadow of a thought. In a profound reflection, there is always immediacy, without hesitation or reflection. It [the thought] has a productive elan in using irreflexively these concepts covered by shadows… The human grasp of the world comprehend the totality in a thematic concept of the world, which nevertheless is a finite perspective, since in its formulation concepts that are kept in the shade are being used." This is a translation from Spanish (Los Conceptos Operatorios en la Fenomenología de Husserl (Originally published in French), 1968), which; in turn, is a translation from German.

(thematic concepts) but not being clear itself[18]. In other words, operative concepts are what are *implicit* in order to make *explicit* the meaning of other concepts. We think that the importance of clarifying this notion is important in both: the intellectual and the pragmatic domains. The latter includes, as we indicated above, peer review in Scientific, technological, humanities, and philosophical Communication.

By searching the Web regarding the phrase "Intellectual Rigor", it is easy to notice important flaws n the context of the most elemental Predicate Logic. "A is B" is not always equivalent the same as "B is A". This kind of equivalency is based on confusing genre with species and/or a set with its subsets. Let us mention an evident example: we may accept that "human beings" are animals" but we can never accept that "animals are human being". This is no-sense because it goes grotesquely again the most elemental Predicate Logic. This is the main reason why it is easy to find, via a quick search on the web, so many different definitions regarding scientific rigor, none of which belonging to Science but to a one kind of science, a scientific discipline, or, even worst, to a sub-discipline, sub-sub-discipline, and so on. If we define Science by one of its disciplines, it is no wonder that we can find several definitions of Science.

Furthermore, intellectual rigor in Mathematics is not the same as intellectual rigor in empirical Science. Experiments are what validate, or invalidate, empirical theories or conclusions. Can we confuse deductive with inductive sciences? Can we define Science in as a deductive process as it is the case of mathematics? Via similar reasoning we cannot, and should not, define Science using a definition of one of its species.

Different Logics are used in Science; all of them are different kinds of scientific manifestations and are related to the notion of Science as its different species. What we can predicate from the notion of Science can be predicated for each one of its

[18] A short article on Fink´s Operative and Thematic Concepts may be found at (The Notions of Operative and Thematic Concepts , 2022)

species, but vice versa is not correct. Similar situations happen or may happen when referring to intellectual rigor, because Science is one among many manifestations of the intellect. So, if we find confusion regarding what is scientific rigor, it is more probable that it would also be found in the context of the more general notion of "intellectual rigor"

This seems so evident that the reader may think "why on earth we are writing this kind of platitudes?" We will provide a clear example (among many) below. Meanwhile, we need to show that this kind of confusions is not conscious but they may confuse the reader who is not alert about this issue. Being aware would help the reader to differentiate what may be correct or incorrect in a book or an article. Any intellectual confusion may lead to logical absurdities. Let us remind the saying in Computer Science/Engineering: ***"garbage in, garbage out".***

Let us provide one of many examples: to use the experimental method in natural sciences in order to define or describe "Scientific Rigor" is a huge mistake and may generate intellectual confusion in the mind of the reader and even in the mind of the writer. It is a flagrant logical fallacy in the context of Predicate Logic.

Applying the notion of "Experimental Science Rigor" to "scientific rigor" or to Science, in general, generates absurdities. Are people like Einstein, Darwin, Freud, Jung, etc. scientists? None of them formulated their scientific theories by means of experimental methods. This seems to add another platitude. This is why it is so surprising and paradoxical to find these intellectual confusions, so frequently, in articles and books of highly reputable authors. Let us cite just one example.

What has been called the *"Pentateuch for scientific rigor"* has been compared to the five pillars of the most traditional religions. The well-cited and prolific authors Arturo Casadevall, Ferric C. Fang (Rigorous Science: a How-To Guide, 2020) affirm that "Traditional Chinese philosophy, Hinduism, Islam, and Judaism are each founded on five elements, pillars, or sacred texts. In Judaism, the first five books of

the Hebrew Bible are collectively referred to as the Pentateuch." Then, they present the Pentateuch of ***Scientific Rigor*** as it is shown in Figure 4.

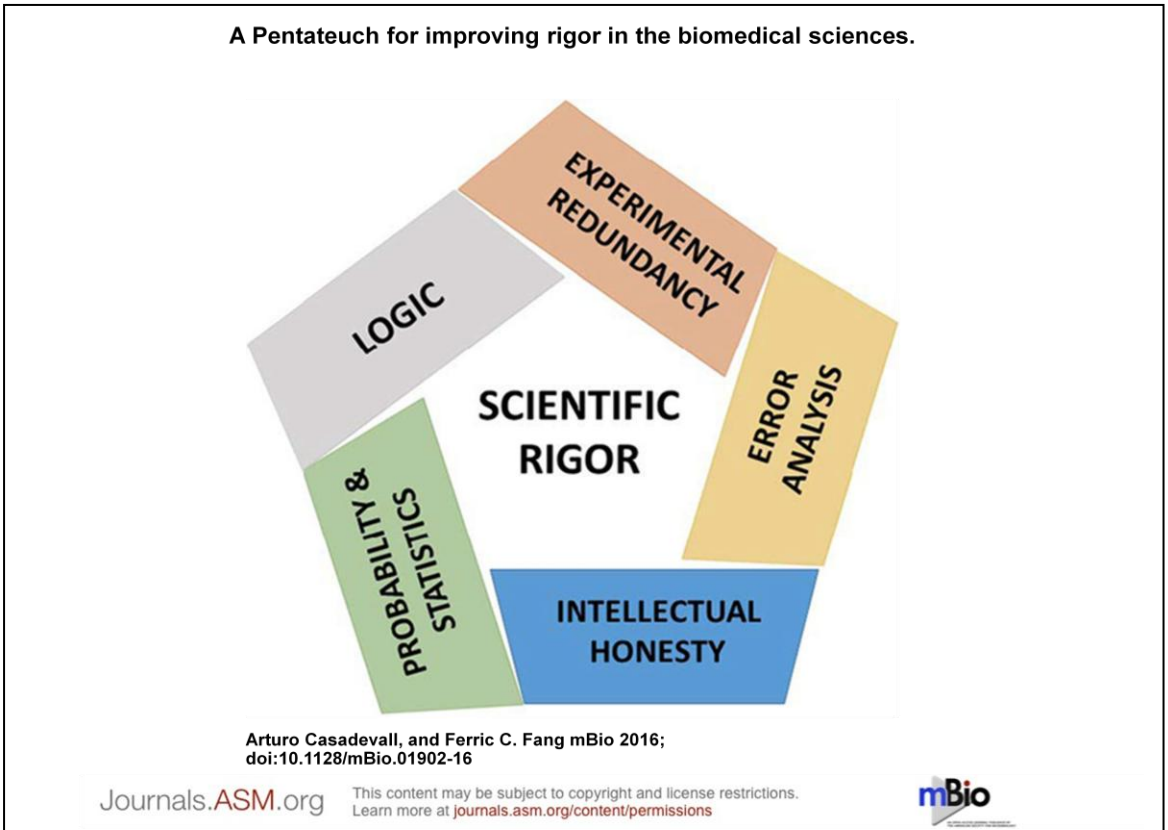


**Figure 4:** A Pentateuch for improving rigor in the ***biomedical sciences***, according to Arturo Casadevall, Ferric C. Fang (Rigorous Science: a How-To Guide, 2020). This figure is copied from a slide provided in the mentioned article.

In the above diagram (Figure 4), Scientific Rigor is reduced to the rigor in Biomedical Sciences. Both terms in the same diagram, one is a species of the genre Science. It is even worst, not even all Biomedical Sciences are ***necessarily*** experimental ones. Take for example statistical medical research, reflexive medical practice, etc. Should we exclude psychiatrics from the Medical Sciences, or should they experiment with human beings in order to be scientists? We are sure that Arturo Casadevall, Ferric C. Fang did not mean that, but they wrote it and even presented it in the same diagram. This is just one example of what can be seen in a quick search for scholarly articles, via Web

If this kind of situations is found in a given Scientific Discipline, can we imagine what might be happening 1) among different scientific disciplines, 2) among scientific and engineering disciplines (especially if we know that Engineering is based on Science but it cannot be reduced to Science), 3) between natural and social sciences, 4) between sciences and the humanities: the famous Snow's (The Two Cultures, 1959/2001), etc. This is why it is important, and even necessary, to identify a general description of the notion of "Intellectual Rigor". This is the purpose of the next sun-section.

### 6.2. The Notion[19] of "Rigor"

The intellectual problem, which was highly summarized in the last sub-section, is among the reasons why we have been, for a long time trying to answer the question "what IS 'Intellectual Rigor'?" and not if any specific thinking or research IS "intellectually rigorous". It is a matter of not to identify "A is B" with "B is A", it is a matter of not to reducing "intellectual rigor" to one kind or species of rigorous intellectual processing or products. This is why we tried to make an abstraction based on what we identified what seems to be common to different kinds of intellectual rigor. Consequently, we suggest the following description of the notion of Intellectual Rigor: ***the degree of achievement of an intellectual objective while constrained by restrictions***. Example of these restrictions are those 1) associated to one or more semiotic systems, as it is the case of *disciplinary* semiotic systems, 2) *methods*, as those associated to different disciplinary, inter-, and trans- disciplinary fields, 3) *environmental* restrictions, as for example the intellectual and material environments. Regarding the latter, we may ask: is it correct to say that Plato and Aristotle, Saint Thomas, among many others, were not intellectually rigorous, just because they are not taking into account Quantum Mechanics and Einstein's Relativity Theory, along with many other intellectual products generated sine then?

[19] Notice here what we already alerted above: we are not defining this term. We are trying to briefly describe the notion (same etymological origin of "cognition", "cognate", and "knowledge") associated to the representing linguistic term. (Callaos N. , The Notion of 'Notion', 2013)

Can we think that Claudio Ptolomeo was not intellectually rigorous in Astronomy because he did not have a telescope? These seem silly questions and actually they are. They are being made as a way of explaining that intellectual rigor depends also on intellectual and material environments, which are restrictions of the rigorous thinkers.

The above definition "intellectual rigor" may be generalized for the general notion of "rigor" if we remove the adjective "intellectual". Consequently, we suggest that "rigor", in general, may be described as is *"the degree of achievement of an objective while constrained by restrictions."*

This short and general description of "rigor" is so general that it may be applied to athletic rigor, spiritual rigor, religious rigor, monastic rigor, ethical rigor, moral rigor, etc. The differences to be found among all kind of rigors are related to the kind *of objective(s) and restrictions*. The different intellectual disciplines are related their objective and to be restricted, mainly, by the respective 1) disciplinary semiotic system(s) and 2) method(s)

In the intellectual dimension "rigor" depends heavily on the discipline or disciplinary field. Any judgment made on a disciplinary or inter-disciplinary field with the intellectual perspective of another disciplinary or inter-disciplinary field, have a high probability of being wrong. So, may we judge engineering or a technological work just from a scientific perspective, or vice versa? In a lengthy article[20] we showed the cybernetic relationship between Science and Engineering based on the fact that Science in one of the most important means of Engineering. Science is a means for engineering and vice-versa: engineering is a means to many scientific disciplinary and inter-disciplinary fields of research. For example, the telescope that supported research in Astronomy and the microscope that supported research in biology, chemistry, and Medicine, are engineering products. But the invention of the telescope was based in what then was new knowledge about nature.

[20] (Callaos N. , The essence of Engineering and Meta-Engineering , 2008)

A list of this kind of examples is almost an infinite one. It is so evident that it is astonishing that this issue has not always been perceived by academic authorities. Frequently, scientists judge the quality rigor of engineering activities and engineers judge the importance or originality of scientific research

The cybernetic relationships between Science and Engineering, generates co-regulations, via negative feedback, and co-amplification, via positive feedback; all of which generated significant synergies among science and engineering. Having said so, Science and Engineering should be evaluated and valued with different, and even opposite, intellectual lens and epistemologies. They have complementary but different nature. The first has a descriptive nature and the second a prescriptive one. Science is oriented to what IS and Engineering is oriented to what potentially may to exist.

On the other hand, from a linguistic or a conceptual perspective, “rigor” is usually confused with one of its species or one of its characteristic. Precision, for example is one kind of “rigor”. We can be precise and not rigorous or rigorous and not precise.

Is it rigorous the demonstration of a theorem based on axioms that contradict each others? Is it rigorous to apply a theorem in a situation where the respective axioms are not fulfilled? The later is not frequently perceived in Engineering, Economics, and other Social Sciences. It may even be found in the Natural Sciences. So, is it time to have a clearer and more explicit description of the notion of “rigor”, especially in the intellectual dimension, or including intellectual disciplines or domains? Is it time to apply Second Order Cybernetics in scientific, engineering, philosophical, etc., domains? Should a reflexivity, and not just reflections be applied in disciplinary, inter-, and trans-disciplinary fields? To reason this intellectual necessity is among the objectives of this article.

Some terms are used as synonyms to “rigor”, but conceptually or notionally, may be wrong, although semantically may be correct. As an example we copied (figure 5) from the Free Thesaurus (Thefreethesaurus ). Notice from figure 5 that the synonymous of “rigour” has been three semantic sets; which were named “thoughtfulness”, “strictness”, and “ordeal”. The first one (“thoughtfulness”) applies to the intellectual domain; the second one (“strictness”) may apply to intellectual domain but also applies to other semantic domains; and the third (“ordeal”) is mostly related to the rigor’s sense of existential (physical and/or psychological) hardships. This sense may also be applied to intellectual hardship. Intellectual rigor may cause intellectual hardship, but it may also cause intellectual joy; and when it generates intellectual hardship, it may end up producing intellectual and/or emotional joy.

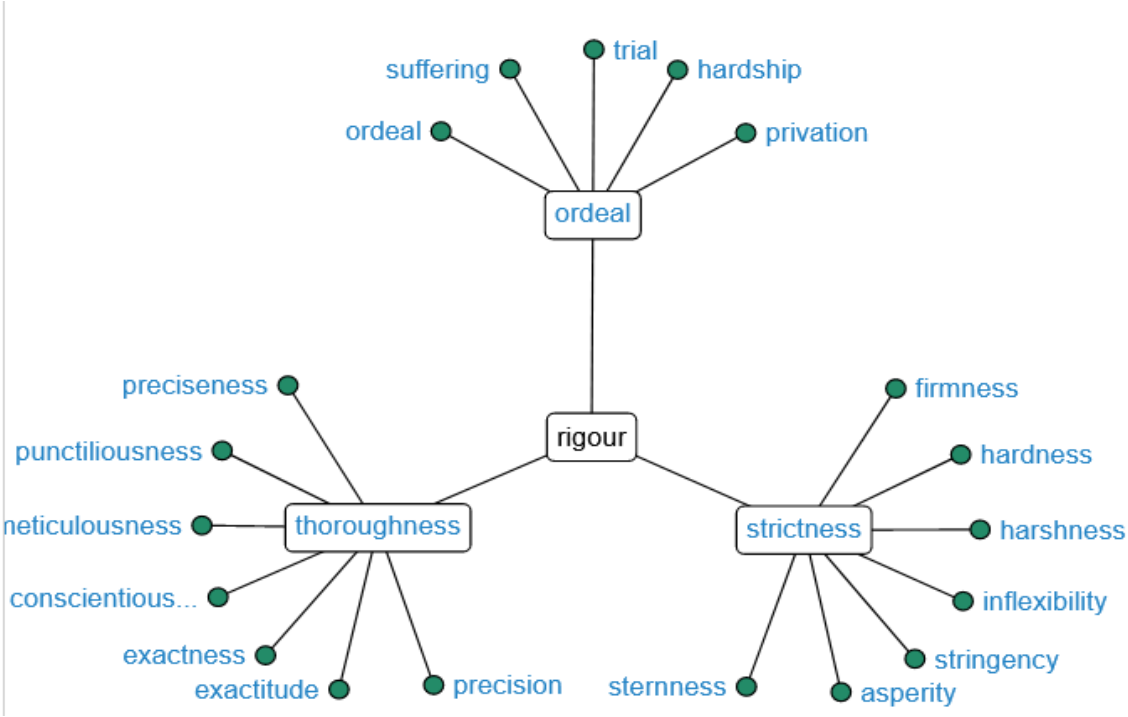


**Figure 5:** Copied from (Thefreethesaurus ) summarizing visually the three sets of what has been called synonymous to “rigour”.

A confusion that implicitly is found in the literature is to associate ***"precision"*** (e.g., mathematics, formal logic, pre-defined technical terms, etc.) with ***"Intellectual Rigor"***. Precision is:

- one of the *mean*s for intellectual rigor, and/or
- a *species* in the genre "intellectual rigor"

So to confuse "rigor" with "precision" fails both: Predicate Logic and/or Ends/Means Logic. It confuses 1) genre with one of its species and 2) a means with its end. The later is especially problematic at the pragmatic level because it may end up in transforming a means in an end-in-itself; which may be tragic intellectually, ethically, and pragmatically. It may corrupt the nature of a means, as a means, not an end and it may fail achieving the real end which was thought by identifying and using incorrectly the means. This may fail achieving the real initial end that triggered the identification of a potential means.

In our experience, this misplacing the end by the means and/or the genre with one of its species is almost always not consciously or intentionally generated. This is why making it explicit and ***reiterating*** it may be intellectually, pragmatically, academically, and ethically advisable.

## 6. The Notion of Intellect:

> "[S]ince we define in order to judge and judge in order to know truth and being, the end of our entire intellectual operations is [to know truth and] being, the formal object of the intellect."[21] Bernard Lonergan.
>
> "[O]ur intellect… is intended to secure the perfect fitting of our body to its environment，to represent the relations of external

[21] (Lonergan, 2009, p. 606)

> things among themselves–in short , to think matter."[22]… The essential function of our intellect, as the evolution of life has fashioned it, is to be a light for our conduct, to make ready for our action on things, to foresee, for a given situation, the events, favorable or unfavorable, which may follow thereupon."[23] Henri Bergson (Nobel Prize)

In this section, we will use and re-contextualize a description we made at in order to support our suggestion of the cybernetic relationships that, implicitly or explicitly, exists between, individual and collective intellects, individual and sociological "cogito"; as among what Nobel Laureate (in Physics), Murray Gell-Mann, called *Apollonian*, *Dionysian*, and *Odyssean* Intellects, which means respectively, discursive, intuitive, and intra-personal intellects (mostly based of tacit and implicit knowledge). We detailed these relationships in (Callaos N. , The Notion of Intellectual Rigor: A Systemic/Cybernetic Approach., 2020). Let us here extract and re-contextualize a brief summary we made in the mentioned article.

Similarly to what we did in section 2, our summary in this section is mostly based on what Ackoff (1962) recommends for making a conceptual definition in Science; which is necessary to support the operational definition, both of which are required in scientific methods. The extension of the comprehensiveness of this definition is oriented to cover the most frequently used senses of the word "intellect" and the most important definitions explicitly provided. This means that we try to identify a comprehensive notion of 'Intellect', sufficiently general, as to cover more specific definitions of this notion.

> "This means that we will try to identify the genus that would include, as its species, most of the other conceptions of 'intellect'. We suggest that this general meaning is located in an analysis of its etymological meaning as well as in Aristotle's notion of "Nous" and the Thomist-Scholastic notion of intellect a *"Habitus Pricipiorum"*, which we will interpret as the ***meta-habit***

[22] (Bergson, 1911, p. ix)
[23] (Bergson, 1911, p. 29)

***of generating intellectual, mental, thinking or reasoning habits***. This conception of the Intellect explains the multiplication of intellectual disciplines and sub-disciplines. It also explains the existence of the three main kinds of intellects [mentioned above] as identified by the Nobel Laureate (in Physics) [and] named as *Apollonian, Dionysian, and Odyssean Intellects (Gell-Mann, 1994, p. xiii).*

It is easily inferable from the two above quotes [at the beginning of this subsection] that Henri Bergson is referring to "Human Intellect" and Bernard Lonergan is referring to "Intellect" in general, i.e. what is common to different individual human intellects. In this section, we will be referring to Human Intellects, while trying to identify what may be common to them, but, ***evidently***, not in such a comprehensive way as Lonergan did it in his Great Work, but [just] as related to the *objectives* and *restrictions* (e.g., time, space, intellectual limitation of the writer) of this article. In this context our objective is, as we informed above, to identify a comprehensive notion; which may include other, more specific, notions, i.e., to identify the ***genus*** of 'intellect' which may contain the different ***species*** that can be found in literature. Since what we predicate from the genus can also be predicated from its species, but no vice-versa, then, then the characteristics of Rigor in the genre are certainly also the rigor of its species. This, as we will see, may help us define what is common to the different kinds of intellectual rigors found in different disciplines. This is a main purpose of this [subsection] … because it will allow a more effective dialogue among … [intellectuals from different disciplines] and, hence, it would support the increasing activities in inter- [and trans-] disciplinary, research, education, and communication. All of this would, in turn, provide more support for a [potential'] Dialogic Academy and systemic knowledge integration. This internal academic integration will make it more effective in getting integrated into the society supporting it with economic and human resources. [Notice that just referred to the two main senses of trans-disciplinary communication (Figure 2, above)]

Let us now, take the first step, trying the etymological approach recommended by Kenneth Arrow … for a conceptual definition; which is the first phase of a Scientific Definition. (Scientific Method: Optimizing Applied Research Decisions, 1962)

The word 'intellect' derives from '*intellectus,*' past participle of '*intellegere*' (understand or reason), from prefix '*intel-*' ('intus[24]', into) and '*legere*' (read). "***I read within me***", as Rev. E. Cobham Brewer (1898) wrote it [italics and emphasis added]. Accordingly, Rev. Brewer (1898) adds, Intellect is "The power of reading mentally; hence the power of understanding and quickly grasping what requires intelligence and thought. (Dictionary of Phrase and Fable, 1898). Intellect means "***I read within me***"; no matter what my [intra-, inter, or trans-disciplinary] field is …. Consequently, intellect is what is common to the arts, sciences, engineering, technologies, humanities, etc., i.e. to *any kind of knowledge and/or experience*, including esthetic experiences.

[Furthermore it probably is important to notice that] … the words 'intellect' and 'lecture' (from '*lectus*' past participle of 'legere') have the same etymological origin: '*legere*', which means 'to read,' and originally "to gather, collect, pick out, choose". The term 'elect' also has the same etymological origin. It derives from the Latin '*electionem,'* from stem of *eligere* "pick out, select," from '*ex'*- (out) and '*-ligere,'* combined form of *legere* "to choose, read" (Online Etymology Dictionary, 2019). Intellect refers to an ability - that of *discrimination, and abstractions*. *A lecture is a choice collection of facts (and, perhaps, opinions), where we abstract those issues related to the lecturer's objectives; while intellect is what provides the mental faculty with the capacity to produce a lecture.* ***"The key intellectual***

[24] (Etimoitaliano, 2019)

***event is a lecture"*** *(Collins, 1998, p. 28) [emphasis added]; which is an* ***ex-position.***

Since the notion of 'intellect' is etymologically associated with 'lecture', 'elect', "to gather, collect, pick out, choose", then, based on its etymological origin, we might hypothesize that ***'intellect' means "the act, or the mental faculty, of gathering, collecting, picking out, choosing, electing within myself,"*** This etymological sense of the term might harmonize with a Constructionist Approach to the notion of 'intellect.' Based on its etymological meaning, we could also conceive the notion of 'intellect' as "the act or the faculty of "reading within me," "lecturing within me," ***lecturing myself***" and/or ***"the act or the faculty of sharing the product generated by lecturing myself".***

It is important to notice that the conclusion shows that "intellect" is the faculty of being reflexive, i.e. the subject is also an object to be "observed" and acted upon. Intellect is not and should not be limited to observe external objects. A subject is impacted by external and internal objects. With our intellect, we are able to dialogue with ourselves, with others; and to observe external objects and interact with them via ***reflection*****s** on the object and also ***reflexions*** on the observing subject, the observing process, and their respective environments. This is what Second Order Cybernetics (SOC) is about. A reflexive practice is necessary condition for an integral intellectual development. Self-observation should complement the observations of external object and interaction with what is external to the intellect (dialogues, experiments, etc.) in order to develop an integrated intellect. Inter-**action** and self-**action** complement each other in the development of the intellect as mental or thinking **faculty**. An intellect is, or should be, **intra**-active and i**nter**-active with the social and natural environments. According to our conclusion above, it is easily inferable that the development of intellect, as faculty, required acting and not just thinking, i.e., self- and inter-action.

## 7. Importance of the Trans-Disciplinary Communication

Trans-Disciplinary Communications are required or, at least, would make more effective and/or efficient Inter-Disciplinary Research, Education, and Communications. This is required for the solution of real life problems. Hence, in our opinion, ***Trans-Disciplinary Communication should be part of the continuous self-educational processes of researchers, academics, and professionals.*** This is one of the reasons why fostering Trans-Disciplinary Communication has been the main founding purpose of the International Institute of Informatics and Systemics (IIIS).

Inter- or trans-Disciplinary Communications are ***input to and output of*** (required and generated by) Inter-Disciplinary and Tran-disciplinary Research and Education. This is why we suggest that *Trans-Disciplinary Communication and the development of the required intellectual skills should be part of the continuous self-educational processes of researchers, academics, and professionals.* This is one of the reasons why fostering Trans-Disciplinary Communication has been the main founding purpose of the IIIS. This special issue is a mini-project oriented to provide incentive(s) for written trans-disciplinary communication. We expect to be giving a step, no matter how small it is, in the direction of (1) fostering trans-disciplinary communication, (2) supporting the self-education of authors regarding the development of the intellectual skills oriented to an effective translation among scientific (and, in general, intellectual) disciplines, and 3) to provide support for relating academy with society at large, as consequence of (1) and (2).

Going back to one of our main conclusion, given above, i.e. Rigor is ***the degree of achievement of an intellectual objective while constrained by restrictions***, we may easily infer that, based on this conceptual perspective, to achieve more objectives with more restrictions requires more intellectual rigor. Consequently, to re-write an

already accepted peer reviewed article, FOR its trans-disciplinary communication requires more intellectual rigor in, at least, two senses:

1. As intellectual ***rigor*** , i.e., *"the degree of achievement of an intellectual objective while constrained by restrictions"*, because of the initially achieved rigor: to meet an intellectual objective while restricted to at least one disciplinary semiotic system, and

2. As the intellectual ***effort*** that should be made to achieve ***another objective*** (to be able to communicate with audiences in other disciplines) while having ***more restrictions,*** those imposed by the respective natural language semiotic systems. *To achieve more intellectual objectives (be able to communicate with other audiences), while being restricted by more restrictions (syntactic, semiotic, and pragmatics) of the respective natural language, requires definitely more rigorous thinking and internal, as well as external communication.*

This would mean that inter-disciplinary communication would require to be restricted by, at least, the disciplinary semiotic systems involved. Consequently, more restrictions have to be met and, hence it requires more *intellectual effort*; which generates a higher *intellectual rigor*.

Applying the same kind of reasoning or inference, trans-disciplinary communication (Figure 2) requires even more intellectual effort to achieve communicational effectiveness because:

1. *More objective(s)* need to be achieved as it is the case of communicating with a larger audience, from more disciplines and/or, potentially, with the general public.
2. *More restrictions* are added by the respective natural language semiotic system

This additional intellectual effort is required to increase the level of intellectual rigor; which is required by the addition of objectives and restrictions. This increase

of intellectual effort and, consequently, this kind of intellectual rigor, generates, at least, personal and common good.
Consequently, in general, the kind of required rigor for trans-disciplinary communication generates, at least, the following merits:

A. ***Personal Good***: an effective trans-disciplinary communication increases the level of understanding of the researcher/academic/professional/ author who is translating from the respective disciplinary semiotic system(s) to a trans-disciplinary semiotic system. This has been the experience of, at least, Einstein and Feynman. We can summarize our reasoning regarding this issue, reiterating[25] the two quotes we inserted, above, in section 3. i.e.;

> ***"If you can't explain it simply, you don't understand it well enough."*** *(Attributed to) Albert Einstein* [Italics and emphasis added]
>
> ***"I couldn't do it. I couldn't reduce it to the freshman level. That means we really don't understand it."*** *Richard Feynman* [Italics and emphasis added]

To re-write a paper that has already been accepted by peers of the author, via any of the reviewing methods or methodologies, requires a translation from disciplinary or inter-disciplinary fields to a trans-disciplinary semiotic systems, as it is the case of natural languages, generate back to its translator more understanding of what s/he wrote. Einstein and Feynman, both Nobel Laureates in Physics, cannot be so wrong about this issue.

[25] We would like to remind the reader that reiteration is different that redundancy. The first is useful and may be desirable and even necessary. The second is unnecessary and not useful. **Re-**iteration is at the heart of cybernetic loops and **re-**search. In written and oral communication Reiterations that are used adequately enhance the meaning of what is reiterated because provide an ***additional context*** which may enhance and make more comprehensive the meaning of what is being reiterated. A friendly reminder to the reader is to, also, reiterate, that the context in which a word used provided the specific sense in which it is used and meaning is the set of the senses on which a word or a phrase has been used. Consequently, reiteration is not necessarily a redundancy.

B. **Common Good:** which is generated by an Effective trans-disciplinary communication supports:

a. Relating academics and professionals from different disciplines which, in turn, support knowledge integration and, consequently, provides the basis for:

1. Cybernetically relating *analytical and synthetic* intellectual skills. This increases the probability of the generation of the kind synergies required by intellectual creativity.
2. Increasing the probability of analogical thinking which is the most frequent input to logical thinking, be it deductive, inductive, abductive, or teleological.

Both: 1. and 2. increase the probability of the academic sociological cogito; which increases knowledge advancement and the intellectual developments of other academics, researchers, and professionals.

b. Relating, more directly, affirmed by the intellectual perspective of Abraham Loeb[26], in his article entitled *"Renewing the Contract between Academia and Society: Universities owe the public a fresh look at their educational and research missions*". He summarized his article as follows:

1. *"[T]he traditional boundaries among disciplines should be blurred since innovation often blossoms along these boundaries. Universities should consider a new organizational structure that moves away from the existing system of departments and enables a continuum of expertise across the arts, humanities and sciences."*

[26] The Scientific American affirms that "Abraham Loeb is chair of the astronomy department at Harvard University, founding director of Harvard's Black Hole Initiative and director of the Institute for Theory and Computation at the Harvard-Smithsonian Center for Astrophysics. He also chairs the advisory board for the Breakthrough Starshot project." (Loeb, 2018)

2. *"Students should be encouraged to take courses in multiple disciplines and organically weave them into new research patterns."*
3. *"For too long universities have been engaged in a monologue ... It is time for us to engage once again in a dialogue with society."*[27] [Italics added]

Abraham Loeb's intellectual perspective, described by the few words just references above, describes quite well the academic and the societal ***common good*** generated by effective trans-disciplinary communication.

In summary, the additional intellectual effort required to re-write an accepted article via peer-reviewing it, *increases both:* ***the personal and the collective common good****,* because 1) it enhances the understanding of the writer (according to, at least, Einstein and Feynman) s 2) develop her/his trans-disciplinary communicational skills, 3) supports knowledge integration because other academics from other disciplines may have access to his knowledge, and 4) support relating academy with Society at Large, more directly, hence with less potential noise related to the indirect relationship that usually exists.

## 8. Acknowledgement

Because of all what we summarized above, and especially regarding the generation *of* ***personal and common goods***, I would like to extend our gratefulness, on behalf of the International Institute of Informatics and Systemics (IIIS), The Journal of Informatics, Cybernetics, and Systemics (JSCI), to all those who made possible the publication of this special issue, i.e., to

- The authors,
- The co-editors,

[27] (Loeb, 2018)

- The members of the Editorial Board,
- The anonymous reviewers randomly selected,
- The non-anonymous reviewers, who were validated and verified by the journal's managing editor
- To the managing editor
- To the beta-readers, and
- To the peer-editors

As well as all others who made possible the publication of this special issue and for volunteering in generating both: personal and common goods.

The list of the above mentioned volunteers have been included in the page related to the Editorial Board.

## Works Cited


Ackoff, R. (1962). *Scientific Method: Optimizing Applied Research Decisions.* New York: John Wiley and Sons.

Ackoff, R. (1962). *Scientific Method: Optimizing Applied Research Decisions.* New York: John Wiley and Sons.

Amey, M. J., & Brown, D. F. (2005). *Interdisciplinary Collaboration and Academic Work: A Case Study of a University-Community Partnership*. (n. 1. New Directions For Teaching And Learning, Productor, & Wiley Periodicals, Inc. Ohio State University Extension, Urban Extension, New Directions For Teaching And Learning, no. 102, Summer 2005 © Wiley Periodicals, Inc.,: https://urban-extension.cfaes.ohio-state.edu/sites/urban/files/imce/New_Directions_for_Teaching_and_Learning_4_20.pdf

Bergson, H. (1911). *Creative Evolution.* (A. Mitchell, Trad.) New York, New York: Henry Holt and Company.

Brewer, E. C. (1898). *Dictionary of Phrase and Fable.*

Callaos, N. (2021). *Ethical and Meta-Ethical Issues in Peer Reviewing,*. (I. I. (IIIS), https://www.iiis.org/contents/Ethics-and-Meta-Ethics-in-Peer-Reviewing.pdf

Callaos, N. (2011). *Peer Reviewing: Weaknesses and Proposed Solutions.* Orlando, FL, EUA: IIIS.

Callaos, N. (2008). *The essence of Engineering and Meta-Engineering* . https://www.researchgate.net/publication/242073115_The_Essence_of_Engineering_and_Meta-Engineering_A_Work_in_Progress

Callaos, N. (2020). *The Notion of Intellectual Rigor: A Systemic/Cybernetic Approach.* (H.-W. C. Nagib Callaos, Editor, w. Internarional Institute of Informatics and Systemics (IIIS, Productor, & Internarional Institute of Informatics and Cyberentics (IIIC)) de Journal of Systemics, Cyberenetics, and Informatics (JSCI): https://www.iiis.org/nagib-callaos/Intellectual-Rigor

Callaos, N. (2013). *The Notion of 'Notion'.* Academia.edu: https://www.academia.edu/4415647/The_Notion_of_Notion
Callaos, N. (2022). *The Notions of Operative and Thematic Concepts,* International Institute of Informatics and Systemics: https://www.iiis.org/contents/operative-and-thematic-concepts.pdf
Callaos, N., & Callaos, B. (2014). *Academic Ethos, Pathos, and Logos: Research Ethos*. (V. 1. International Institute of Informatics and Systemics, Productor, & International Institute of Informatics and Cyberentics) Journal of Systemics, Cybernetics and Informatics (JSCI). vol. 12, pages 76-95: www.iiisci.org/journal/PDV/sci/pdfs/SA359CD14.pdf
Casadevall, A., & Fang, F. C.-1. (2020). Rigorous Science: a How-To Guide. *mBio* .
Cherry, C. (1982). *On human Communication: A Review, A Survey and a Criticism* (Thotd Edition ed.). Cambridge, Massachusetts, USA: The MIT Press.
Chubin, D. E., & Hackett, E. J. (1990). *Peerless Science, Peer Review and U.S. Science Policy;*. New York, New York, USA: State University of New York (SUNY) Press.
Collins, R. (1998). *The Sociology of Philosophies: A Global theory of Intellectual change.* Cambridge, Massachusetts, USA: The Belknap Press of Harvard University Press.
Corneliussen, S. T., Physics Today: http://scitation.aip.org/content/aip/magazine/physicstoday/news/10.1063/PT.5.8057
Dekker, C. (2001). *e-Talk Radio: Yourdon, Ed.* (Q. P. Technologies, Productor) StickyMinds, TechWell Community: https://www.stickyminds.com/article/e-talk-radio-yourdon-ed-21-november-2000
DuBois, J. M. (2013). *Assessing the Need for a Research Ethics Remediation Program*. (N. N. Health, Productor) e National Library of Medicine - Clinical and Translational Science 6(3): 209–213: Also at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3683893
Etimoitaliano. (2019). *Intelligenza*. https://www.etimoitaliano.it/2010/11/etimologia-della-parola-intelligenza.html
Feynman, R. (1963). *Six Easy Pieces, Essential of Physics Explained by its Most Brilliant Teacher.* New York: Basic Books.
Fink, E. (1968). Los Conceptos Operatorios en la Fenomenología de Husserl (Originally published in French). En C. Royaumont, *Husserl.* Argentina (Initially published in Paris): Paidos (Originally published by Les Editions de Minuit).
Gell-Mann, M. (1994). *The Quark and the Jaguar: Adventures in the Simple and the Complex.* New York, New York, EUA: W. H. Freeman and Company.
Han, L. (2014). *Juri Lotman's autocommunication model and Roland Barthes's representations of Self and Other*. (S. S. 42(4):517, Productor) ResearchGate: https://www.researchgate.net/publication/276338103_Juri_Lotman%27s_autocommunication_model_and_Roland_Barthes%27s_representations_of_Self_and_Other - DOI:10.12697/SSS.2014.42.4.05,
Harper, D. (2019). Online Etymology Dictionary: http://www.etymonline.com/
Kaplan, D. (2005). *How to Fix Peer Review: Separating its two functions - improving manuscripts and judging their scientific merit - would help.* (V. 1. The Scientist, Productor) ResearchGate: https://www.researchgate.net/profile/David-Kaplan-9/publication/293246158_How_to_fix_peer_review/links/59f72095a6fdcc075ec62ddf/How-to-fix-peer-review.pdf?origin=publication_detail
Lonergan, B. (2009). *Collected Works of Bernard Lonergan - The Triune God: Systematics* (1st Edition (June 29, 2009) ed.). Toronto, Canada: University of Toronto Press, Scholarly Publishing Division;.
Lonergan, B. J. (1992). *Insight: A study of human understanding.* University of Toronto Press.
Lotman, J. (1977). Two models of communication. En D. P. Lucid (Ed.), *Soviet Se-miotics: An Anthology. 99–101*. (D. P. Lucid, Trad., págs. 99-101). London. Baltimore, UK. USA: The Johns Hopkins University Press.
*Online Etymological Dictionary*. (s.f.). https://www.etymonline.com/word/complication
Ryan Hyde, C. (2010). *Pay It Forward.* New York: Simon & Schuster.
Snow, C. P. (1959/2001). *The Two Cultures.* London: Cambridge University Press.
Thefreethesaurus . (s.f.). *Rigour*, de The Free Dictionary: https://www.freethesaurus.com/Intellectual+rigor

Wikipedia,. *Beta-Reader*. (Wikimedia Foundation, Inc., a non-profit organization) https://en.wikipedia.org/wiki/Beta_reader