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Informing Science: The International Journal of an Emerging Transdiscipline

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- Informing Science Volume One: Concepts and Systems, and
- Informing Science Volume Two: Design and Research Issues

Lastly, in 2009 I wrote the paper A Philosophy of Informing Science.

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Informing Science: The International Journal of an Emerging Transdiscipline

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Contents

Sr. No.	Article / Authors Name	Pg. No.
1	Transdisciplinarity: Marginal Direction or Global Approach of Contemporary Science? <i>- Vladimir Mokiy , Tatiana Lukyanova</i>	1 - 18
2	Informing Agility in the Context of Organizational Changes <i>- Rimvydas Skyrius, Mindaugas Krutinis, Svetlana Nemitko, Justina Valentukevičė , Gulbinovič , Marija Sanosianaitė</i>	19 - 30
3	Created Realities: A Model <i>- Eli Cohen</i>	31 - 48
4	The Predatory Journal: Victimizer or Victim? <i>- T. Grandon Gill</i>	49 - 81

Transdisciplinarity: Marginal Direction or Global Approach of Contemporary Science?

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ABSTRACT

Aim/Purpose The article is designed to contradict the existing opinion that "transdisciplinarity is a marginal direction of contemporary science."

Background The difficulties of implementing transdisciplinarity into science and education are connected with the fact that its generally accepted definition, identification characteristics, and methodological features are still missing. In order to eliminate these disadvantages of transdisciplinarity, its prime cause and initial idea had to be detected. Then an attempt was made to analyze correspondence of the existing opinions about transdisciplinarity with the content of its prime cause and initial ideas.

Methodology The bibliometric content analysis of the literature reviews on the subject of transdisciplinarity was used in order to determine correspondence of the opinions about transdisciplinarity with the meaning of its prime cause and initial ideas, as well as to generalize these opinions. This method allowed detecting and classifying opinions into 11 groups including 39 stereotypes of transdisciplinarity. For substantiation of transdisciplinary approaches consistency with the approaches of the contemporary science C.F. Gauss random variables normal distribution was used. The "Gauss curve" helped to show the place of transdisciplinary and systems transdisciplinary approaches in the structure of academic and systems approaches. The "Gauss curve" demonstrated the step-by-step broadening of the scientific worldview horizon due to sequential intensification of synthesis, integration, unification, and generalization of the disciplinary knowledge.

Contribution Based on rethinking the results from bibliometric content analysis of the literature reviews, the generalized definition of transdisciplinarity could be formulated, as well as the definition for the transdisciplinary and systems transdisciplinary approaches could be given. It was shown that transdisciplinarity is a natural stage for development of contemporary science and education, and the transdisciplinary approaches were capable to suggest the methods and tools to solve the complex and poorly structured problems of science and society.

Findings Many existing stereotypes of transdisciplinarity do not meet its prime cause and initial ideas. Such stereotypes do not have deep philosophic and theoretical substantiation, as well as not suggesting the transdisciplinary methods and tools. Thus, the authors of such stereotypes often claim them to be transdisciplinary or suggest perceiving them as transdisciplinarity. This circumstance contributed to the fact that many disciplinary scientists, practitioners, and initiators of higher education view transdisciplinarity as a marginal direction of contemporary science. Based on the generalized definition of transdisciplinarity, as well as its prime cause and initial ideas, we managed to show that transdisciplinarity is presented in contemporary science in the form of two different approaches: the transdisciplinary approach and the systems transdisciplinary approaches. The objective of the transdisciplinary approach is ensuring science development at the stage of synthesis and integration of

disciplinary knowledge. The objective of the systems transdisciplinary approach is ensuring solving of modern society problems using unification and generalization of disciplinary knowledge. **Recommendations for Practitioners** The practitioners should consider that the transdisciplinary and systems trans-disciplinary approaches have different specific features. Within the limits of the transdisciplinary approach a team of disciplinary specialists forms a new method to solve each new problem every time. As a result, the problem solution is formed based on the consensus formed by compromises. Such a solution is difficult to be risk analyzed. Within the limits of the systems transdisciplinary approach a team of disciplinary specialists uses a universal systems transdiscipli-nary methodology to solve each problem. In this case the disciplinary specialists don't seek compromises but perform their part of the research using the disci-plinary methods and tools. The disciplinary results are unified and generalized by the generalist specialist, who has a methodology of the systems transdiscipli-nary approach. In this case the problem solution shall be subject to risk analysis, as it is included into the basic research process.

Recommendations for Researchers The researchers should consider that within the limits of the transdisciplinary approach the disciplinary specialists are managed. Within the limits of the systems transdisciplinary approach the disciplinary knowledge is managed. Thus, the transdisciplinary approach is efficient for organization and research with participation of the scientists of complementary disciplines. An example for such research can be a team of researchers of medical disciplines and complimentary disciplines from chemistry, physics, and engineering. The systems transdisciplinary approach is efficient for organization and performance of re-search with participation of scientists of non-complementary disciplines, for example, economics, physics, meteorology, chemistry, ecology, geology, and so-ciology.

Impact on Society The prime cause of transdisciplinarity is associated with a desire of economists, politicians, and managers to find a method of efficient control for social and economic development of modern society searching for the solution for cur-rent problems accompanying this development. The transdisciplinary ap-proaches formed the methods and tools to solve these tasks. So society can use the advantages of the transdisciplinary approaches, it is necessary to ensure that in the consciousness of the disciplinary specialists "the desire to have such ap-proaches" coincide with "the desire to apply such approaches" for the benefit of the society.

Future Research In terms of the main initial idea, transdisciplinarity is formed as a global ap-proach. The global approach should have a traditional institutional form: it should be a science discipline (meta-discipline) and have carriers with the trans-disciplinary worldview. Training for such carriers can be organized by the uni-versities within the limits of the systems transdisciplinarity departments and Centers of Systems Transdisciplinary Retraining for Disciplinary Specialists. Thus, it is reasonable to initiate discussion for the idea to reform the discipli-nary structure of the universities considering creation of such departments and centers.

Keywords transdisciplinarity, transdisciplinary research, systems approach, systems trans-disciplinary approach, higher education

INTRODUCTION

In September of 2020 transdisciplinarity turned 50. Over the years many books, articles, and reports were published on the transdisciplinary subject. But it turned out that these publications contained

different (depending on the certain situation) definitions of transdisciplinarity. The authors of these publications variously perceive transdisciplinarity and the transdisciplinary approach, as well as variously interpret their intended purpose and identification characteristics. These circumstances allowed for some researchers of transdisciplinarity to make the following conclusions:

Despite its increasing popularity, transdisciplinarity is still far from being academically established, and current funding practices do not effectively support it at universities and research institutions. One reason for this deficit is that a universally accepted definition for transdisciplinarity is not available yet. Consequently, quality standards that equally guide researchers, program managers, and donors are widely lacking. Therefore, a rhetorical mainstreaming of transdisciplinarity prevails, which risks marginalizing those who seriously take the integrative efforts creative collaboration requires. (Jahn et al., 2012)

We are sure that such conclusions are bad advertisement for transdisciplinarity and restrict attention to it on the part of the students and young researchers, who will have to solve the acute problems of the contemporary science. In order to change the relation to transdisciplinarity it is necessary to prove consistency of transdisciplinary approaches with the approaches of academic and system science. Thus, in this article we have classified and generalized opinions about transdisciplinarity, which are given in the literature reviews on the transdisciplinary subject; formed its generalized definition, which can play a role of its expected generally accepted definition; and shown the vital difference between the transdisciplinary and systems transdisciplinary approaches, as well as given recommendations for the researchers, practitioners, and sponsoring organizations concerning targeted use of these approaches. During substantiation of the article's results, the features of the scientific worldview were considered, which were not always taken into account by the disciplinary scientists and practitioners. It is important to note that the definition for term "transdisciplinarity," as well as the definition for terms "transdisciplinary approach" and "systems transdisciplinary approach" were formulated in terms of the prime cause of transdisciplinarity and two its initial ideas.

PRIME CAUSE AND INITIAL IDEAS OF TRANSDISCIPLINARITY

The prime cause is an expectation associated with the necessity to solve the current problem, which is assumed to be solved by the transdisciplinarity. The initial idea is a formulated thought, which expresses the essence, objectives, and prospects of transdisciplinarity, and it is an initiator for actions contributing to achievement of these objectives and prospects.

The prime cause of transdisciplinarity was formulated during the Working Symposium on Long-Range Forecasting and Planning (Villa Serbelloni, Bellagio, Italy, 27th October to 2nd November 1968), which was organized by the Organization for Economic Cooperation and Development (OECD). E. Jantsch, Austrian philosopher and astrophysicist, being one of Rome Club founders had a hand in the description of this prime cause. The participants of the symposium unambiguously spoke in favor of the problem solving, long-range forecasting, planning, and control of social and economic development of the society by creation and use of the global approach. The participants of the symposium expressed assurance that within the limits of the global approach a deep synthesis of disciplinary knowledge and different initial data should occur, which allows forming the comprehensive worldview. Thus, the following was recorded in the final symposium declaration:

Many of the most serious conflicts facing mankind result from the interaction of social, economic, technological, political and psychological forces and can no longer be solved by fractional approaches from individual disciplines. The time is past when economic growth can be promoted without consideration of social consequences and when technology can be allowed to develop without consideration of the social prerequisites of change or the social consequences of such change. (Jantsch, 1969, p. 7).

The international presentation of transdisciplinarity took place two years later during the Seminar on Interdisciplinarity in Universities, Paris, September 7th - 12th, 1970. This seminar was organized by the Centre for Educational Research and Innovation (CERI), which was a part of the Organization for Economic Cooperation and Development (OECD) in collaboration with the French Ministry of Education at the University of Nice, France (Apostel, 1972). This seminar is famous because during its preparation and debates the participants formulated two initial ideas of transdisciplinarity: main and additional.

The main initial idea confirmed that transdisciplinarity, as a global approach, had to have traditional institutional form: being a special discipline, more precisely, a meta-discipline. But the scientific approach and discipline cannot exist without carriers – scientists, teachers, students, and specialists having the transdisciplinary worldview. Training of such specialists required reforming of the disciplinary structure of the universities. On this subject E. Jantsch, an author of the main initial idea of transdisciplinarity, stated that, ultimately, the entire education / innovation system can be coordinated as a multilevel multigoal hierarchical system through the transdisciplinary approach implying generalized axiomatics and mutual enhancement of disciplinary epistemology (Jantsch, 1970, p. 403). During the seminar E. Jantsch specified his position in his report:

Transdisciplinarity – the coordination of all disciplines and interdisciplines in the education / innovation system on the basis of a generalized axiomatic and an emerging epistemological pattern. A systems approach as it is proposed in this paper would consider science, education, and innovation, above all, as general instances of purposeful human activity, whose dynamic interactions have come to exert a dominant influence on the development of society and its environment. Knowledge would be viewed here as a way of doing, a certain way of management of affairs. (Jantsch, 1972, pp. 105-106)

However, an idea of global approach creation seemed to be so ambitious that some participants of the seminar perceived a desire to perform the deep synthesis of disciplinary knowledge and different initial data as a basis for an independent (additional) initial idea of transdisciplinarity. The essence of the additional initial idea of transdisciplinarity was formulated by J. Piaget, a French philosopher and psychologist. According to his opinion, transdisciplinarity would become an efficient method for deep synthesis of disciplinary knowledge. Within the limits of the additional initial idea transdisciplinarity didn't have to be the global approach being capable to perform vertical or external forms of coordination for organization principles, actively modifying disciplinary concepts, limits, and interfaces, as E. Jantsch proposed. Psychologist J. Piaget was interested in the prospects of natural integration (improvement of relations) of disciplinary discourses (verbal, language communication) but not in their external form of coordination. Thus, within his meaning transdisciplinarity was associated with the highest form of such integration. On this subject J. Piaget wrote:

We may hope to see a higher stage succeeding the stage of interdisciplinary relationships. This would be 'transdisciplinarity', which would not only cover interactions or reciprocities between specialized research projects but would place these relationships within a total system without any firm boundaries between disciplines. (Piaget, 1972, p. 138)

A key term "verbal, language disciplinary integration" assumes that for transdisciplinarity implementation it is sufficient to use the services of the experienced facilitator (a specialist ensuring successful group communication) and, thus, reach a consensus of opinions based on compromises of the disciplinary specialists. For verbal, language disciplinary integration, the conditions, which are formed within the limits of interdisciplinary, multidisciplinary research, are required. Thus, it was assumed that within the limits of the additional initial idea transdisciplinarity had to be a skill of the specialist, which was obtained within the limits of a temporary creative team of disciplinary specialists, but not in classrooms of the university.

Since 1970 both initial ideas of transdisciplinarity have initiated two parallel processes of the targeted actions in the area of science and education. Studying the literature on the transdisciplinary subject we came to a conclusion that a major part of Russian and foreign authors preferred to develop and describe a personal opinion about transdisciplinarity not often paying attention to the specific features of its prime cause and initial ideas.

SYSTEMATIZATION AND GENERALIZATION OF THE OPINIONS ABOUT TRANSDISCIPLINARITY

The most suitable primary documents for the task that we are trying to solve in this article are the literature reviews. The authors of such reviews initially select the books and reports that contain the complementary opinions about transdisciplinarity as well as perform primary generalizations of the opinion content. Thus, such reviews contain descriptions of the parameters, characteristics, and properties, which can play a role of identification characteristics of transdisciplinarity. In order to detect these parameters, characteristics, and properties, we performed bibliometric content analysis for 20 literature reviews and 80 analytical articles on the transdisciplinary subject that were published within the period from 1968 till 2021. The literature reviews on the transdisciplinary subject are in free access in the subject section of large scientific social networks: Academia.edu (Academia, n.d.); Researchgate.net (Researchgate, n.d.); Scholar.google.com (Scholar, n.d.).

The literature reviews contain special internet projects: Td-net (Td-net. Network for transdisciplinary research, n.d.); ATLAS (Academy of Transdisciplinary Learning and Advanced Studies, n.d.).

Examples of the literature reviews were articles by the following authors: Alvargonzalez, 2011; Arnold, 2013; Baptista, & Rojas-Castro 2019; Bernstein, 2015; Brandt et al., 2013; Brenner, 2014; Ba-zhanov, & Scholz, 2015; Darbellay, 2015; Jahn et al., 2012; Kiyshenko & Moiseev, 2009; Max-Neef, 2005; McGregor, 2014; Mobjörk, 2010; Mokiy, 2019a; Montuori, 2013; Osborne, 2015; Pasquier, & Nicolescu, 2019; Rigolot, 2020; Rimondi, & Veronese, 2018. Scholz, & Steiner, 2015a, 2015b; Thompson, 2013, 2014.

This list can be supplemented with the articles on the trans disciplinary subject, which were published within the last years in the specific issues of Informing Science: The International Journal of an Emerging Transdiscipline (InformingSciJ) (<https://www.informingscience.org/Journals/Inform>

ingSciJ/Articles) and Transdisciplinary Journal of Engineering & Science (TJES) (<https://www.atlas-tjes.org/index.php/tjes>).

The overview of the literature reviews allows focusing on the results of the primary generalization of the literature content, but not on the continuous quoting and discussions of its authors, as it occurs in the traditional literature reviews. The results on generalization of the literature review content allowed making a conclusion that the existing opinion about transdisciplinarity was recorded in the scientific environments in the form of 39 stable stereotypes.

TRANSDISCIPLINARITY STEREOTYPES

The stereotype is a belief or idea of what a particular transdisciplinarity is. This evaluation prevails in the scientific and personal consciousness and forms the prejudiced attitude to the term. Use of stereotypes allows for human brains to save energy spent for mental activity. The stereotypes simplify un-ordinary and fuzzy image of transdisciplinarity trying to describe it in expressions being simple and common for the authors of the articles and literature reviews. In terms of the certain articles the stereotypes of the transdisciplinarity appear to be convincing. However, it should be noted that authors of some stereotypes use their own perception of transdisciplinarity, which content turns out to be far from its prime cause and initial ideas. Probably this circumstance is one of the main reasons that some researchers consider transdisciplinarity to be a marginal direction of contemporary science. However, during bibliometric content analysis we detected that a major part of stereotypes recorded any certain property, parameter, or characteristic of the transdisciplinarity. This circumstance allowed classifying the detected stereotypes into 11 groups (A-K) (refer to Table 1).

Table 1. Distribution of Stereotypes by Similar Content

GROUP OF STEREOTYPES	CONTENT OF STEREOTYPES
A) Main prime causes of transdisciplinarity (6):	<ul style="list-style-type: none"> - Desire to have a global approach to the control of social and economic development of the modern society tending to globalization; - Desire to solve the problem for stable development of the modern society; - Desire to overcome division of the scientific disciplines and disciplinary knowledge; - Desire to integrate worldviews of the academic and systems approaches; - Desire to integrate knowledge of science and practice; - Desire to generalize mythological, religious, philosophical and scientific worldviews.
B) Main initial ideas of transdisciplinarity (2):	<ul style="list-style-type: none"> - Transdisciplinarity of higher education as a meta-discipline (systems transdisciplinarity) allowing training the student in the systems transdisciplinary method for wicked problem solving in the modern society; - Transdisciplinarity of scientific research as a special type of transdisciplinary research allowing to the scientists and specialists to form unique methods to solve the certain complex scientific problem.

<p>C) Meanings of “transdisciplinarity” definition (5):</p>	<ul style="list-style-type: none"> - Declaration stating and protecting the equal rights of famous and little-known scientists, great and little science disciplines, cultures, and religions, in research of the outside world; - High level of education, versatility, generality of knowledge of the certain person; - Rule of the outside world research; - Principle of scientific knowledge organization providing great opportunities of interaction for many disciplines when solving the complex scientific problems; - Type of systems approach developed within the limits of forming meta-discipline “system transdisciplinarity”.
<p>D) Transdisciplinarity forms (3):</p>	<ul style="list-style-type: none"> - Theoretical form relating to research of the proper transdisciplinarity and its methodology; - Phenomenological form being capable to connect theoretical principles with observed experimental data when forecasting the further results; - Experimental form being capable to ensure the level of the experiment procedure reproduction and the results being acceptable for the scientific society.
<p>E) Transdisciplinarity kinds (5):</p>	<ul style="list-style-type: none"> - Transdisciplinarity-0 uses the illustrative potential of the artistic metaphor and figurative language as a basis; - Transdisciplinarity-1 designates formal interconnection of several disciplines during transdisciplinary research; - Transdisciplinarity-2 designates internal connection of the disciplinary knowledge with personal experience of the researcher;
	<ul style="list-style-type: none"> - Transdisciplinarity-3 is associated with use of the general metaphors having fundamental cognitive meaning; - Transdisciplinarity-4 is associated with forming meta-discipline (systems transdisciplinarity), in the basis of which there is a special world view (transdisciplinary reality) and transdisciplinary methodology of its research.

<p>F) Transdisciplinarity types (2):</p>	<ul style="list-style-type: none"> -Transdisciplinarity of ideal type (Mode 1) supposing creation of general cognitive-epistemological structure, by means of which an attempt to combine all disciplinary languages and specific types of causality is made; - Transdisciplinarity of real type (Mode 2) supposing cooperation of science, practice, and society (combining of scientific and empirical knowledge).
<p>G) Institutional statuses of transdisciplinarity (4):</p>	<ul style="list-style-type: none"> - Transdisciplinary approaches as a method for implementation of trends to integrate and generalize disciplinary, interdisciplinary and multidisciplinary knowledge and models of the object; - Transdisciplinary processes as a method for combining of “theoretical severity” of the scientific knowledge and “empirical wisdom” of practical knowledge about the real world; - Transdisciplinary research as a method for creation of different disciplines of new conceptual, theoretical, and methodological innovations to solve the complex scientific problems by researchers. <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <ul style="list-style-type: none"> - Transdisciplinary metadiscipline as a way to coordinate knowledge of the unconditional, intuitive, speculative, and empirical types of knowledge. </div>
<p>H) Trends for transdisciplinarity activity (5):</p>	<ul style="list-style-type: none"> - First trend (slogan “Integration”) is a modern version of systematic integration and synthesis of disciplinary knowledge; - Second trend (slogan “Unity”) is a modern version of unification and generalization of disciplinary knowledge and existing world views; - Third trend (slogan “Transgression”) is a modern version of attempts to overcome the borders of academic and unacademic knowledge, borders of class, gender, race, ethnic and other identities, etc.;
	<ul style="list-style-type: none"> - Forth trend (slogan “Holism”) is a modern attempt to move beyond the disciplinary views formulating the integral image, pattern, or model of the research object; - Fifth trend (slogan “Problem Solving”) is a focusing on wicked problem solving in the modern society.

<p>I) Potential states of transdisciplinarity (2):</p>	<ul style="list-style-type: none"> - “Weak” transdisciplinarity is associated with transdisciplinary approach in classification of the academic scientific approaches. This approach is based on the natural-science world view and supposes search of unique methods to solve the complex problems of science; - “Strong” transdisciplinarity is associated with systems transdisciplinary approach in classification of the systems approaches. This approach is based on the philosophic picture of a single world (unicentrism) and uses a universal systems methodology to solve the wicked problems in the modern society.
<p>J) Consistency of transdisciplinarity to the scientific method (2):</p>	<ul style="list-style-type: none"> - Consistency to academic (classical) approaches in their classification; - Consistency to systems approaches in their classification.
<p>K) Associative relation determined as the transdisciplinarity (3)</p>	<ul style="list-style-type: none"> - Transdisciplinarity as an association with some “crossing plays” being capable to describe homogeneity for theoretic activity in different areas of science and engineering independent from the field, where this activity is performed, formulated only in the mathematical language; - The transdisciplinarity as an association with original theoretic concepts, which are outside the scope of one research area only; - The transdisciplinarity as intellectual sophistication associating with the common to humanity culture.

Rethinking of stereotypes in their group combination in terms of the prime cause and two initial ideas allowed for us to form the generalized definition of transdisciplinarity:

Transdisciplinarity is a method of the intellectual activity intensification in the area of inter-disciplinary interactions contributing to maximum broadening of the scientific worldview horizon.

Such definition of transdisciplinarity supposes availability of the tools that ensure broadening of the scientific worldview horizon. A role of such tools in the area of interdisciplinary interactions is played by the transdisciplinary and systems transdisciplinary approaches. Considering the generalized definition of transdisciplinarity the definition of such transdisciplinary approach will be as follows:

Transdisciplinary approach is a method for broadening of the scientific worldview horizon in the terms of natural-science worldview by implementation of integrative trends of disciplinary, interdisciplinary, and multi-disciplinary knowledge and models of the object.

In the classification of the academic scientific approaches the transdisciplinary approach allows maximum integration and synthesis of disciplinary knowledge by the idealized object model. The idealized object is an imagined structure of a real object, which is provided with all possible (real and un-real) properties during mental experiments. The idealized object is used as a basis to construct theories, which allow describing reality laws (Subbotin, 2010).

In its turn the definition of the systems transdisciplinary approach will be as follows:

Systems transdisciplinary approach is a method for broadening of the scientific worldview horizon within the limits of the philosophic picture of a single world by simulation of the object in the form of the transdisciplinary system allowing using the systems transdisciplinary methodology for its research. In the classification of the systems approaches, the systems transdisciplinary approach allows maximum unification and generalization of disciplinary knowledge within the limits of the transdisciplinary system. The transdisciplinary system is an imagine structure of general order conditioning unity of proper space, information, and time of each object, as well as the proper environment, which elements are these objects (Mokiy, & Lukyanova, 2021). The systems transdisciplinary models of spatial (Mokiy, 2020), informational (Mokiy, 2021a), and temporal (Mokiy, 2021b) unit of the order provide object with strictly certain properties, as well as initially determine the basic parameters for these properties, their values, nature and intensity of their interaction in the object.

CONSISTENCY OF TRANSDISCIPLINARY APPROACHES WITH ACADEMIC AND SYSTEMS SCIENTIFIC APPROACHES

For demonstration of consistency of transdisciplinary approaches with academic and system scientific approaches C.F. Gauss random variables normal distribution was used. The normal distribution law is called the C. F. Gauss random value distribution law (Prokhorov, 2020). Distribution of random values is shown by the Gaussian curve (Gaussian). A part of median (Gaussian center) is executed by some average value of the researched parameter. As a result, the Gaussian can show, for example, distribution of shell burst around the target aim point on "short-long" principle; distribution of blood pressure values in the group of peoples, which doesn't achieve or exceeds averaged value of 120/80 mmHg; or distribution of height values for these people, which don't achieve or exceed the average value of 175 cm. The law of normal distribution for scientific approaches differs from distribution of shell bursts around target aim point. Thus, the law of normal distribution for scientific approaches differs from distribution of shell bursts around target aim point. In this case axes of Gaussian will not have numeric (quantitative) but logic (qualitative) characteristics.

In the classification of academic and systems approaches, the continuity is associated with a sequential broadening of the scientific worldview horizon. Thus, it is important to exactly visualize what the stereotype "broadening of the scientific worldview horizon" means. Sight sense of amphibians, for example, frog, is organized so that it sufficiently recognizes moving objects and actively responds on them. It sees and responds to the flag, which is moved by wind. But if the wind goes down, then for the frog the flag turns out to be fuzzy grey spot on the fuzzy grey background of the environment (Zhdanova, 2018). Therefore, a frog will start moving in order to broaden the worldview horizon. At the moment of motion all stationary objects start moving in relation to the frog and it can see and distinguish them! Viewing of the disciplinary specialist has also specific features. The "reality" eyes of the disciplinary specialist see a bent spoon in the glass of water (see Figure 1a), which is actually straight one (see Figure 1b).

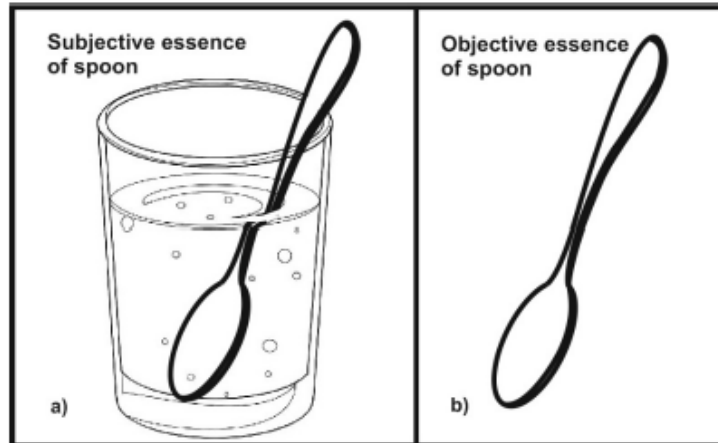


Figure 1. Image of Straight Spoon in Glass of Water

If the disciplinary specialist does not have the possibility of removing the spoon from the glass or does not initially know what it actually is, then the specialist will research and describe what is seen – the bent spoon.

However, if the spoon has a real bend copying its supposed bend (Figure 2b), then the reality eyes of the disciplinary specialist see the straight spoon in the glass of water (see Figure 2a). As a result, the specialist will research and describe the bent spoon as a straight spoon.

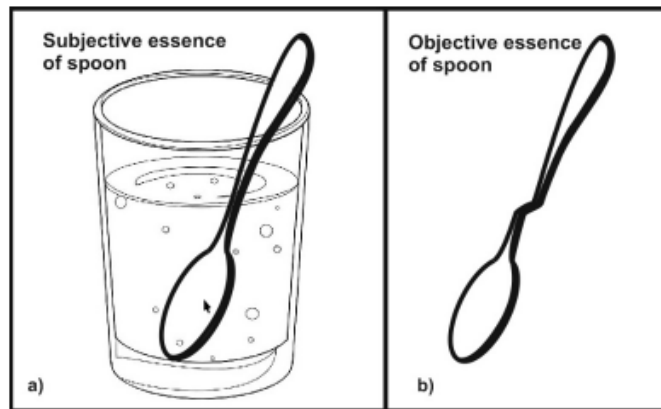


Figure 2. Image of Bent Spoon in Glass of Water

This example prompts asking a question, what are actually the objects and subjects of public (social) sciences that the specialists see in reality? Are these bent spoons that are actually straight ones, or are these straight spoons that are actually bent ones? In this case it is reasonable to ask another question: "What form of social relations (subjective or objective) do economists, sociologists, politicians, and managers use for development of new models of the world social and economic order and control of the local and global processes of the social and economic development?" In order to answer these questions, it is necessary to "take out" the objects of public (social) sciences from the natural environment, as the spoon from the glass of water, and see what they are in reality. Without unambiguous answers to these questions, it is impossible to analyze the risk from implementation of a new model of the world social and economic order. Thus, the specialists of the public (social) sciences should pay attention to the systems transdisciplinary approach, which allows distinguishing the objective essence of the objects, subjects, and their interactions not breaking their connection with the environment.

However, a desire of the disciplinary specialist to achieve a maximum scientific worldview horizon is similar to the desire of a smoker to give up smoking. Theoretically it is possible, but practically it is difficult; thus, it makes the specialist leave the area of psychological comfort that is formed by the disciplinary worldview. In reality, this desire obtains noticeable support if the smoker sees an X-ray image of their lungs. Possibly, the Gaussian pattern, which demonstrates consistency of the transdisciplinary approaches with the academic and systems approaches, will help the disciplinary specialist. Such Gaussian is given in Figure 3.

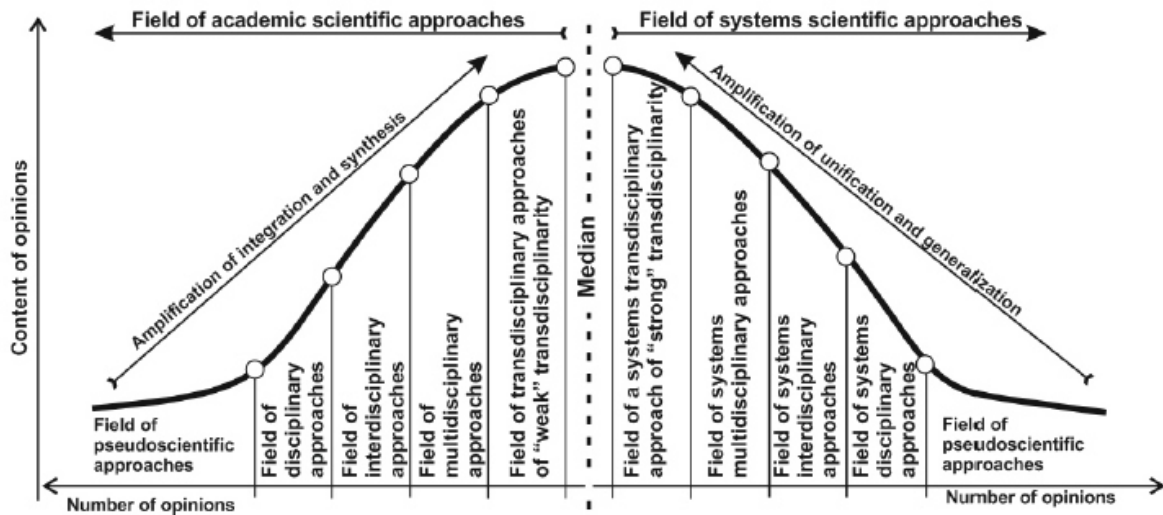


Figure 3. Gaussian Distribution of Academic and Systems Approaches in the Environment of Interdisciplinary Interactions

In this case the median divides the Gaussian into two halves. These halves (areas) are characterized by similar structures of classification for the academic and systems approaches.

AREA OF ACADEMIC APPROACHES

The area of academic approaches is located on the left side of the median. This area is formed with five types of approaches in the direction from pseudoscientific approaches to transdisciplinary ones. The total priority of disciplinary knowledge and disciplinary methodologies in this area does not allow the transdisciplinary approach to form any general theoretical structures. In such a form the transdisciplinary approach calls for greater reflectivity, particularly to humility, openness for interaction with other methodologies and practices, and readiness to give place to other approaches if they are more proper for modern challenges. Such a transdisciplinarity plays a part of weak transdisciplinarity, and its methodology essentially is similar to the methodology and multidisciplinary scientific research (Max-Neef, 2005). However, a weak transdisciplinarity has strong properties. These properties are formed as a result of disciplinary knowledge integration and synthesis. Synthesis is a procedure of imagine connection of the appropriate features, properties, and relations distinguished during analysis of the objects and problem. Integration is a method for maximum filling of the obvious model of the idealized object with knowledge of complementary disciplines. Generally, this knowledge has already been systematized in their disciplines. Within the limits of their own disciplines for knowledge within the standard quantitative and qualitative characteristics, their numerical or logical values are determined. However, the disciplinary knowledge remains indifferent to the process of integration in the integral model of the idealized object (simply stated, they and their numeric values represent only what they present). Thus, the disciplinary specialists often have to make a conclusion and describe the results of interdisciplinary, multi-disciplinary, and transdisciplinary research based on compromise searching. In its turn, the search of compromises results in three negative consequences:

Ambiguousness of Methodological Assurance. Each research of the complex object or solving of the complex scientific problem needs creation of a unique method. The content of the unique method cannot be predicted, as it is newly formed every time during the cooperation of participants from a temporary team. The temporary team of disciplinary specialists is broken apart and a unique method is lost. It should be noted that the unique method requires a unique way for risk analysis due to implementation of the object research results or problem solving. But the proper creation of such analysis ways is a complex scientific problem.

Elitism. Forming of the unique method is available for the specialists, who have formed a scientific world view, but it is unavailable for the students, who are in process of scientific world view forming and training of the scientific method essence. Thus, the rules to form the unique methods cannot be taught in the universities.

High probability of self-reference disciplinary traps. Self-reference occurs in the cases when some notion refers to itself. For example, when the disciplinary specialists have to prove the obvious sense of the straight spoon only on the basis that it is perceived as the straight spoon. But earlier we have shown how false its obvious essence could be.

AREA OF SYSTEMS APPROACHES

The area of systems approaches is located from the right side of the median in Figure 3. Moreover, this area is formed with five types of approaches in the direction from a pseudoscientific systems approaches to a systems transdisciplinary one. Contrary to the transdisciplinary approach in classification of the academic approaches, which use the obvious (subjective) sense of the model for the idealized object, the systems transdisciplinary approach uses the objective essence of the object representing it in the form of the transdisciplinary system (Mokiy, 2019b). Availability of special philosophic substantiation (unicentrism) and the appropriate universal methodology provides the features of strong transdisciplinarity for the systems transdisciplinary approach. The systems approaches of the Gaussian right area are characterized with an increase of disciplinary knowledge unification and generalization degree.

Unification is a process for bringing the disciplinary knowledge and/or their disciplinary classifications to a uniform systems transdisciplinary classification. In other words, the existing classifications of disciplinary knowledge are specified within the limits of isomorphic systems transdisciplinary models for space, time, and information units of the order, which conditions a unity of the world and each object and process. After unification, the disciplinary knowledge becomes an active part of the systems transdisciplinary solution for acute problems of modern society, as well as during solving of the complex scientific problems. Thus, the specialists can forecast change of quantitative and qualitative characteristics of the certain object even concerning condition of the objects, which were located within one area (Mokiy, 2019c).

Generalization is a method of filling of the systems transdisciplinary models of the order units with the disciplinary knowledge, which describes the objective essence of the object or problem. It should be noted that the systems transdisciplinary unification and generalization do not break the disciplinary classifications of knowledge and do not cancel their disciplinary criteria, indices, and parameters. It allows interpreting these criteria, indices, and parameters in terms of the order conditioning a unity of the environment, as well as the objects and processes, which are its elements. Moreover, relevance,

reliability, scientific severity, and efficiency of the disciplinary tools and methods used for the process of systems transdisciplinary research are retained.

The systems transdisciplinary unification and generalization of the disciplinary knowledge results in six positive consequences:

- allows excluding the practice of compromise search between the disciplinary specialists;
- allows for the specialists of the transdisciplinary team to focus on their professional competences, but not the compromise search: in particular, provide the required volume of disciplinary information, organize and perform the required experiments, control and comment the process of disciplinary knowledge generalization in the direction of wicked problem solving;
- contributes to substantiation for selection of the disciplinary specialists in the temporary teams, as well as the disciplinary knowledge, that will be used in the systems transdisciplinary research;
- contributes to use of the universal research method and universal method of risk analysis due to research results implementation; the rules for use of the universal method of research and risk analysis can be studied in the universities;
- reduces the part of facilitators in the transdisciplinary teams of the disciplinary specialists, as a result management (coordination) of the disciplinary knowledge, but not disciplinary specialists, is performed;
- allows avoiding dead end with self-reference, as the specialists of the transdisciplinary team use the objective and uniquely determined philosophic, conceptual, and methodological categories excluding use of the corrupted or incorrect research object pattern and solved problem.

CONCLUSION

The results of the overview of the literature reviews witnesses that the prime cause of the transdisciplinary is a desire of politicians, economists, managers, and other disciplinary specialists to solve the problems of control for global and regional social and economic development of modern society, which include the social and political problems and problems of international relations by means of the global approach. Thus, for the last 50 years the main initial idea has contributed to forming trans-disciplinarity as a global approach, within the limits of which several important problems are solved.

- develop the global approach within the limits of the independent meta-discipline (systems transdisciplinarity);
- develop a single (universal) method to solve the acute problems of the modern society based on the meta-discipline.
- organize studying of the students in this meta-discipline partially reforming the disciplinary structure of the universities;
- present the social and economic development as natural fragment for development of planet nature within the limits of this meta-discipline. In this case development of the society and management risk analysis is evaluated with regard of objective laws of nature and society uniformity conservation.

The systems transdisciplinary approach, as one of the main pretenders for the global approach title, supposes control (coordination) of disciplinary knowledge. In this case the systems transdisciplinary specialist (generalist) performs unification of disciplinary knowledge at the first stage of research. This

specialist organizes the proper research: determines composition of the disciplinary specialists and scientific disciplines; specifies the list of parameters to be considered; forms several scenarios of research development in the direction to the determined objective, etc. Moreover, the part of the disciplinary specialists in the research results in traditional professional activity by means of strict disciplinary methods. The generalist specialist corrects the research scenario, which will cause the certain objectives and results, at the subsequent stages of research. At the final stage, together with the disciplinary specialists, it generalizes the results; forms the final conclusions of the research; describes them with a language that is understandable by the specialists and administrative workers; and analyses the risk due to implementation of the systems transdisciplinary research results. In such a role the systems transdisciplinary approach allows solving the poorly structured problems of the science and society.

It should be noted that T. Kuhn (1962) stated in his famous book "Structure of Scientific Revolutions" that almost always people, who successfully provided the fundamental development of a new paradigm, based on which the global approaches were constructed, were either very young or beginners in this area. Thus, we attach important significance to partial reforming of the disciplinary structure of the universities allowing creating the Systems transdisciplinary departments and the Centers of systems transdisciplinary retraining of disciplinary specialists. Moreover, T. Kuhn warned that the change of tools in science was a last extreme measure, which was taken only in case of actual necessity. Significance of social and economic and social and political crises of modern society consists particularly in that they speak about the relevance of such tools change. Little remains – it is necessary that disciplinary specialists want to use the tools of a global approach to solve global problems.

Why is the transdisciplinary approach, which is formed by the additional initial idea, more known in science and education this day? This occurred due to the overlapping of the subjective desire of practitioners to eliminate subdivision of the disciplinary approaches on the objective desire of scientists to synthesize and integrate the disciplinary knowledge, with which the modern stage of the science development is characterized. Such overlapping contributed to transformation of multi-disciplinary research into a special form of transdisciplinary research, which was associated with the transdisciplinary approach or transdisciplinarity. The distinctive feature of the transdisciplinary approach is forming a unique method for each complex scientific problem. Such method is based on the experience of facilitation, consensus, and compromise of disciplinary specialists being participants of the temporary transdisciplinary team. Thus, within the limits of the transdisciplinary approach, the global and regional social and economic development is interpreted as stable development based on subjective laws of the human being and society development, stage standards of morality and ethics.

It should be noted that the effectiveness of the transdisciplinary approach and, thus, transdisciplinary research is negatively affected by objective and subjective interpersonal, world vision, ideological, psychological, methodological and other problems of interdisciplinary interaction (Lotrecciano, & Misra, 2018). In this case, the problem solving concerning interaction of specialists from different disciplines does not depend on objective scientific methodology. It depends on practical experience of the facilitators to a greater degree. As a result, many problems of modern society, which expect its solution and in which the social and political aspects appear, are declared to be acute problems. It should be noted that such problems are excluded from the list of problems that could be solved by means of science (Rittel, & Webber, 1973). Therefore, the transdisciplinary approach allows solving sufficiently structured scientific problems in which knowledge of the complementary disciplines takes part.

In view of the above, we can conclude that transdisciplinarity is not a marginal direction of contemporary science. Transdisciplinarity is a method of intensification of intellectual activity in the area of interdisciplinary interactions contributing to maximum broadening of the scientific worldview horizon. The transdisciplinary approach and the systems transdisciplinary approach play the role of tools that expand the horizon of the scientific worldview.

Considering the above mentioned information, it can be concluded that the transdisciplinary approach and systems transdisciplinary approach have a different initial idea, a different intended purpose, and a different research potential. We hope that the initiators of higher education currently discussing the problem of university disciplinary structure reforming will pay attention to differences of the transdisciplinary and systems transdisciplinary approach. In this case they should take timely actions for exact designation of the purposes for such reforming and start moving to achieve these objectives (Mokiy, 2019c).

The customers and sponsoring organizations trying to obtain the solution form the problem of long-range forecasting, planning, and control of the global and regional social and economic development of the society, which include the social and political problems and problems of the international relations, should pay attention to these differences. Thus, to solve such problems, firstly it is necessary to involve the teams of specialists who have skills in knowledge of the systems transdisciplinary approach and who are able to conduct a risk analysis of the proposed solution.

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Informing Agility in the Context of Organizational Changes

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ABSTRACT

Aim/Purpose

This paper, although conceived earlier than the emergence of COVID-19 pandemic, addresses the problem of informing agility as part of organizational agility that has become a rather important issue for business survival.

Background

While the general issues of business informing, and business intelligence (BI) in particular, have been widely researched, the dynamics of informing, their ability to act in accord with changes in business and preserve the key competencies has not been widely researched. In particular, the research on BI agility is rather scattered, and many issues need to be clarified.

Methodology

A series of in-depth interviews with BI professionals to determine relations between organizational agility and BI agility, and to round up a set of key factors of BI agility.

Contribution

The paper clarifies a candidate set of key factors of BI agility and gives ground for future research in relations with areas like corporate and BI resilience and culture.

Findings

The interview results show the relations between organizational changes, and changes in BI activities. BI has limited potential in recognizing important external changes but can be rather helpful in making decision choices and detecting internal problems. Lack of communication between business and IT people, existence of data silos and shadow BI, and general inadequacy of organizational and BI culture are the key factors impairing BI agility.

Recommendations for Practitioners

There are practical issues around BI agility that need solving, like the reasonable coverage of standards or creation of a dedicated unit to care about BI potential.

Recommendations for Researchers

The research is still in its starting phase, but additional interesting directions start to emerge, like relations between BI agility, resilience and corporate agility, or the role of informing culture and BI culture for BI agility issues.

Impact on Society

Agile business, especially in times of global shocks like COVID-19, loses less value and has more chances to survive.

Future Research

Most likely this will be focused on the relations between BI agility, resilience, and corporate agility, and the role of informing culture and BI culture for BI agility issues.

Keywords : organizational agility, business intelligence agility

INTRODUCTION

The usual terms describing the current business environment – "fast", "turbulent", "dynamic" – have been coupled to necessity to face changes and prepare for them. The orientation towards permanent changes has supported the spread of the notions of corporate agility, resilience and ability to survive. The arrival of COVID-19 pandemic, however, has put a sudden and harsh test to such qualities. While the conditions of activity under the pandemic are rather different for different lines of business, no business activity remains untouched.

The pandemic is performing a severe test on maturity, agility, and resilience of any organized activity. The function of corporate IT, information systems, and business intelligence (BI) in particular will be affected as well. Opulent analytics have to adapt to new conditions or give way to blunt estimates and insights on mere survival. External context suddenly is extremely hard to forecast and to develop scenarios. Military-grade informing measures are required to maintain control over situations with fast and flexible decisions, direction and rearrangement of resources, and subsequent action to achieve results with minimum delay.

It should be noted here that many BI studies, performed in less turbulent times, have been oriented towards the growth of operational measures like user satisfaction, BI value, or profitability as a sought-after result or dependent variable (see, e.g., Talaoui, & Kohtamaki, 2020). Such studies often do not discern between measured short-term gains and long-term effects that may positively or negatively influence the agility and vitality of an organization. We make an assumption here that agile informing is one of the key factors of agile behavior of an organization, enabling appropriate and timely action. While these considerations seem rather obvious, the area of informing agility, and especially BI agility, is rather under-researched. So the current paper focuses on agility (and resilience) of business intelligence and analytics. Without this discussion, BI has to adapt and evolve anyway, but we believe that a set of common features or factors of agility can be defined that would provide guidance for maintaining BI being more agile and less fragile and rigid.

In general, agility is a term that defines fast and flexible action – the opposite to inertia and rigidity. Being currently on the rise, the notion of agility is applied to many different areas – agile organization, agile business, agile software development, agile process, and so on. In any of these cases, agility is hardly possible without awareness and fast decisions – features that are based on the use of information and informing process. Zimmer et al. (2012) state that agility "is understood as the ability to react to unforeseen or volatile requirements regarding the functionality or the content of a BI solution in a given time frame." Conboy, and Fitzgerald (2004) define agility as "the continual readiness of an entity to ...

embrace change through high quality, simplistic, economical components and relationships with its environment." As this paper discusses the issues of business intelligence (BI) agility, for its purposes the issues around BI agility can be divided into two interrelated areas:

- The role of informing and BI in supporting organizational agility; and
- the agility of BI function itself.

Several examples of situations requiring BI agility:

- Flexible adaption to new information sources;
- Flexible adaption to new BI platform, especially when there is a need to transfer accumulated skills. There always are innovations that significantly differ from what's currently in use;
- Flexible adaption to new informing requirements: internal – integration of data and information that has not been done before – or external – e.g., new disclosure requirements;
- Adaptation to changes in business models, especially interconnected partnerships.

One more important feature of organizations, often mentioned together with agility, is resilience, the relevance of which has grown with the current pandemic. Both agility and resilience are related in a sense that they are intended to handle disruptive forces, deal with changes, and overcome uncertainties. However, there are differences: agility deals with both threats and opportunities, while resilience focuses more on large-scale problems and abilities to maintain the significant or maximum share of potential or capacity. Agility mostly means fast and flexible action driven by current results, while resilience aims to overcome hard times with minimum losses. Although resilience is not a subject of this paper, it is a potentially rather interesting issue both for organizations (this direction is currently being actively researched) and informing activities (still under-researched), and most likely will be considered in the future.

RELATED WORK

In literature discussing organizational agility and its features, one of the key supporting roles in dynamic business environment is adequate informing (Laval et al., 2018). According to Zimmer et al. (2012), BI is seen as a set of resources or a collection of capabilities that need to be constantly rearranged and reconfigured for sustaining adequate informing and analytic competence. Cyert, and March (1963), discussing organizational learning in the early years of business informing, have argued that a firm learning from its experience leverages rules, routines, and procedures intended to respond to external shocks, and by doing this strengthens organization agility and adaption to the environment changes. Discussing the implications of dynamic capability theory for BI, Meredith et al. (2012) differentiate between moderate-velocity context and high-velocity context. In moderate-velocity case, analyses may be complex, but they are executed in a predictable path. For high-velocity cases, uncertainty is more common and, therefore, more flexible and an evolutionary approach is required. Another interesting point made by Meredith et al. (2012) is the analysis of two positions, vendor literature and academic research, where authors justifiably point out that vendors concentrate on data engineering to support faster and better decisions without explaining how faster decisions are better. In addition to this, vendors mostly ignore the role of external information that is often of prime importance in transformational situations. Reeves and Whitaker (2020) discuss organizational resilience and describe its focus around the unknown, changeable, unpredictable, and improbable – features that in other works are largely prescribed for agility to cope with. There are numerous works that point out the weaknesses of rigid and inflexible organizations and their practices – institutionalized procedural order that worked in its own time, but eventually became rigid and inflexible. An opposite approach – the ability to evolve

through trial and error – has been pointed out by Reeves and Whita-ker (2020), who bring up an important point of adopting constant change and experimentation as the default, deeming iterative adjustment far less risky than massive one-time changes. Discussing dynamic capabilities, Zahra et al. (2006) have noted, "Managers do not, and probably should not, create 'once-and-for-all' solutions or routines for their operations but continually reconfigure or revise the capabilities they have developed. ... The new routines form the foundation of firms' knowledge bases." However, old routines remain in some form of experience collections, although as valid competences they have lost their usefulness. Such experience collections may form a sort of timeline or time series of competence changes and may be useful in forecasts for new competences.

Although not abundant, there is a certain volume of published research dedicated to the issues of informing agility and its possible impact on organization. Knabke and Olbrich (2018) have presented the results of research on factors influencing BI agility and have pointed out BI adoption for business operations and market understanding having significant impact on BI agility. Baars and Zimmer (2013) argue that BI solution that is seen agile from one business line perspective can have negative impact on agility of enterprise-wide BI and suggest splitting of BI agility concept based on subject of agility (content, function, scale) and architectural layers. Different perspective of BI agility concept is presented in the article by Skyrius and Valentukevici (2020), where authors stress the importance of managerial and especially cultural factors in building up agility competences at three levels: organizational, informing, and BI. Laval et al. (2018) proposed to measure informing agility as the key performance indicator for an existing enterprise information system and noted that very few research works focus on IS agility and its measure. Simchi-Levi et al. (2014) have proposed a model of time-to-recovery in situations with unexpected shocks. Instead of attempting to quantify the likelihood of events with high risk and low probability, the authors suggest identifying the most important exposures and developing risk-management plans to mitigate them. Blay et al. (2020) developed an information resilience framework, based on several persistent resilience dimensions like adaptability, business continuity, coping ability, awareness and preparedness, and several antecedents of resilience – redundancy, flexibility, promoting innovation and valuing variety, monitoring, learning from the past, resilient culture. The culture element stands out in many sources pointing out that agile is more a culture than a process (Appelo, 2010; Denning, 2010; Hesselberg, 2019; Kulak & Li, 2017; Spayd, 2010).

Summing up, agility may be defined as the feature of BI reflecting the readiness to cope with the dynamics of business and supporting competencies to navigate and survive in complex, dynamic, and unpredictable contexts.

The results of literature analysis, and the resulting positioning of BI agility, have prompted the subsequent research activities. Several issues deserving consideration have come out. Firstly, BI agility, and agility in general, is a vague concept, although several features, like flexibility, collaboration, awareness, and ability to learn, are common to most existing research on the subject. Secondly, technical agility issues intertwine with managerial and organizational issues, creating a complex informing environment that is more a culture than a process or technical excellence. The existence of these issues has guided the choice of research method, presented in more detail in the following section.

RESEARCH METHODOLOGY

RESEARCH PHILOSOPHY AND METHOD

This qualitative research was performed following a paradigm of interpretivism. Since the phenomenon is under-researched and complex, the study of meanings to research participants can create new, richer understandings of organizational realities (Saunders et al., 2016). We assume the individual, in-depth, semi-structured interview to be the most effective method of gathering information for our research because it is flexible, accessible, intelligible, and provides the opportunity for discussion, through which complexities are explained and new topics emerge (Qu, & Dumay, 2011).

In order to be able to explore a phenomenon in sufficient detail, the duration of each interview was between 1 and 2 hours. The interview guide, with the set of 14 pre-designed questions ordered to follow a logical progression based upon the objectives of the study, was prepared and used during interviews but since the interview format was semi-structured some questions were rephrased, reordered, added, or skipped based on the interviewee's background and responses. The interviews were conducted on a one-to-one basis. Due to Covid-19 related epidemiologic situation, most of the interviews were conducted via remote video communication service such as Microsoft Teams. Interviews were recorded and transcribed.

For triangulation purposes the interviews were conducted by 5 researchers. This allowed to ensure quality of the data by addressing the risk of researcher bias.

SAMPLING

We followed the judgmental sampling approach in selecting respondents to ensure a relevant representation of the researched phenomena. In total ten interviews were conducted with a sample of informants in BI specialists or managers positions from medium to large-sized firms and BI experts from firms providing BI services to medium-large size clients. All interviewed respondents were from local or international companies with operations in Lithuania.

Due to the complexity of analyzed phenomena, the homogeneity of the population under consideration and the contact time spent on each individual respondent, we believe that sample size of 10 is representative to generate a valid research finding. However, the research group plans to execute several additional interviews with the aim to move closer to the data saturation point and observe more information or themes in the data from completion of additional interviews (Guest et al., 2006).

DATA ANALYSIS

The general inductive approach was applied to condense raw textual data into a summary format, to establish the links between research objectives and findings derived from the data, and to describe the most important themes (Thomas, 2006). This approach was selected as it allows reliable and valid research findings to emerge from the themes inherent in raw data by applying simple procedures for analyzing qualitative data.

The transcripts were read and analyzed by 2 members of the research team with an output of identified themes most relevant to research objectives.

INTERVIEW FINDINGS

The structure of the interview has targeted the issues of organizational changes and the role of BI in the process, followed by changes in BI and perceived BI agility and factors supporting or limiting agility.

RECENT CHANGES FOR ORGANIZATIONS

The respondents have been asked to indicate the changes, experienced over the last three years by their organizations. The named changes are rather varied and do not allow for any generalization. However, the two important events having happened lately are mentioned by everyone – COVID-19 and Brexit – because they have affected virtually any business. As a consequence of COVID-19, many retailers have established or reinforced their e-commerce platforms. Many employees, especially the ones working with information or digital products and services, had to switch to working from home. Some sample responses:

"Brexit has affected the import-export oriented trade and retail companies. 'What-if' scenarios had to be developed to estimate the changes in customs taxes and see how competitiveness would be affected."

"In some travel-related sectors like aviation and airports, business has experienced serious setbacks, tightening belts and reconsidering investments. Many layoffs have been made."

"All of our customers (the company performs IT technical support) had to switch to working from home because of the pandemic. Although the move was executed smoothly, the number of problems and volumes of work have increased."

"The pandemic has forced the digitalization and virtualization of work processes. More work emerged for call centers, and an e-commerce channel had been established."

BI ROLE IN ORGANIZATIONAL CHANGES

The role of BI in detecting and recognizing organizational changes is, in many cases, undefined and unclear. Meanwhile, at the more simple level of informing, the role of ERP systems is quite clear, and activity seriously suffers if these systems go out of service. The dependency upon BI is not so clear; on the other hand, managers and decision makers at all management levels want to be well-informed. One of the most important reasons for this contradiction is an obvious absence of feedback between the business and BI specialists, leading to misunderstandings and disappointments.

BI is hardly able to detect important external changes like Brexit or COVID-19. At the same time, BI is recognized as important for monitoring important internal signals. As well, BI, having incorporated the tools and techniques of decision support, assists in evaluating scenarios or alternatives in making decisions. Several sample responses:

"In reality, it is more the case of business needs directing BI, and less the case of BI showing emerging problems or opportunities in advance. BI has a range of tools (trend estimation, portfolio analysis), but the management hardly uses them, and carries on analysis in Excel. ... The BI had created interactive graphs and tools, but nobody used them. The main reasons for this are the lack of intelligence culture, and significant workloads that prevent wider perspectives."

"The data is directed towards data-based decisions. BI specialists are lacking feedback on how business use data for decision making."

"The BI system has helped noticing some transaction-related customer trends, like a relation between money transfer delay and transaction payment – clients prefer to wait for 3 days to avoid paying for the transaction."

"The BI system is used to base business cases and validate hypotheses before making decisions."

"In practice I haven't seen such situations that BI would be telling what changes in organization are needed. Most often human insights are being supported by data from BI. For example, for one of our clients we have made forecast model that allowed to evaluate what cost cuts are required in order to survive challenging period of pandemic."

CHANGES IN BI

As stated before, organizational changes initiate important changes in BI system. Such changes mostly relate to data layer, and the interviewed specialists report cases of changing data structures, creating data warehouses, or opening data silos. There is a noticeable growth of data lake projects in larger organizations, intended to accumulate assorted data from various sources in different formats in a loosely organized collection.

Serious changes in BI have been introduced by the advent of self-service, user-friendly software – Qlik, PowerBI; this is seen as a countermeasure for Excelization – a term used for the ubiquitous use of Excel in assorted analytical and intelligence activities and labeled by most sources as "shadow BI". Several sample responses:

"One of the most complicated issues in BI changes is to estimate the impact of changes in client DB to other ar-eas."

"One of the important changes in BI over the last three years has been the creation of ODL (Operational Data Lake), where data from many systems is collected. ODL is a base for data science models like churn identifica-tion or AML (Anti-Money Laundering) models, using internal and external data."

"The creation of data warehouse made creation of static reports a lot easier. Previously, reports have been created by copy-pasting from ERP to Excel, and currently reports are made in real time from updated data. Data warehouse has created substantial value and saved considerable human efforts."

"ABC (Activity-Based Costing) naturally joins data from data silos. But other analytics do not join data from, e.g., commerce and logistics. No one has raised such need; commerce does not care how much merchandise delivery is costing (logistics data). This may be reasoned by the lack of intelligence culture, or by the fact that data analysts did not 'sell' the idea of wider analytical context."

"Most of our clients initiate changes in BI as a consequence of organizational changes such as new business area, new structure, new software as a data source. In most cases BI changes are being done together with organ-izational change or even before that. I can state that Pareto principle works here as 80% of changes are being planned and the rest are unexpected ones when BI system was forgotten changing something else."

"Any organizational change can affect and disrupt BI. The implementation of new billing process had severe impact on BI, some data was missing, and many parts needed to be rebuilt."

PROBLEMS UPDATING BI

Changes in BI, intended to provide more insight potential, permanently lead to managerial problems – ownership, responsibility, motivation, data silos. Many BI systems appear rather inertial when having to face changes, and miscommunication only compounds the problem. Some typical responses:

"The merger of 2 organizations has created the need to join 2 data warehouses. ... Poor sponsoring from company management; did not understand what is being done; large investments have been questioned. Emergence of scope creep; lack of architectural vision. ... Friction between data analysts and data engineering because of figures mismatch. Legacy warehouse contained hardcode. Black box problems started to emerge. Reverse engineering discovered many hardcode locations in legacy warehouse."

"When after a merger migrating from old data warehouse ETL to new data warehouse ETL, no one wanted to accept responsibility. An ownership problem emerged. Business transformations (as a result of merger) have shown an exaggerated focus on organizational silos, products and processes, and not being customer-centric. There appeared to be 150 systems containing client data."

"BI agility is impaired by technical debt and legacy systems – large old systems that are widely used and hard to replace. Such changes require substantial investment and time."

"Data storage in silo models; there's no scalable data model to encompass the entire activity."

"There's no BICC (business intelligence competency center), BI is performed against separate queries and chaot-ically. In a working day there's no time for general analytics. There's a lack of understanding what the others are doing; everyone is in their own bubble; there's no understanding and need to understand the business process in general. No connecting join."

LOW BI AGILITY CONSEQUENCES

As a result of low BI agility, there is a general drop of confidence in BI, and an overall doubt in BI's role emerges. The spread of shadow BI brings the risks of unmanaged analytic activities, potential errors, and growing animosity between business activities and IT, as the responses show:

"BI agility is an ability to add a data column in X hours. The later it is done, the more complicated it gets to manage, because data are volatile, and delay moves analytics to shadow BI."

"Product-based systems are oriented towards the product, not the customer. This is changing to have a better understanding of a customer journey, but obsolete BI technology may slow down the understanding of this journey."

"If a BI project has a wider scope, it often gets stuck because of other teams, and mostly the centralized ones. ... Lack of system agnostic data model."

"The intelligence vision gets stuck on several uncorrelated parameters, and important changes in activity may be missed."

"If required changes in BI are slow, BI system is circumvented, and shadow BI is used. Later, it becomes rather hard to find roots, and this creates mistrust in BI."

AGILITY GROWTH

Giving the users more control over the changes in BI appears to be one of the leading driving factors behind BI agility. The creation of a dedicated team or unit to handle changes is another solution to boost BI agility. The issue of a reasonable set of rules and standards comes up,; "reasonable" here meaning not too wide to avoid overregulation and support flexibility and not too narrow to avoid contradictions and chaos. It also appears that the two parts of BI – source data part (data and information collections) and functional part (reporting, queries, analytics, modeling etc.) – have uneven agility potential, the functional part being more agile. This may be explained by the more stable nature of data infrastructure that is more acceptable to standards. However, there appears to be a downside to this – in data infrastructure any more serious shakeup is significantly more painful if compared to the functional part. Several responses:

"The decentralization helps to increase the speed of changes. However, in order to ensure common architecture, certain guidelines and rules must be introduced to avoid duplication and discrepancies."

"The most effective way to increase BI agility is to allow the user to lead BI dynamics. Naturally, such approach requires more human resources and is more expensive."

"It is difficult to manage situation due to organizational BI maturity and culture. To increase BI competences, BI center of excellence was established, although they are not responsible for data, and it is a challenge to make sure that business takes ownership of data."

"Unified glossary is the key element, as it should be clear what is called what in the organization."

"If BI activities are not considered and involved during the planning of organizational changes, this might lead to drastic changes in BI. But if BI architects are involved early, then it could be expected to maintain what already exists, and add new content by evaluation if changes are related to old data models or require completely new ones."

"One of the implemented solutions to improve agility was a new team dedicated for implementation of smaller BI changes. This has improved throughput. One more team focuses on larger changes in integrations. As well, data governance board has been established, where all needs for BI are being evaluated and prioritized, and only then they enter the backlog for implementation."

OTHER FACTORS OF BI AGILITY

Among the managerial, organizational, and human factors, the importance of cultural factors comes up throughout the answers. This also underscores a point that purely managerial instruments like orders or rules do not lead to good results. The development of culture that is supportive to agile competencies cannot be effected by a decree – it is a lengthy and careful process of applying indirect factors-catalysts.

"The culture issue comes up. The cultural differences between business and IT are visible as one side is oriented towards frequent and fast changes, while the other one is concerned about stability and ensuring that systems do not crash."

"Organization has shifted from being technology-oriented to people-oriented. Not all changes center on technologies; maybe changes are required for culture and people mindset."

"The involvement of business into BI development is an indispensable condition for success. Even the technologically best BI solutions might fail due to the lack of trust, mismatch with business requirements and insufficient collaboration in developing BI."

"The effort to build BI culture and initiative from the top management are important for BI agility. The other factors are trainings, presentations to the end users and availability of user-friendly tools."

"It is not sufficient to have one professional analyst who analyses and shares insights. The analyst could drive analytics culture but not all analysis in business."

To summarize, the interview results, although rather varied, demonstrate several common traits:

- Whatever changes the organization encounters, informing processes, information systems, and BI activities are affected. This is an obvious statement, but very often these changes test the vitality and preparedness of the informing environment. Some of such changes are unexpected and sudden (e.g., COVID-19 pandemic), some are expected and allow preparation (e.g., Brexit), and all of them may seriously disrupt BI activities.
- BI has limited potential to assist the management in recognizing important changes in the external environment. Regarding internal processes, BI is potentially important to detect problems in early stage, but much less so in external environment.
- Regarding BI technology resources, the changes at data level are painful and require substantial effort. However, some of those changes may be foreseen, allowing better planning. The existence of data silos remains a key problem.
- There is a serious lack of communication between business and IT people, and this lack complicates the BI preparedness for changes, as well as the overall quality of BI services. As a result, problems like shadow BI and hardcode use start multiplying. An establishment of a dedicated organizational unit to oversee the above issues is seen as a significant help.
- Cultural differences between business and IT, as well as rigid overall organizational culture, are an important limiting factor for organizational and BI agility. On the other hand, the importance of culture, both organizational and informing, is more and more recognized and receives growing attention.

CONCLUSIONS

Although the interviews have shown a rather scattered picture of BI agility issues, the obvious relation between organizational and BI agility has proved to cover all kinds of informing activities. Given the importance of effective informing for good management, this is hardly surprising. However, the agility of technical issues is clearly giving way to the organizational, managerial, and human issues. Several groups of factors affecting BI agility have been identified, where the most prominent factors are business and IT communication, user involvement, BI reinforcement by creating dedicated organizational units, and development of BI culture. The closing statement for this paper may be as follows: agile informing is one of the key factors in organizational agility and resilience, as confirmed by many sources; because of this importance it deserves more research attention than has been assigned until now. This research has rounded up an initial set of factors supporting informing agility. The authors are aware of the limitations of the presented study, regarding both the method (qualitative interview) and the sample (a

set of BI professionals or business users). Further research directions are planned towards a more systematic view of the set of these factors, as well as a subsequent development of quantitative survey for empirical testing of agility factors.

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Created Realities: A Model

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ABSTRACT

Aim/Purpose The purpose of this paper is to provide a model to help explain why ideas about reality differ. Background Misinformation is an important topic that in the past several years has gained prominence. The author developed a model of informing.

Methodology The methodology is model extension and creation, in this case to extend an existing model of informing so as to accommodate disinformation.

Contribution The principal contribution is providing, perhaps, the first model that explains how differing beliefs of reality are created. It also introduces the concept of created reality.

Recommendations for Researchers The model can be applied to a variety of situations to assist researchers in understanding created realities. **Impact on Society** The paper extends our understanding of how and why different people understand and believe reality differently.

Future Research We recommend that researchers across the disciplines test and build on this model of created realities.

Keywords created realities, misinformation, disinformation, fake news, beliefs, informing

OVERVIEW

If you ask 100 people about their opinion on almost any topic, you will find various beliefs about what they believe. Some beliefs will be based on facts, and some will be based on misinformation and disinformation. Such beliefs make up one's sense of reality.

Long ago, all those living in a small community saw and heard the same things. But today, with numerous sources of information, we each choose which information sources we attend. Some of those sources are based on facts, while others are artificial, based on misinformation and disinformation.

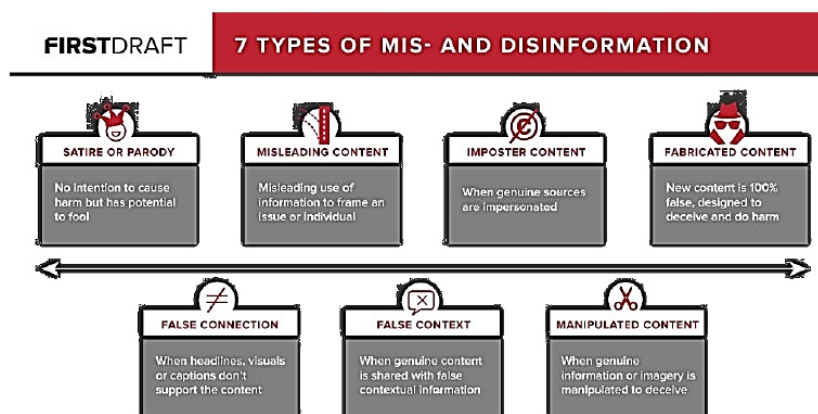


Figure 1. 7 Types of Misinformation and Disinformation (Source: Wardle, 2017)

As noted in Figure 1, disinformation is more than reporting as true that which is not true. It often contains some kernels of truth (Ellick & Westbrook, 2018). Lejla Turcilo and Mladen Obrenovic (2020) note that disinformation, while not new, is used to attack democracies. It came into great use in recent centuries, particularly during World War II. All types of propaganda were perfected in Russia (see E. Cohen & Boyd, 2019), where it was used both against its own population and to influence world events and opinions against democracy. The impact of mass media and now social media makes it easier to mislead with false information. Pomerantsev (2014) titled his book on Russian Propaganda "Nothing is true and everything is possible" to denote that Russian leaders and those of other countries can create chaos through promoting falsehoods as true so that people no longer know what to believe. Chaos as to what is true enables the creation of alternative realities.

Historically, the main supplier of disinformation is Russia, but other countries now do the same, e.g., Rawnsley (2021). Sokoloski (2021) writes that a Russian organization has flooded social media, particularly Parler, with false assertions, pretending to be coming from personal accounts of "US citizens, larger social and public social media, and US political and grassroots organizations." Russian disinformation includes "assertions that mail-in voting amounts to fraud, that left-wing activists somehow infected President Trump with the coronavirus, and that Joe Biden is a 'sexual predator.'" Sokoloski continues, "These are all part of a continuing effective Russian disinformation campaign run by the IRA and infiltrating all conservative right-wing media."

"You're seeing the complete collapse of reality," said Christopher Guess (cited in Tardáguila & Mantas, 2021), lead technologist at the Duke Reporters' Lab, when asked if the Capitol breach [of January 2021] had any connections with misinformation. "You've got people arguing for a worldview that Joe Biden is not the president."

Similarly, Stern (2021) writes, "People are shown things [on social media] that appeal most to them, they click, they read, they watch, they fall into rabbit holes that reinforce their thoughts and ideas, they connect with like-minded people. They end up in their own personalized version of reality. They end up inside the US Capitol [as part of the attempted insurrection]."

For more on this topic, see, e.g., Ariely and Jones (2008), Brafman and Brafman (2008), Henry (2019), Jowett and O'Donnell (2018), Rabin-Havt (2016), and Thompson (2008).

Let us consider two examples of the creation of alternative realities that relate to the normalization of fascism, that is, the attempts by a charismatic authoritarian leader to split the population into "us" and "them" (nationalism) by creating a false sense of history.

CREATED REALITY: EXAMPLE 1

In the US, various investigators, including the Federal Bureau of Investigation, and courts found no evidence of significant voter fraud in the US 2020 presidential election. Yet, a good portion of the American voters believes [in December 2020] that Donald Trump won the 2020 election. (Rose, 2020; see also D. Cohen, 2021). "At least 86 judges have rejected claims by President Trump or his supporters in election lawsuits" (Weiss, 2020). This belief led to the attempted insurrection of January 6, 2021. Prior to that attempt, 48% of Republican voters in US believed that Trump will be sworn in as President in 2021, not just that he should be (Seidel, 2020). According to C. Kim (2020), 70 percent of Republicans think the election was not free and fair despite fact-checking. Days after the storming of the US Capitol

on January 6, 2021, an NPR/PBS NewsHour/Marist poll showed that 8 in 10 of those who consider themselves Republicans do not believe that the results of the 2020 election were accurate (Marist Poll, 2021).

A large element of this disconnect is due to a billion-dollar disinformation campaign to reelect Donald Trump as President of the USA (Coppins, 2020). While the research by Benkler et al. (2020) concluded the greatest source of disinformation about voter fraud came from President Trump, Marcelino et al. (2020) also found credible evidence of foreign interference in the 2020 election. Indeed, Posard et al. (2020) describes Russian interference in the 2020 US Election. OAN, a channel known for promoting falsehoods and conspiracy theories, shows disinformation as if Mr. Biden weren't President at all (Peters, 2021)

Many Trump supporters believe QAnon and other conspiracy theories. An NPR/Ipsos poll, cited in Rose (2020), asked respondents if they believe that "a group of Satan-worshipping elites who run a child sex ring are trying to control our politics and media." Over half of Americans believe that it could be true. According to the survey by the American Enterprise Institute cited in Sales (2021), "29% of Republicans believe the baseless claim that former President 'Donald Trump has been secretly fighting a group of child sex traffickers that include prominent Democrats and Hollywood elites."

In part, this is because Russia has been using social media to boost and amplify belief by Americans in QAnon's conspiracy theories (Menn, 2020a; 2020b). According to a joint report issued by the CIA, FBI, and NSA (United States Senate, 2020), we know that Russia expended great effort to elect Trump in 2016. In 2014, General Philip Breedlove, NATO's military alliance's top commander, declared that Russia is waging "the most amazing information warfare blitzkrieg we have ever seen in the history of information warfare" (cited in Pomerantsev, 2014). The Russian campaign against democracy is not new, as seen through the next example of a created reality.

A second created reality: Example 2:

The KGB's official warfare against democracy is more than 50 years old. E. Cohen and Boyd (2019) and Izabella Tabarovsky (2019) describe an extraordinarily successful Russian disinformation campaign that began in the 1960s to destabilize the only democracy in the middle east, Israel. The KGB campaign named Operation SIG recruited and prepared the leadership of the PLO (Arafat and Abbas), training them both in guerilla war and in the use of highly developed disinformation techniques. Abbas is now in the 17th year of his four-year term.

(It is interesting to note that while many have traced Trump's connection to Russia over 30 years, e.g., Dorell, 2017, ex-KGB spy Major Yuri Shvets (cited in D. Smith, 2021) claims that Russia cultivated Trump as an asset for over 40 years. Smith also notes that Craig Unger, author of *American Kom-Prat*, that "around 1980, the Russians were trying to recruit like crazy and going after dozens and dozens of people.")

One element of the disinformation campaign can be called "truth decay." It involved creating disinformation about Palestinian history and the PLO leaders' desire and successor regimes for peace with the Jewish state. As in the case of Trump, many of the PLO supporters believe this disinformation.

KGB-inspired tactics include the following: planting misinformation, disinformation, and false narratives with unknowing assistants, journalists, and willing world bodies to gain sympathy and believability for their cause.

In this case, the leadership of the Palestinian Authority focuses on promulgating disinformation against the Jewish state. In a recent example, James Zogby and Ayman Mohyeldin (Mohyeldin, 2020) claimed that Israel refused to vaccinate Arabs under PA control. Without vetting these allegations' truth, news outlets blamed Israel (Hendrix & Rubin, 2020; Krauss, 2020). However, the Palestinian leadership alone is responsible for all healthcare under the Oslo Accords, and Israel is prohibited from doing so. The Oslo 1995 Interim Accords, Article 17 clearly states that the Palestinian side agrees to vaccinate their population as part of their commitment to Israel. Yet, the Palestinian leadership did not even ask Israel for help (Bybelezer, 2020.) Nonetheless, this falsehood was picked up and amplified by the New York Times, the Washington Post, CNN, and then reprinted in other local papers, according to Sternthal (2020a, 2020b). Such disinformation serves the Palestinian leader's desires in the Palestinian Authority and Hamas to prevent peace between the Palestinians and Israel (Miller, 2021).

Only in 2021 did the PA Ministry of Health finally request Israeli dosages of the vaccine (Abu Toa-meh, 2021). However, the Fatah-controlled PA still has failed to ask for vaccine dosages delivery to Hamas control Gaza (Harkov, 2021b).

Israel was already vaccinating Palestinians living in east Jerusalem. While they are not citizens, their healthcare falls under Israel's purview per the Oslo Accords (Harkov, 2021a).

The intersection of Russian disinformation campaigns with Trumpism and the PLO/Hamas Propaganda Igor Yakovenko, a journalism professor at the Moscow State Institute of International Relations, writes, "If previous authoritarian regimes were three parts violence and one-part propaganda, this one [referring to Putin's] is virtually all propaganda and relatively little violence. Putin only needs to make a few arrests—and then amplify the message through his total control of television" (cited in Pomerantsev, 2014). In Example 1, we see this is the actions of Trump and his allies. Example 2 also promulgates falsities, such as that Jesus was not a Jew but a Palestinian Arab. This deception is re-peated and amplified even by US Congresswoman Ilhan Omar, and the Black Lives Matter head Linda Sarsour (Frantzman, 2019). Lies like these come not only from the PLO and Hamas but also from the Nation of Islam. Lubbock (2020) writes that Russia amplifies the Nation of Islam's anti-semitism.

Nowadays, Russia and other bad actors need to disseminate only a few hundred carefully planted lies on social media, and the message is repeated by the gullible. Pomerantsev (2014) writes that the Russians do not care if they are caught in a lie. They care only about their lies producing results. Pomerantsev writes, "But there is one great difference between Soviet propaganda and the latest Russian variety. For the Soviets, the idea of truth was important—even when they were lying. Soviet propaganda went to great lengths to 'prove' that the Kremlin's theories or bits of disinformation were fact."

A result of disinformation and propaganda is a loss of a common sense of reality. Different people view reality differently (E. Cohen, 2020). Let us now look at why this is the case.

PERCEPTION OF REALITY

As we have seen above, in the minds of different people exist different senses of reality. Modern media has made this reconstruction of reality more prevalent (Weimann, 2000).

As noted earlier, Stern (2021) wrote, "People are shown things [on social media] that appeal most to them, they click, they read, they watch, they fall into rabbit holes that reinforce their thoughts and ideas, they connect with like-minded people. They end up in their own personalized version of real-ity. They end up inside the US Capitol [in the insurrection]".

This paper explores the modeling of reality or realities from a psychological view. It also helps us understand post-modernists' philosophical view that facts do not exist, only interpretations, that is, alternative views of reality (Aylesworth, 2015).

BUILDING ON THE M-C-B MODEL

E. Cohen (2020) explored the issue of why different people perceive identical information differently. That paper makes a case for a person constructing their own sense of reality. It advances a case that a moderator exists in the brain that filters and weighs the various messages that reach people. Cohen names this moderator for messages Cognitive Message Processor. In contrast, this paper expands on that work by exploring how different people self-select different information sources.

Cohen's model falls in the class of Stimulus-Organism-Response, or S-O-R, Models. (For more on the SOR model, see, for example, M. J. Kim et al., 2020.) For this reason, the model is called the M-C-B model for Messages – Cognitive Message Processing – Beliefs. As in other S-O-R models, the brain is the moderator; here, messages serve as the stimuli.

The paper now provides an overview of the M-C-B model.

The simplest illustration of the M-C-B model is shown in Figure 2. Messages enter the black box that is in the human brain and result in the development of beliefs. By message, we are not assuming an accurate representation of reality. Messages include those based on facts and on non-facts: misunderstandings, fabrication, rumors, stories, and dishonesties, to name a few. The black box provides the message processing.

Figure 3 diagrams the Cognitive Message Processor in the brain as a black box.



Figure 2. The M-C-B Model. Cognitive Message Processing takes place in the brain.

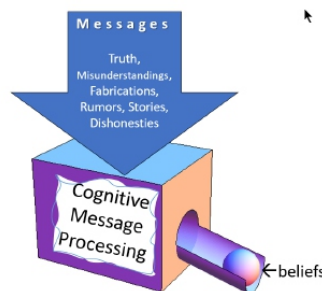


Figure 3. The moderator between messages and beliefs in the M-C-B Model is the Cognitive Message Processor. Messages affect beliefs based on the current state of the Cognitive Message Processor.

Extending the M-C-B Model's Scope

The diagrams above are a simplification of the model proposed by E. Cohen (2020). That paper demonstrated a model that explained why different people, upon encountering a single message source, come away with different beliefs. That paper used headlines in various news sources reporting on the single event of Donald Trump's remarks to a reporter.

This paper goes beyond that Cohen paper by showing that the model can also be applied to where different people choose to view different information as the truth.

People are confronted by numerous sources of information, such as newspapers, television, radio, social media sites, the web, and talking with others. But we do not and cannot attend to them all. This is illustrated in Figure 4.

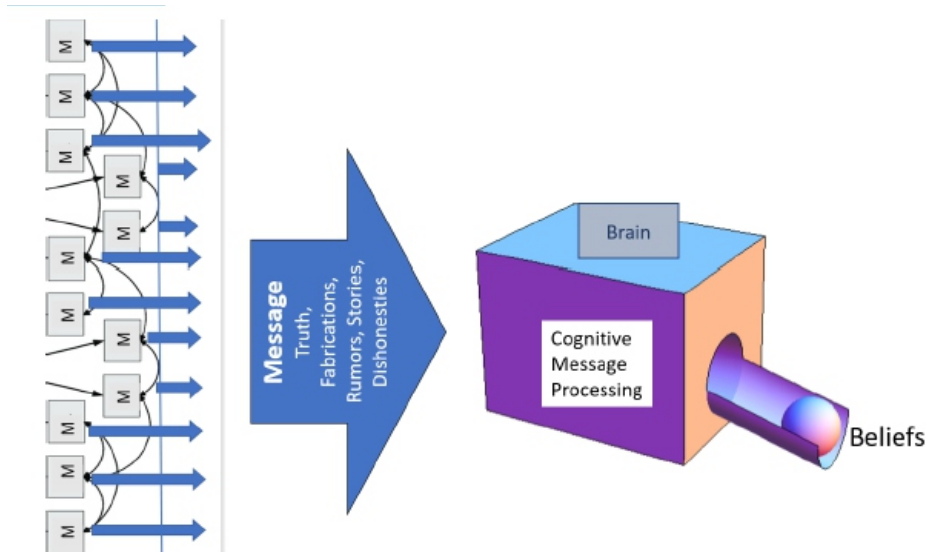


Figure 4. An individual is confronted with an array of message sources.

The message sources often rely on one another. We select which ones to attend.

As noted above, people cannot attend to all information sources. People need to select which sources to monitor. Below, the paper discusses how people select their preferred information sources.

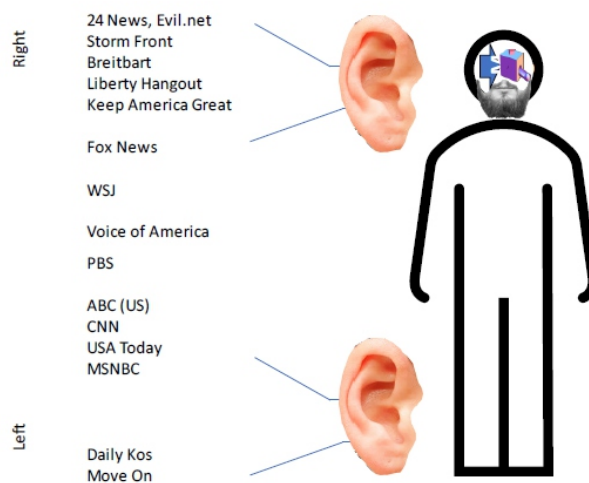


Figure 5. Different people attend to different message sources.

The ear on the top illustrates a person who attends to right-wing to extreme right-wing sources primarily, while the ear on the bottom illustrates a person who attends primarily to left-wing to far-left sources.

Figure 5 shows two different people, each attending to their own non-overlapping sources. The ear represents hearing and seeing and all other senses; the sources include those listed and all sources of messages, including friends, Facebook, and more. People select which message sources they attend based on their current position on such dimensions, as explained below. This is known as affirmation bias and can lead to a political echo chamber (see, e.g., Barberá et al., 2015). Benkler et al. (2018) refer to such situations as propaganda feedback loops.

Figure 5 shows some sources of information on a single dimension, left-wing to right-wing bias. This is a simplification in terms of its dimensionality. Messages can be categorized on multiple dimensions. Messages sources vary not only on the left to right bias but also on truthfulness/factuality and the degree to which they choose to repeat conspiracies or pseudoscience, according to Media-BiasFactCheck.com. This is illustrated in Figure 6.

For example, in prior years, the Voice of America had been rated least biased on the left to right-wing dimension, mostly truthful, and low on the conspiracy/pseudoscience dimension. It and all other sources can be represented as a dot in the cube.

Representing this as a cube assumes that these three dimensions are non-orthogonal. Most likely, they are not. Additional research will determine the true shape.

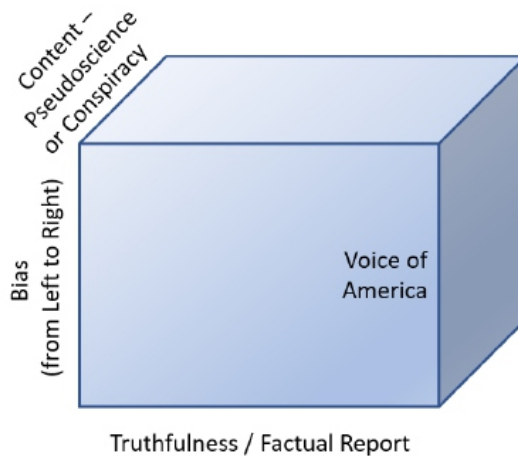


Figure 6. Messages sources vary not only on the left right bias but also on truthfulness/factuality and the degree to which they choose to repeat conspiracies or pseudoscience, according to MediaBiasFactCheck.com.

The question remains, why some people prefer to attend to left-wing biased information sources while others prefer the opposite. The paper now addresses that question.

INFLUENCES ON SELF-SELECTION OF SOURCES FOR MESSAGES

This section describes some reasons why people choose and believe the message sources that they do.

Bias

A great deal has been written about bias. E. Cohen (2020) provides an overview of bias in messages and message selection. For that reason, this paper will merely mention the types of cognitive bias that affect how people believe. Most important for this paper is confirmation bias and conservatism bias. Confirmation bias refers to the tendency to attend primarily to information that confirms our pre-conceptions (see, for example, Nations, 2019). Conservatism bias makes it hard to change our views; people favor prior evidence over new evidence, for example, consider birtherism (Serwer, 2020)

Beyond Bias: People Differ on Preferences and Values

Notice that some people like hip-hop music and hate opera. Others prefer just the opposite. Some people enjoy both styles of music and some like neither. Such differences can be best described as styles or preferences (see, e.g., Sadler-Smith & Riding, 1999).

Not well explored in this context are values. To clarify that values often differ, see Table 1. In any group, few people will rank-order the values on this list in the table the same. This list gives only a few of the many values people hold in real life. Consider how one person may value an embryo's right to live over the mother's right to control her own body. This is not a case of right vs. wrong, but of rights vs. rights—more to the point, weighing one value over another. We shall see that values cor-relate with political preferences.

Table 1. A Simple example of how different people's values can differ.

Select the 10 most important items from the following list. Rank them from 1-10, with "1" being the most important item. (Source: Therapist Aid, n.d.)

- | | |
|---|---------------------------------------|
| <input type="checkbox"/> Love | <input type="checkbox"/> Honesty |
| <input type="checkbox"/> Wealth | <input type="checkbox"/> Humor |
| <input type="checkbox"/> Family | <input type="checkbox"/> Loyalty |
| <input type="checkbox"/> Morals | <input type="checkbox"/> Reason |
| <input type="checkbox"/> Success | <input type="checkbox"/> Independence |
| <input type="checkbox"/> Knowledge | <input type="checkbox"/> Achievement |
| <input type="checkbox"/> Power | <input type="checkbox"/> Beauty |
| <input type="checkbox"/> Friends | <input type="checkbox"/> Spirituality |
| <input type="checkbox"/> Free Time | <input type="checkbox"/> Respect |
| <input type="checkbox"/> Adventure | <input type="checkbox"/> Peace |
| <input type="checkbox"/> Variety | <input type="checkbox"/> Stability |
| <input type="checkbox"/> Calmness | <input type="checkbox"/> Wisdom |
| <input type="checkbox"/> Freedom | <input type="checkbox"/> Fairness |
| <input type="checkbox"/> Fun | <input type="checkbox"/> Creativity |
| <input type="checkbox"/> Recognition | <input type="checkbox"/> Relaxation |
| <input type="checkbox"/> Nature | <input type="checkbox"/> Safety |
| <input type="checkbox"/> Popularity | |
| <input type="checkbox"/> Responsibility | |

Political Preferences and Values

Values clarification was developed to help people understand their own values and how they affect one's decisions. Values are inculcated from an early age by the actions of parents, teachers, work-places, and religious institutions (Simon et al., 1972). The field of values clarification was critiqued by Stewart (1975) and Kirshenbaum et al. (1977). It helps people understand themselves and others in their relationships with family, friends, aging and death, work and leisure.

The idea of values clarification can be applied directly to political preference. The Pew Research Center (2019) found that party affiliation surprisingly is much more important when determining a person's values than race, religion, education, age, or gender. The greatest difference between Republicans and Democrats in the US are, in order, attitudes toward gun policy, race, climate and environment, social safety net, and immigration.

The issue of political preference is more complex than just left- or right-wing party affiliation. 8values (n.d.) uses a 70-item questionnaire to measure values on four different political values: economic, diplomatic, civil, and societal. The four dimensions are described below:

- **Economic:** equality (progressive tax codes, social programs, and, at the higher end, socialism) vs. markets (lower taxes, privatization, deregulation, and, at the higher end, laissez-faire capitalism)
- **Diplomatic:** nation (patriotic and nationalist) vs. world (cosmopolitan and globalist)
- **Civil:** liberty (Those who support strong civil liberties tend to support democracy and oppose state intervention in personal lives.) vs. authority (Those supporting strong authority tend toward wanting strong state power, and support government intervention into personal lives.)
- **Societal:** tradition (strict adherence to a moral code, usually religious, and support the status quo) vs. progress (believe in social change and rationality, usually secular or atheist, and support environmental action and scientific or technological research).

AltValues (n.d.) is a modification of the 8Values. It uses 58 questions to plot one's political position. It produces a measure across 9 dimensions. The dimensions are the following: social, economic, worldview (both essence and moral), universalism vs. particularism, ecological, social politicization, religious, and historic vs. futuristic reference.

Thus, values play a large role in why people select which message sources to which to attend. But another and different question is, why do some messages elicit a greater impact than others? Why are some stories read and others ignored? The paper now turns to Cognitive Consistency and Message Resonance to answer those questions.

Cognitive consistency, motivated reasoning, and relationships

One can better understand what leads people to adopt beliefs by examining a few psychology theories, such as cognitive consistency or dissonance, homophily, and motivated reasoning.

Cognitive Dissonance. Festinger's 1962 cognitive dissonance theory helps us to understand why some messages have a greater impact on our beliefs than do others. Festinger et al. (1956) report on a

doomsday cult that predicted a flood that would end the world, which was to be caused by space al-iens. Believers of the cult thought they would be "taken:" evacuated to a spaceship before the calam-ity as a reward for their being faithful.

When the calamity did not happen, the cult leader said she received transmissions from outer space that God saved the entire world because of the cult's faith. At that point, some cult members, those who were not with the leader at the doomsday experience, drifted away due to cognitive dissonance. In contrast, those with the leader resolved their cognitive dissonance by proselytizing, seeking to per-suade others of the truth of their beliefs. The believers who proselytized created for themselves cog-nitive consonants.

This bizarre conviction is not unlike that of the modern-day adherents to QAnon who believe that Satan-worshipping pedophiles, including Democrats, politicians, journalists, entertainment moguls, and other institutional figures in the "deep state" seek to undermine President Trump, according to Forrest (2021). Collins (2021) reports the QAnon adherents are preparing for doomsday.

Similarly, Harwell and Timberg (2021) write:

Q, QAnon's unidentified online prophet, had promised that Trump was secretly spearhead-ing a spiritual war against an elite cabal of child-eating Satanists who controlled Washington, Hollywood, and the world. Believers in these false, rambling theories had counted down the hours waiting for Trump to corral his enemies for military tribunals and mass executions in a show of force they called "the Storm." Some QAnon followers felt that they had been played, but oth-ers doubled down [emphasis mine].

According to Graham Brookie (cited in Harwell & Timberg, 2021), others made increasingly illogical leaps as they struggled to make sense of developments. Brookie wrote, "It's something that has long been true of conspiracy theories: When they don't come to fruition, they shift their delusions to the next thing," he said. He noted how some comments posted below Trump's farewell video suggested that "it wasn't quite time for the Great Awakening, but it's coming soon, and this is how."

When one's beliefs are proven wrong, some people continue with the false beliefs. This behavior can be explained by cognitive dissonance theory. Harmon-Jones and Mills (2019, p. 3-6) write:

Dissonance is aroused when people are exposed to information that is inconsistent with their beliefs. If the dissonance is not reduced by changing one's belief, the dissonance can lead to misperception or misinterpretation of the information, rejection or refutation of the information, seeking support from those who agree with one's belief, and attempting to per-suade others to accept one's belief. (p.6)

The greater the magnitude of the dissonance, the greater is the pressure to reduce disso-nance. ... dissonance can be reduced by removing dissonant cognitions, adding new conso-nant cognitions, reducing the importance of dissonant cognitions, or increasing the im-portance of consonant cognitions. (p. 3)

The above deals with showing how cognitive dissonance can explain one's beliefs. Another psycho-logical theory is the homophily principle.

People with similar beliefs have shared values. As McPherson et al. (2001) write, "Similarity breeds connection. This principle—the homophily principle—structures network ties of every type, includ-ing

marriage, friendship, work, advice, support, information transfer, exchange, comembership, and other types of relationship" (p. 415).

Homophily. Homophily refers to the tendency for people to socialize with those they find similar. The potential dark side of homophilous belief sharing is intimidation. When the group advances a belief to which an individual differs, that individual can feel compelled to go along with the group or remain silent. Elisabeth Noelle-Neumann (1974) found people tend to remain silent when they feel that their views are in opposition to the majority view. They do this out of fear of isolation or re-prisal. She called this phenomenon the "Spiral of Silence." For more on social networks' impact on cognition, see E. B. Smith et al. (2020).

Motivated Reasoning. People have an unconscious tendency to credit and dismiss factual information independent of the truth to promote some goal or interest. This has been studied as motivated reasoning (Kunda, 1990). Identity-protective cognition (IPC) is a type of motivated reasoning; Sherman and Cohen (2006) write that people display IPC when they alter their beliefs to protect their status within the affinity group.

Relating to the 2021 US Insurrection. Hannah Arendt (1973) wrote the following in *The Origins of Totalitarianism*. "Before mass leaders seize the power to fit reality to their lies, their propaganda is marked by its extreme contempt for facts as such, for in their opinion fact depends entirely on the power of man who can fabricate it." This phenomenon may explain the split in the US Republican party between followers of Trumpism and followers of more traditional Republican values. See also Brown (1963) and Ottenheimer (2020) for techniques of propaganda and brainwashing. In "Propaganda as signaling," political scientist Haifeng Huang (2015) noted that propaganda is not just brainwashing. Another purpose is instilling pro-regime values and attitudes. Authoritarian leaders are not necessarily trying to convince you; they are reminding you of their power. By repeating a tiresome and obviously false message, the authoritarian leader signals that the public is powerless and "helpless to do anything about it." "If a regime can make the people around you partake in absurdities, you are less likely to challenge the regime."

The above discussion helps us understand why people select the sources of information that they do. But even within each message source, some messages garner more attention than do others. We call this Message Resonance.

Message Resonance

E. Cohen (2020) explored message resonance; the following section is based on that paper. This section describes elements that make messages more effective at changing beliefs (or at least guiding one's attention).

Heath and Heath (2007) summarize how to make ideas that "stick," that is, that have an impact on the receiver. They call their model SUCCESs.

- S- Simple. Keep the message simple and short.
- U – Unexpected. Messages that are unexpected garner the most attention.
- C – Concrete. Have the message paint a mental picture that helps people remember it.
- C- Credible. Quote experts or anti-authorities.
- E- Emotional. People care about people more than they do about numbers and statistics.
- S – Stories. As the authors write, "stories drive action through stimulation (what to do) and inspiration (the motivation to do it)."

Robert Cialdini (2016) has written extensively on this topic.

- Keep the client focused on your message, and it will become vital for them, at least for a short time.
- Once you have initial buy-in for the message from the client, get the client to commit
- For some messages, violence and sex attract attention.

Wording

"Since we cannot change reality, let us change the eyes which see reality." – Nikos Kazantzakis (source: "Nikos Kazantzakis," 2020)

When telling a story, Carver et al. (1983) show how the selection of wording can have a significant impact on the informing. For example, people prefer to purchase a "pre-owned" car than to buy a "used" car. Retitling the estate duty as a "death" tax makes many loyal taxpayers less enthusiastic about sharing their inheritances.

Words can even impact the impact of one's genes and, in this way, how one perceives reality, according to Newberg and Waldman (2013, p.3). They write, "a single word has the power to influence the expression of genes that regulate physical and emotional stress." Positive words like "love" build resilience in the brain; hostile language disrupts neurochemicals production that protects us from stress. The book notes the following:

Over time, the structure of your thalamus will also change in response to your conscious words, thoughts, and feelings, and we believe that the thalamic changes affect the way in which you perceive reality [emphasis mine]. (pp.34-35)

Psycholinguists also research the issue of words and the brain. Danziger and Ward (2010) found that words, even the selection of language spoken, impact decision-making (see also Burton, 2009).

Wording and Framing Theory

"Facts are one thing. And the way that people react to them and make evaluations is entirely different", says Isaiah Arkin, a professor of Structural Biochemistry at the Hebrew University of Jerusalem, in an interview with David Horovitz (2020). In the interview, Arkin related the following anecdote on the psychology of decision making used by Nobel Prize winner Daniel Kahneman from the Hebrew University.

Someone goes to a doctor with a particular problem. The doctor tells him, "oh, fantastic; I have a procedure that will cure this by 90 percent." The patient says, "Excellent procedure — sure. Sign me up." That individual might choose to go to a different doctor. And that different doctor might say, oh, I have a procedure, but there's a 10 percent failure. The patient says, "That's a terrible procedure. Why would I use that?"

Tversky and Kahneman's 1989 Framing Theory tell us that choice phrasing greatly impacts how choice-message will be accepted when given alternatives.

Like framing, wording can trigger the metaphor's construct in one's brain.

Wording that invokes metaphors create message resonance

"If you want to change the world, you have to change the metaphor." Joseph Campbell (quoted by Bill Moyers, 2017).

While all have their sense of reality, myths and other common sets of shared beliefs are elements of one's sense of reality. Whether based on facts or unproven stories, myths form the backdrop for metaphors on what to believe, right from wrong, and how to live life.

An empirical study by Thibodeau et al. (2017) demonstrates the metaphor's power. They asked subjects to offer a solution to a real-world problem, changing just one word in how the problem was posed: beast or virus. The choice of which specific word, beast, or virus, changed the metaphor subjects used in calculating the best solution. Subjects read the following:

Crime is a [beast/virus] ravaging the city of Addison. Five years ago, Addison was in good shape, with no obvious vulnerabilities. Unfortunately, in the past five years, the city's defense systems have weakened, and the city has succumbed to crime. Today, there are more than 55,000 criminal incidents a year - up by more than 10,000 per year. There is a worry that if the city does not regain its strength soon, even more serious problems may start to develop.

Those whose paragraph included the word "beast" was more in favor of incarceration. Those reading the word "virus" were inclined more toward treatment. An out-of-control monster needs to be captured and locked away, but spreading infection requires thoughtful analysis to determine and then eliminate its root causes. So, changing just one word activated different mental constructs in the narrative and so stimulated different solutions.

Typically, people do not even notice the metaphor and do not realize its great impact on them. The wording selection may elicit a shortcut in one's Message Process System that directs attention into one area for a solution and thus away from others. Notice something unusual in the above case. The single word change did not attract attention. At the start of this paper, we initially defined resonance as getting past the narrative's filters and associated it with the message attracting attention. But re-search shows that in some cases, it is not necessary to attract attention.

Goodhew and Kidd (2020) show that even the color of the word on the page or screen affects behavior. This finding fits well with Galdi et al.'s (2008) theory that automatic mental associations affect decision making, or using the terms of this paper, the impact a message will have on the receivers.

SUMMARY

This paper brings to focus research and studies derived from a variety of academic fields.

It has explored the influence of information, misinformation, and disinformation on why people have differing beliefs.

It has brought to focus the concept of created realities and used two examples to show the influence of Russian and other disinformation campaigns.

It showed how an extension of the M-C-B model of message processing can explain how different individuals select different messages to create their beliefs.

The paper looked at influences that determine how people select which messages to attend. The paper then introduced the concept of values in message selection.

The readers saw how cognitive consistency and cognitive dissonance influence message selection and determine whether to express thoughts contrary to one's group. When confronted with evidence that one's prior beliefs were false, we saw how some abandon the belief while others believe even stronger in the false beliefs.

Finally, the paper explored another element in message selection, message resonance, in terms of how the message is packaged and worded.

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The Predatory Journal: Victimizer or Victim?

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ABSTRACT

Aim/Purpose Labeling a journal as "predatory" can do great damage to the journal and the individuals that have contributed to it. This paper considers whether the predatory classification has outlived its usefulness and what might replace it.

Background With the advent of open access publishing, the term "predatory" has increasingly been used to identify academic journals, conferences, and publishers whose practices are driven by profit or self-interest rather than the advancement of science. Absent clear standards for determining what is predatory and what is not, concerns have been raised about the misuse of the label.

Methodology Mixed methods: A brief review of the literature, some illustrative case studies, and conceptual analysis.

Contribution The paper provides recommendations for reducing the impact of illegitimate journals.

Findings Current predatory classifications are being assigned with little or no systematic research and virtually no accountability. The predatory/not predatory distinction does not accommodate alternative journal missions.

Recommendations for Researchers The distinction between legitimate and illegitimate journals requires consideration of each journal's mission. To serve as a useful guide, a process akin to that used for accrediting institutions needs to be put in place.

Impact on Society Avoiding unnecessary damage to the careers of researchers starting out.

Future Research Refining the initial classification scheme proposed in the paper.

Keywords predatory journals, peer review, replication, complexity, scientific research

INTRODUCTION

What makes a journal or publisher "predatory"? Since University of Colorado librarian Jeffrey Beall first popularized the term in a 2012 Nature News article, research interest in this question has grown, as illustrated in Figure 1. With the growth in the predatory label's popularity, the number of journals and publishers characterized as "predatory" or "potentially predatory" has grown correspondingly. What is less clear is whether the characterization is always, or even mostly, warranted. Since being classified as predatory does indisputable damage to a journal's reputation and that of the authors that have published in it—often unknowingly—the question posed by this paper is one that should be of great interest to researchers across nearly every discipline.

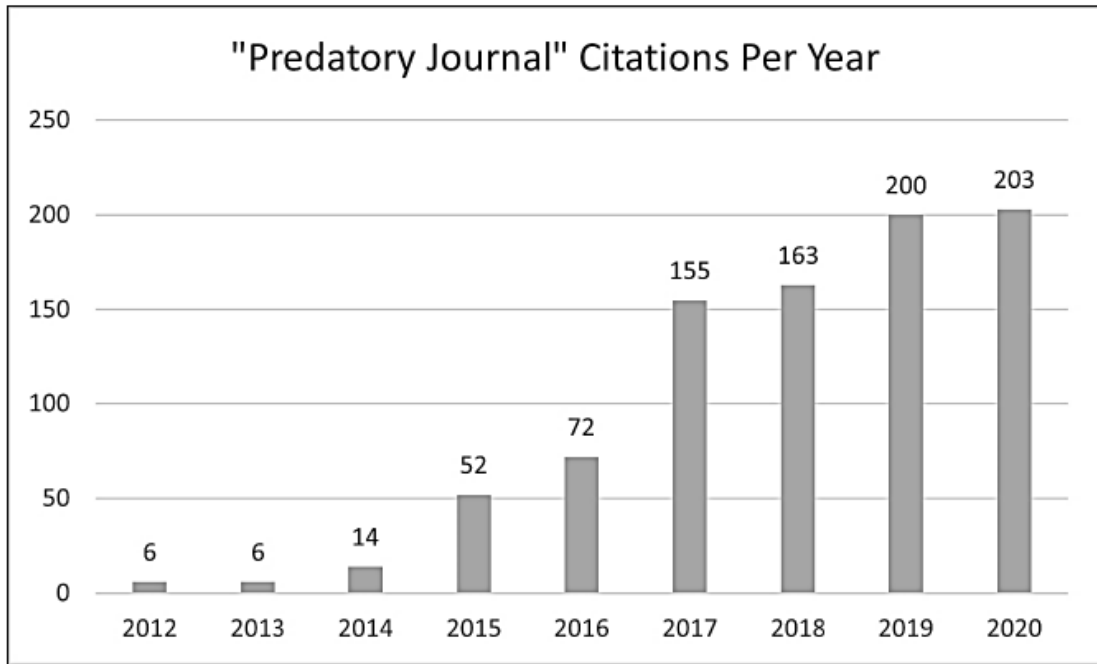


Figure 1: Article counts from Google Scholar search of "predatory journal" compiled using Harzing's "Publish or Perish".

I begin this article with an overview of the rapidly growing body of literature that addresses predatory journals and publishing practices. Of particular interest in this review were the following:

1. The attributes or indicators that cause a journal to be characterized as predatory.
2. The perceived stakeholders that are damaged by predatory journals, with emphasis placed on concrete examples of damage.
3. The domain of concern (e.g., humanities, life sciences, social sciences, etc.), where specified.
4. The geographic region of concern, where specified.
5. The underlying research approach (e.g., empirical, conceptual, opinion).

The review is followed by an analysis of some of the key elements that lead to a journal being placed on a list of predatory journals, as identified in the literature review. Most significant among these are publication fees, the peer review process, focus, and quality of the editorial board. In each of these cases, I propose that policies that may be indicative of predatory objectives in one context can represent sensible choices in another context.

To illustrate the challenge of distinguishing what is predatory from what is not, I then present two case studies of organizations that have been tarnished with the "predatory" or "potentially predatory" label. Based on my own observations and experiences, I present the argument that such a label makes little sense. To the contrary, these organizations go to great effort and expense to offer value to the research community through their mentoring activities and the opportunities they provide to re-searchers with limited access to the resources of the well-funded research-intensive institutions of the Western world. Building upon the cases, I then propose that the predatory/non-predatory classification should be eliminated entirely. Instead, a legitimate/illegitimate distinction would better address the genuine need to identify bad actors in the journal world. I further propose that within the space of legitimate journals, mission-specific categories—such as competitive, exploratory, translational, and developmental—be established. Journals should then be assessed according to the consistency of their practices with the

mission categories that they have adopted. Such an approach would parallel that used by agencies in accrediting institutions. I conclude the paper with some specific recommendations on how to reduce the damage inflicted by illegitimate journals.

LITERATURE REVIEW

As shown previously in Figure 1, the amount of literature examining the nature and impact of predatory journals is expanding rapidly. In this section, I briefly consider what has been written. I begin by describing the methodology employed, then present a summary of key findings. I conclude the section with proposed approaches to addressing the problem and summarize research expressing concerns about the process through which these so-called predatory journals are currently identified.

METHODOLOGY

In conducting the literature review, my goal was to understand better how the academic community perceived the challenge presented by predatory journals. Given the relatively recent nature of most of the literature (e.g., more than 80% of the articles identified in Figure 1 were published in the past 4 years), seminal contributions could not be identified—aside from Beall's (2012) original one-page article. For that reason, I followed a protocol that seemed likely to yield a relatively broad overview of the perceptions of the research community. The protocol was as follows:

1. All the articles listed in the top 10 pages of a Google Scholar search conducted at the end of December 2020 were identified (100 articles total).
2. Electronic copies of all articles were retrieved, excepting books, articles not accessible through my institution's library, and articles that were clearly not relevant. This process reduced the number to 87 articles.

3. I skimmed each article looking for key elements:

- a. What broad area was the article applied to? Examples included life sciences, such as medicine, biology, and nursing (40), library or information science (36), social sciences (7), general research (3), and engineering (1).
- b. Was the article tied to a specific locality? 10 articles were tied to a specific region. These included India, Africa, Middle East, Pakistan, and Italy.
- c. What stakeholders were potentially damaged by predatory publishing? Examples were authors (35), institutions (17), publishers (7), reviewers (2), and the broader community (1). Nearly half (40) expressed explicit concerns regarding the impact of these journals on the field (i.e., the underlying science) in which they were published, and nearly all appeared to express the concern implicitly.
- d. Were empirical findings presented? Thirty-two articles described empirical research conducted by the authors, usually bibliometric in nature.
- e. Was a solution to the problem of predatory publications proposed? 11 articles proposed one or more potential solutions.
- f. Were concerns expressed regarding the validity and reliability of how journals were classified? 22 articles expressed concerns about the process, particularly the danger of labeling a legitimate journal as predatory.

4. RESULTS WERE TABULATED IN A SPREADSHEET.

An additional column was added for illustrative quotes from each article.

KEY FINDINGS

In analyzing the research literature relating to predatory publishing, a set of commonly discussed themes emerged:

- Indicators of a predatory journal
- Awareness of predatory journals
- Damage inflicted on various stakeholders by predatory journals
- Proposals for reducing predatory publishing
- Reservations relating to the current conceptions of predatory publishing.

These themes are now briefly explored.

Indicators of a predatory journal

The most referenced indicators of a predatory journal are summarized in Table 1. Many of these are also included in a list of criteria for determining predatory open-access publishers developed by Jef-frey Bell (2015a).

Table 1: Common Indicators of a Predatory Journal

Indicator	Description	Illustrative Quotes
Publication Fees	The journal charges a publication fee inconsistent with its costs and may hide the existence of the fee until after an article is accepted.	“Some predatory publishers spam researchers, soliciting manuscripts but failing to mention the required author fee. Later, after the paper is accepted and published, the authors are invoiced for the fees, typically US\$1,800. Because the scientists are often asked to sign over their copyright to the work as part of the submission process (against the spirit of open access) they feel unable to withdraw the paper and send it elsewhere.” Beall, 2012, p. 179)
Peer Review	Peer review processes are inadequate, not followed or inadequately disclosed.	“Predatory journals have, at last, had the tables turned on them with stings to show their peer review processes are flawed or, more commonly, non-existent. This is critical as too many seem unaware of the lack of peer review and the damage that causes. A particularly classic example, if you can excuse the salty language, is the paper by David Mazieres and Eddie Kohler published in the journal International Journal of Advanced Computer Technology and entitled ‘Get me off your f***** mailing list.’ That particular paper literally consisted of nothing more than repeating the text of the article’s title, including the expletive, hundreds of times. The manuscript was accepted for publication.” (Roberts, 2016b, p. 619)
Speed of Publication	Very rapid submission to publication times experienced or advertised.	“Predatory journals may seem attractive, with their scaled-down publication times (in return for payment), but are really not to be recommended: such speedy treatment does not allow time for proper reviewing, and there is little assurance that the publication will stay in the scientific field for very long.” (Laccourreya et al., 2018; p. 39)
Failure to Follow Publishing and Preservation Standards	Journals do not assign DOIs to articles and fail to ensure they are archived for future readers.	“Few predatory publishers practice digital preservation according to established standards, and fewer, I think, even know what it is. I suspect that few back up their content, and I have documented cases of publishers disappearing from the Internet, their content forever lost.” (Beall, 2015b; p. 474-475)
Inadequate Quality Control	Articles were published with significant grammatical and spelling errors that should have been caught with rudimentary proofing.	“Two hundred thirty-three articles (65.6%) had documented errors in writing and included all the errors on the review form, plus others such as the use of colloquial language, overuse of abbreviations, incomplete sentences, and awkward phrasing. The obvious inadequate use of the English language is one red flag that should alert readers to the fact that many of the articles in predatory journals are not suitable as citations or as evidence to guide practice. Many of the articles that reflected inadequate English were by authors for whom English is likely a second language. However, blatant grammatical problems also occurred in articles from English-language countries written by authors with Eurocentric names. Although perfection in publication is an elusive goal, there should be processes in place, including copyediting, that ensures that the final published article is factually correct and professionally presented.” (Oermann et al., 2018, p. 9)

<p>Inadequate Verification of Submission Authenticity</p>	<p>Failure to take basic steps to prevent plagiarism and misattribution.</p>	<p>“We discovered one journal that published plagiarized content from another and vice versa. This was identified by a member of the review team who found one article to be very similar to an article already reviewed. Further investigation (reading the articles side by side) revealed that the title was modified, different authors were listed, and the location and affiliation of the authors were changed. The first and second sentences of the abstract and of the article were slightly rewritten, but beyond that, the rest of the text was identical. This prompted us to rereview the randomly selected articles from the two journals wherein it was found that all the content was plagiarized in this way. A spot check of additional articles in the journals suggested that they contained 100% plagiarized content, which between them accounted for 163 published articles. Interestingly, these journals were published by different publishers. Both journals have names that are similar to the titles of legitimate, nonpredatory journals— in one case, the name varies by only one letter, creating an additional layer of confusion for a reader.” (Oermann et al., 2018, p. 9)</p>
<p>Failure to Safeguard Intellection Property</p>	<p>Reviewers or editors take authors ideas and use them without proper attribution and may even interfere with a manuscript’s publication for their personal benefit.</p>	<p>“A study conducted by Resnik et al. reported unethical and unfortunate evidences [sic] of predatory reviewers stealing original authors’ ideas and purposely delaying their publications. It was reported that among study participants including researchers, research staff, post-doctoral trainees, and technicians working at the National Institute of Environmental Health Sciences, 6.8% of the respondents reported experiencing predatory reviewers breaching the confidentiality of their manuscript submission, they also reported that predatory reviewers unethically used their ideas or data without their will and permission to gain personal benefits. About 9.2% respondents claimed that reviewers unethically delayed their review process so that he or she could publish their own research on the same topic with similar idea or even may reject manuscript that carries major advances and innovations.” (Sharma & Verma, 2018; p. 228)</p>
<p>Falsified Editorial Board</p>	<p>To increase their credibility, journals list well-known scholars on their board without permission.</p>	<p>“I also get e-mails from the predators’ victims. Some have been named as members of editorial boards without their knowledge or permission.” (Beall, 2012, p. 179) “Still other reputable individuals have found their names listed on journal Web sites, without their permission or knowledge, as members of bogus editorial boards.” (Nahai, 2015, p. 1042)</p>

Excepting the last of these (falsifying the editorial board), none of the Table 1 criteria necessarily demonstrate predatory intent on the publisher's part except in the most egregious cases. For example, a journal or publisher that cannot afford plagiarism detection applications may accidentally publish plagiarized work. For example, Retraction Watch (2013) reports that in a single year, both the Journal of Business Ethics and the Journal of Academic and Business Ethics had to retract articles where blatant plagiarism was detected. The process of preparing publications for third-party archiving can be quite challenging. Ensuring all peer reviews are done at a high level requires continuous monitoring and mentoring of the activities of volunteers who may be receiving little or no credit for their efforts. A publisher is unlikely to have much control over a reviewer's decision to steal another author's work; what the publisher can control is the actions taken upon detecting such an incident. Getting articles professionally proofed can be expensive, while requiring editors to perform that task often results in errors slipping through. The careful reader will notice that even among the direct quotes from the research gathered for this article, several grammatical errors were detected (indicated by [sic]).

Publication fees, also known as article processing charges (APC), present a particularly ambiguous case. These charges can be an important source of operating revenue for open access journals that neither charge libraries nor individuals for their publications. Many of the articles examined for this study presume that acquiring these fees is the principal motivation for predatory practices. For example:

Predatory journals recruit articles through aggressive marketing and spam emails, promising quick review and open access publication for a price. There is little if any quality control and virtually no transparency about processes and fees. Their motive is financial gain, and they are corrupting the communication of science. (Clark & Smith, 2015, p. 1)

The situation is not so black and white, however. Many well respected, widely read journals such as Science and Nature charge fees in the thousands of US dollars, with an additional charge if authors choose to have their work published open access. An empirical study of open access journals found that the mean APC charged by journals in the Directory of Open Access Journals (DOAJ) was around \$900-\$1000 USD (Shen, & Björk, 2015, p. 13). Indeed, when examining whether to institute an APC for its journals several years ago, the Informing Science Institute was advised by a well-respected librarian that the institute would lack credibility if they did not initiate a publication fee.

The irony here is that the research literature appears to be more concerned about APCs that are too low than APCs that are too high. For example:

Finally, authors should be cautious when the listed APC of a biomedical journal is under \$150 USD. This is very low in comparison to presumed legitimate, fully open access bio-medical journals for which the median APC is at least 18 times more ... extremely low APCs may simply be a way for potential predatory journals to attract as many submissions as possible in order to generate revenue and presumably to build their content and reputation. (Shamseer et al., 2017, p. 11).

The APCs by predators are, nevertheless, much lower than the APCs by more credible OA publishers, which on the other hand often offer waivers from the charges to authors from developing countries. (Shen, & Björk, 2015, p. 13).

By charging low fees, however, the economic motivation to engage in predatory practices seems quite low. For example, one study of Indian open access journals found that the median annual revenue garnered from publication fees (computed by multiplying the published fee by the number of publications) was \$2752 USD (Xia, 2015, p. 73).

Awareness of predatory journals

A frequently stated concern in the literature was that authors and institutions might not be aware of the predatory nature of the journals they submit to or publish in. Some quotes from the articles illustrate this from both the empirical and personal perspective:

Young researchers are inexperienced in the process of publishing and therefore unaware of predatory journals. In this situation, companies publishing predatory journals offer the young scientists, who are often frustrated by a series of rejections, rapid peer review processes and publication times. (Richtig et al., 2018, p. 1447)

We surveyed participants of writing workshops at veterinary and medical schools and an international conference over a 1-year period. ... Of the 142 respondents who answered, 33 (23.0%) indicated awareness of the term "predatory journal"; 34 (23.9%) were aware of the Directory of Open Access Journals; 24 (16.9%) were aware of the Science "sting" article about predatory journals; and 7 (4.8%) were aware of Beall's list. Most (93/144, 64.5%) definitions of predatory journals described poor but not predatory journal practices, and some respondents misunderstood the term completely. Mentors should help novice authors to be aware of predatory journals and to distinguish between legitimate and illegitimate open-access journals, thus selecting the best journal for their work. (Christopher & Young, 2015, p. 1)

My first paper was published in December 2014 in a predatory journal without my approval. Although the journal was very new, it claimed to be an international, open access journal with a high impact factor, broad indexing, and a rigorous peer review. The title of the paper published in that journal was "Perceptions, practices, and use of Facebook: a cross-sectional survey on physiotherapy students in Pakistan." Within 2 weeks of submission, the reviewer's comments were received, which did not add anything to improve the content of the manuscript, and the article was accepted with an invoice for article processing charges. I did not agree to pay anything to the journal (since the fee was not disclosed ahead of time), nor did I sign a copyright agreement with them. Being unaware of this phenomenon, I was duped at the beginning of my publishing career, and the paper was published in the predatory journal without my consent. (Memon, 2018, p. 146)

What is not discussed at length in the literature is the authors' responsibility to objectively assess the quality of the process after a manuscript is submitted. In the third quote, for example, precisely what happened is a bit vague. The author reports getting back entirely useless peer reviews in two weeks along with an invoice for a previously undisclosed APC. All of these suggest a "textbook" predatory journal, a fact that the author apparently recognized. What is unstated is if the author actually paid the APC. If so, then the author bears some responsibility for the publication since many red flags were ignored. If not, by publishing an article without receiving an APC, the journal operated in a very atypical way if its motivation was purely economic. In either case, the journal was almost certainly predatory (as we understand the term). In the case where it went ahead and published the article without the author's permission and without holding the copyright, it was also guilty of a criminal violation of intellectual property law. Unfortunately, where organizations are willing to engage in criminal conduct, addressing the problem through regulations, requiring transparency, and demanding accepted practices may have little effect. Criminals have little problem with using deception, anonymity, and international borders to shield their activities.

DAMAGE INFLICTED TO STAKEHOLDERS

The question of pre-existing awareness of predatory journals is important because of the potential damage and penalties that publication in predatory journals can inflict. Examples of concerns expressed in the literature for different stakeholders are presented in Table 2.

In considering these findings, it is worth pointing out that much of the damage described in the literature—particularly as it applies to authors, reviewers, and institutions—stems from association with a journal labeled as predatory. It is the label, rather than the underlying content of the paper, that does the damage. The difficulty this presents is that of Type 1 error: a journal or publisher mistakenly classified as predatory when, in fact, it is not.

Table 2: Examples of Stakeholders Damaged by Predatory Publishing

Stakeholder	Description	Illustrative Quotes
Field of Study	General damage inflicted on science	<p>“Predatory journals threaten science, scientists and the effective communication of science.” (Beall, 2016, p. 78)</p> <p>“Predatory publishers are thus undermining the core business of generating evidence to improve global health. The journals also pollute the evidence base on which clinical practice and public health policy depend, and, as Beall points out, the weak or absent review systems mean that predatory journals can be ‘reservoirs of author misconduct,’ including plagiarism, falsified data, and image manipulation.” (Clark & Smith, 2015, p. 1)</p> <p>“Predatory journals challenge the establish [sic] regime of academic knowledge production from the inside.” (Dobusch & Heimstädt, 2019, p. 616)</p> <p>“Entire fields of scientific research are now be [sic] susceptible to a pollution of the literature by unverified research or even fake articles published in fake journals being incorporated into legitimate meta-analyses. All that is needed is for a careless author of a review article, or a meta-analysis, to cite one of these articles from a predatory journal to create a distortion to the published record and, thus, potentially cause future misdirection of research.” (Roberts, 2016a, p. 1831)</p>
Authors	Loss of reputation, position or status as a result of publishing in a predatory journal	<p>“By publishing in a predatory journal, researchers immediately render their work unusable, illegitimate, and stigmatized. Funders will not recognize the publication and there is a risk reputations can be tainted by association with such an untrustworthy publication.” (Roberts, 2016a, p. 1831)</p> <p>“Unfortunately however, naive authors may not appreciate the negative consequences of publishing their research findings in predatory journals, such consequences may include loss of the manuscript, ‘negative scars’ in their publication records, career damage, lost or disappearance of predatory journals altogether.” (Al-Khatib, 2016; p. 282)</p> <p>“Increased attention should be paid as to where papers have been published. A publication in a predatory journal might not be neutral on a CV and might even be an active demerit that harms the reputation of everyone, especially young scientists, listed on the article.” (Richtig et al., p. 1447)</p>
Publishers	Legitimacy of scientific publishing is called into question	<p>“Predatory journals threaten the integrity of the scientific system by undermining the aims of open access, creating confusion around those journals that operate ethically under the APC model. They harm the reputation of reviewers and editors whose names they include without permission, of authors, mainly inexperienced ones, that publish their work in them out of ignorance, and of journals that start their trajectory with this model but are not yet established enough to be indexed in prestigious databases.” (Abad-Garcia, 2019, p. 56.e5)</p>
Community	Non-academics who might be impacted by research	<p>“When ‘Jane’ turned to alternative medicine, she had already exhausted radiotherapy, chemotherapy and other standard treatments for breast cancer. Her alternative-medicine practitioner shared an article about a therapy involving vitamin infusions. To her and her practitioner, it seemed to be authentic grounds for hope. But when Jane showed the article to her son-in-law (one of the authors of this Comment), he realized it came from a predatory journal — meaning its promise was doubtful and its validity unlikely to have been vetted.” (Grudniewicz et al., 2019 p. 210)</p>
Reviewers	Collateral damage to a reviewer’s career by being affiliated with predatory journal.	<p>“Being asked to serve on an editorial board or as an editor of a journal is a recognition of one’s expertise; however, before accepting any invitation, it is critical to assess the quality of the journal, as serving in the editorial board of PJ [predatory journal] is useless as well as detrimental to the researcher’s career.” (Forereo et al., 2018, p. 586)</p>

Institutions	Failure to properly assess faculty contributions leading to invalid hiring, promotion and tenure decisions	<p>“The professor was awarded tenure in the spring semester. No one noticed the fact that all 15 of the articles listed in his application appeared in “pay-to-publish” journals—publication outlets that masquerade as serious, legitimate scholarly periodicals but in reality are mostly financial scams. In short, the professor had bought his way to tenure.” (McLeod et al., 2018, p. 121)</p> <p>“Undeserved promotion of faculty, on the grounds of publications in predatory journals, will also discourage genuine ones who are sincerely working for making impactful contributions. This will contribute to increased job dissatisfaction and more brain drain from developing countries. Moreover, academics promoted on the grounds of publication in predatory journals end up being assigned administrative and academic positions where they will be dealing with complex issues without having the necessary experiences and intellectual capacity, further contributing to declining excellence. Such professors are wittily dubbed ‘zombie professors’ in many countries in Africa, implying that they are professors only in their titles and not in intellectual status and contributions.” (Balehegn, 2017, p. 98)</p> <p>“I think that, since the advent of predatory publishing, there have been tens of thousands of researchers who have earned Masters and Ph.D. degrees, been awarded other credentials and certifications, received tenure and promotion, and gotten employment – that they otherwise would not have been able to achieve – all because of the easy article acceptance that the pay-to-publish journals offer.” (Beall, 2017, p. 275)</p>
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Proposals for addressing predatory publishing

A variety of solutions have been proposed to address the problem of predatory journals. To the extent that concerns arise from the label, one recommendation is to abandon the label altogether. For example: A potential solution to reduce the publisher or perish pressure (and, relatedly, the shortcut through predatory journals) may exist at the institutional level: the San Francisco Declaration on Research Assessment (DORA) developed in 2012, aims to improve the ways in which the outputs of scholars are evaluated. The DORA recommendations include ground-breaking concepts:

- (1) Journal-based metrics should not be used as measure of the quality of individual research articles to assess an individual scientist's contributions, or in hiring, promotion, or funding.
- (2) Especially for early-stage researchers, the scientific content of an article is much more important than publication metrics or the identity/standings of the journal in which it was published. To date 1553 organizations and 15,006 individuals signed the DORA. (Cortegiani et al., 2020, p. 195)

Some additional proposed solutions are summarized in Table 3.

Table 3: Examples of Proposed Approaches for Addressing Predatory Journals

Solution	Description	Comment
Retraction Letters	Provide a mechanism whereby authors who discover they have appeared in predatory journals to publicly retract their article if the journal refuses to do so.	“Predatory journals will usually not be willing to retract papers, or might ask for ‘retraction fees.’ Even when a retraction is denied, authors can upload the retraction letters attached to their papers on institutional or personal archiving services, such as Google scholar citation page, Research Gate, and Academia, etc. This will be viewed as an ultimate display of commitment to science, quality, and professionalism on the part of the author and the institution.” (Balehegn, 2017, p. 99)

Rating System	Rather than a simple predatory/non-predatory distinction, provide a system of points that assesses the degree to which a journal has predatory features.	“We introduce a new metric, the Predatory Rate, PR, for ranking journals. This metric helps us to do judgment about predatory journals and let editors to evaluate their journals against predatory practices. Academic databases could use this metric to indicate the journal predatory rate in their evaluation process. According to this metric, journals would be classified in three groups as follows: predatory journals, journal with predatory practice, and non-predatory ones, also in order to help a journal with predatory practice to be converted to a non-predatory one.” (Dadkhah & Bianciardi, 2016, p. 4)
Predatory List Committee	A committee assesses journals and keeps the list updated. A similar proposal involves establishing a global collective to oppose predatory journals.	“Kscien has recruited a special committee consisting of 23 young researchers under the title of (Predatory List Committee (PLC)). The members were trained and passed through several specified workshops to expand their knowledge regarding predatory journals and publishers. They are working unceasingly to keep the list refurbished, expose current tricks invented by the predators and guide authors. The list is designed to be updated daily.” (Kakamad et al., 2019, p. 6) “A global collective effort to protect authors from predatory journals and publishers” (Al-Khatib, 2016; p. 282)
Open Peer Review	By making peer review more open and posting reviews and comments publicly, the quality of a journals processes becomes more transparent.	“The rise of predatory publishing should be a trigger to experiment with more open forms of peer review. OPR practice can not only curb predatory journals but also can lead to more rigorous (through dialogue within the academic community) and relevant (through dialogue with other interested parties) management research.” (Dobusch & Heimstädt, 2019, p. 616)
Web Page Feedback	An application that provides feedback to potential authors on each journal’s web page; feedback would be determined by a committee of stakeholders.	“We envision a plug-in tool that researchers could click to get immediate feedback about a journal page they are visiting and whether it has characteristics of predatory journals. This feedback could provide them with the relevant information to determine if the journal suits their needs and/or meets any policy requirements to which they must adhere (e.g., digital preservation, indexing).” (Cobey et al., 2018, p. 15)

Reservations regarding the predatory journal label

Over a quarter of the articles surveyed expressed significant reservations about the predatory journal label. These concerns tended to fall into two broad categories: concerns about the label itself and concerns about how lists of such journals were constructed.

With respect to the limitations of the predatory label, one article summarized these as follows:

Key points

- The term 'predatory journal' hides a wide range of scholarly publishing misconduct.
- The term 'predatory journal' unhelpfully bundles misconduct with poor quality.
- The term 'predatory journal' blinds us to important possibilities, needs, and questions arising in the developing scholarly landscape.
- The current scholarly publishing environment cannot rely on such a simplified classification of journals into predatory or not. (Eriksson & Helgesson, 2018, p. 181)

On the issue of the range of misconduct, it must be recognized that many of the sins attributed to predatory journals—such as plagiarism, theft of ideas, and falsification of results—are, in fact, committed by authors or reviewers. They sometimes impact even the most reputable journals. Consider the following quote:

Predatory journals also can be abused to hide potential conflict of interests: a very famous case – although not published in a predatory journal – was the case of Wakefield in the *Lancet*. This case demonstrates how one falsified study can continue to have tremendous effects on public health for decades. In his work, Wakefield linked the MMR vaccine with autism in children, which later was proven to be a false claim and led to the retraction of the article in 2004. However, the retracted articles still get continuously cited, although its claims have been proven wrong. (Richtig et al., 2018, p. 1447)

In the entire body of predatory publishing literature that I examined this is the most concrete example of damage caused by invalid research. Ironically, the authors used it to illustrate one of the dangers presented by predatory journals despite the fact that (a) the fraudulent nature of the submission would have likely eluded the attention of almost any reviewer, and (b) the impact of the article on the community was almost certainly driven by the prestige of the *Lancet*.

For other predatory behaviors, such as intentionally hiding APCs and listing board member without permission, journals and publishers must clearly be held accountable. This leads us to the second item, bundling misconduct with poor quality. Unfortunately, objective measures of article quality are limited and may vary considerably across disciplines. What might be viewed as ludicrous junk science in one discipline could be hailed as solid postmodern research in another. It seems unlikely that a binary choice of predatory/non-predatory distinction can capture the variation between journals and disciplines, which is the basis of Eriksson & Helgesson's (2018) fourth point.

With respect to the process through which predatory journal/publisher lists are constructed, serious concerns have been raised. Many researchers have complained about Beall's list, which has been characterized as being instrumental in the fight against predatory journals (Strielkowski, 2017, p. 416). These involved both the criteria used (e.g., see Beall, 2015a) and transparency. For example:

The effort involved in developing Beall's list was impressive and it was a reasonable starting point for someone who wanted to investigate a journal's or publisher's authenticity. However, Beall did not list the specific criteria he used to categorize a given journal as predatory and he mistakenly black-listed some legitimate journals and publishers, particularly those from low and middle income countries (LMICs). (Laine & Winkler, 2017, p. 287)

Like Batman, Beall is mistrusted by many of those he aims to protect. "What he's doing is extremely valuable," says Paul Ginsparg, a physicist at Cornell University who founded arXiv, the preprint server that has become a key publishing platform for many areas of physics. "But he's a little bit too trigger-happy." (Bohannon, 2013, p. 62)

Beall's list was not objective and that his criteria for including journals were not transparent. (Das & Chatterjee, 2018, p. 198)

There were also complaints that Beall's list was biased in its focus on open access journals. For example:

Any list such as Beall's will have both type I errors (journals being wrongly included) and type II errors (journals being wrongly excluded). However, for this research, Beall's focus on open access journals also creates an additional potential bias. Other publishers may follow similar practices but be protected

from scrutiny by pay walls. Thus, relying on Beall's list may result in undercounting of articles in journals with predatory practices. (Pyne, 2017, p. 143)

This study demonstrates the subjective nature of the Criteria by which Beall constructs his lists. Furthermore, it highlights the finding that well-regarded academic journals, whether OA or not, can be considered as possible predatory journals, even when LIS professionals apply the Criteria. (Olivarez et al., 2018, p. 62)

Finally, the fairness of the list, and the process by which the list could be modified, is questioned. For example:

It seems that the objective of the Beall's list is to make the list larger, however there should be a (real) chance to remove items. The way Jeffrey Beall was the "judge jury and executioner" in his 'verdict' on whether a journal or publisher is (potentially) predatory has been questioned on several occasions (Keller, 2019, p. 20)

The last of these issues has become particularly problematic in recent years. In early 2017, Jeffrey Beall discontinued his blog and stopped updating his list. Another individual, who has chosen to remain anonymous, took over the list and continues to update it as of the time of this writing. That website describes the author as follows:

I am not Jeffrey Beall. I prefer my identity to be anonymous, largely for the reasons that Beall mentioned in his recent article. ... However, I can tell you that I am a postdoctoral researcher in one of the European universities and have hands-on experience with predatory journals.

I will keep the list updated as much as possible, although I suspect I simply won't have time to do as thorough job as Beall. Hopefully, people will point me to the new, possibly predatory journals and publishers. However, expect the list's applicability to diminish over time. That is why I strongly suggest anyone that deals with publishing academic articles to read the information available on ThinkCheckSubmit.org, which has tips about how to publish in a journal that is not predatory. I would also suggest you read Beall's criteria for identifying a predatory publisher.

The upshot of this is that lacking transparent mechanisms to ensure the accuracy of the list, journals or publishers placed on the list have no way to defend themselves.

CASE STUDIES

In this section, I present two case studies—one a publisher, one a journal—that ended up on the anonymous copycat version of Beall's list.

INFORMING SCIENCE INSTITUTE

The Informing Science Institute was established in 1998 to serve as a community of researchers seeking to share ideas about information systems across disciplines that have traditionally operated in silos. Its philosophy was expounded in an article written by Eli Cohen (1999) titled "Conceptualizing Information Systems as a Field of the Discipline Informing Science: From Ugly Duckling to Swan". Its origins and history are described in a research article (Murphy, 2020) and a case study (Koch & Johnson, 2018).

About the Informing Science Institute

The institute's philosophy and research focus are described on the institute's website as follows (Informing Science Institute, 2021):

Informing Science Institute Philosophy

The Informing Science Institute is a mentoring organization. One of the Informing Science Institute's core principles is helping our fellow colleagues to become better and better: better as an author, as a reviewer, as an editor, and as an editor-in-chief. We use the peer review process of our journals to support author colleagues by providing them with constructive suggestions on ways to improve their work even if a submitted article is not accepted for publication. Our Editors-in-Chief assist reviewers and editors by being coaches and guides to the authors, reviewers, and editors.

ISI Research Topics

ISI encourages the sharing of knowledge and collaboration among the wide variety of fields, often using information technology to advance the multidisciplinary study of informing sci-ence. These areas can include Business, Communications, Communicating Meaning, Community and Society, Computer Science, Data Management, Distance Education, eCom-merce, Education, eLearning, Government, Health Care, History, Information and Library Science, Journalism, Justice and Law, Mathematics, Management, Philosophical Issues, Psychology, Public Policy, Sociology, and Human Resources.

In the more than two decades since the institute was established, it has grown to publish 14 journals (including several partner journals). As of 2020, it had published "more than 4100 articles by over 4500 authors from over 600 universities" (Murphy, 2020, p. 165). Its constituency is highly global, as illustrated in Figure 2.

Beyond its publishing activities, the institute was also dissatisfied with available options for managing the peer-review process. While both open source and commercial tools could accept submissions and manage review assignments, they lacked key capabilities that the institute wanted for its mentoring missions. Consistent with its stated mission, it felt that the ability to provide developmental feedback to reviewers and editors on their performance was critical if the researchers in these roles were to improve in their performance. To address this, at considerable expense in time, money, and effort, the institute contracted to develop its own peer reviewing and publication system. The current version of the system requires editors to provide feedback both to reviewers and authors, and each editor-in chief is further required to provide feedback to editors on their performance. The system supports many features that are not readily available in existing alternatives, such as collaborative authoring, automatic assignment of DOIs, many different automatic messaging alternatives to generate reminders, and a user-friendly interface that supports both journals and conferences. The system also supports partner journals and partner conferences, which pay a use fee well below that of widely used commercial peer review products, such as Manuscript Central.

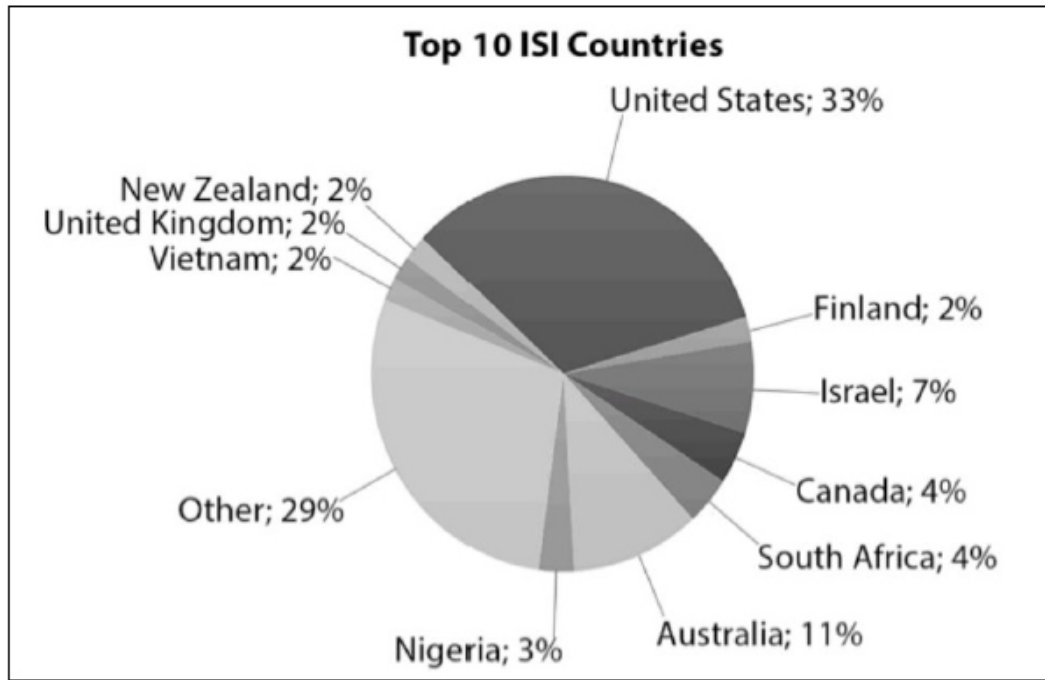


Figure 2: The Percentage of Articles with Authors Representing Various Countries (from Murphy, 2020, p. 170)

The institute requires its journals, including its partner journals, to be open access and to subscribe to its stated philosophy of mentoring authors, reviewers, and editors. For its first two decades, no APC was charged for any of the institute's publications. In 2016, one of the institute's governors was tasked with investigating how to achieve better visibility across the research communities it seeks to serve. Based on the advice of an Australian research librarian—who asserted that having an APC was critical to building the credibility of its publications—the institute decided to levy a fee of \$75 per article in 2018. That amount was chosen based upon the cost it was paying for proofing (\$50/article) and was waived for members of the institute—regardless of how many articles were submitted and published over the course of a year. Not coincidentally, the cost of an annual membership was also set at \$75. Not surprisingly, most authors chose to become members.

On 18 November 2018, in response to what the institute thought was a routine application to the Directory of Open Access Journals (DOAJ), it received the following correspondence:

Following your applications for journals to be listed in DOAJ, our staff has undertaken a detailed review of your journals. This review has produced evidence of poor editorial conduct.

In particular, we found evidence of:

- Editorial board members linked to questionable publishers
- Anonymous website registration

We conclude that your journals do not adhere to many of the principles of good publishing practice.

It is therefore the decision of the DOAJ management to reject the applications for your journals and remove any journals already included in DOAJ from Informing Science Institute or any affiliated publishers.

When the institute appealed the decision, it offered to change the website registration (something the domain registrar specifically warned against doing), also pointing out that the organization's leadership and the business address of the institute (the executive director's place of residence) were easily found on the institute's website. It also asked for further clarification on the editorial board members in question. The DOAJ denied the appeal and indicated that they could not release the names of suspect members owing to privacy concerns. They would also not name the "questionable" journals.

Subsequently, on January 19, 2019, the Informing Science Institute was added to the list of "possible predatory publisher" on the anonymous copycat Beall's site. No explanation was given, nor was there any response to a query submitted on the site's contact form. Inclusion on the list has led several authors to withdraw their unpublished manuscripts that had already been accepted after going through the full peer review and revision process.

It is telling that Beall himself recognizes the potential value of research communities run by volunteers and guided by a common purpose:

There are many tight-knit communities of researchers centered on a field or sub-field who cooperatively edit journals — both subscription and open-access — and whose voluntarism and tight editorial control makes each of these community-supported journals successful. Such communities enable effective and meaningful communication among peers, and such journals should be models for all scholarly fields. (Beall, 2018, p. 3)

From my perspective, the Informing Science Institute is precisely the type of organization Beall described. To explain that perspective, I now turn to considering how my involvement with the institute has impacted my professional research career.

Personal reflections

Owing to the lack of transparency from an anonymous Beall's list copycat and DOAJ organizations, it is difficult to fathom the underlying processes that led to the decisions to exclude the institute. What I can describe, however, is my experience as a researcher involved with the institute and as an active participant in the organization. Some key elements of the relationship include the following:

- My first publication in the journal *Informing Science* (Gill & Hicks, 2006) has been cited well over 100 times according to Google Scholar. While this would not be a particularly impressive number for a top tier journal in my field, it would be extremely atypical for a predatory journal article, since these tend to be cited only rarely (Björk, et al., 2020). In total, my citations in the institute's publications exceed 800. My original article has also been central to my research agenda for the past 15 years.
- My second publication in *Informing Science*, co-authored with one of the most cited researchers in my field (Gill & Bhattacharjee, 2007), led directly to two publications in the premier journal in my discipline, *MIS Quarterly* (Gill & Bhattacharjee, 2009a, 2009b).
- A publication I co-authored in the *International Journal of Doctoral Studies* (Gill & Hoppe, 2009) has been cited more than 80 times. It led to an interview with *Bloomberg BusinessWeek* and was instrumental in the establishment of a highly successful Doctor of Business Administration program at my university; a program that I now lead.
- In collaboration with the institute, I served as principal investigator on a \$170,000 grant from the U.S. National Science Foundation to develop case studies for a capstone course; the institute provided an outlet for these cases through launching the *Journal of IT Education: Discussion Cases*. The *Informing Science Press* also published a book I wrote on case writing (Gill, 2011), fulfilling another deliverable requirement of the grant.

- I received a \$58,000 Department of Defense grant to investigate the informing flows of a week-long event (Murphy et al., 2015).
- I received a core Fulbright award to help South African faculty members learn how to write ICT for development case studies; the invitations I received to work with six South African universities were all set up by colleagues from the institute. It led to a book published by the Informing Science Press (Twinomurinzi, et al., 2018).
- I served as principal investigator on a subsequent \$300,000 grant from the U.S. National Science Foundation to develop a series of cybersecurity case studies. Once again, the institute served as a partner organization for the grant. The cases developed led to a book published by the Informing Science Press (Gill, 2018).

The list that I have provided is far from complete. Given the positive impact of my involvement with the institute on my professional career—along with my direct observation of the selfless activities of the many individuals who volunteer their time and intellect to the institute—it is unfathomable to me that it could be considered predatory by any measure.

JOURNAL OF SYSTEMICS, CYBERNETICS, AND INFORMATICS

The Journal of Systemics, Cybernetics, and Informatics is an open journal published by the International Institute of Informatics and Systemics (IIS). Its content consists primarily of articles fast-tracked from two annual conferences organized by IIS and held in Orlando, Florida. Because conference submissions often end up in related journals, many researchers lump predatory journals and conferences together (e.g., Cortegiani et al., 2020; Sonne et al., 2020). The journal has been blacklisted by Cabell's International and rejected by the DOAJ (Strinzel, et al., 2019).

Background

The IIS was established by Dr. Nagib Callaos, then dean of research at Venezuela's Simon Bolivar University, one of the leading universities in South America. Its principal goal was to foster communications between disciplines and, particularly, between the separate worlds of the academy and practice. To accomplish this, IIS runs two annual multi-conferences. These conferences seek contributions across a very wide range of topics.

The conferences IIS organized in Orlando several times a year were highly successful, attracting over a thousand participants in the larger summer session. Then, in 2005, the situation changed. Three graduate students from Massachusetts Institute of Technology submitted a computer-generated paper using a tool called SCiGen that produced nonsensical but superficially plausible-looking papers (Massachusetts Institute of Technology [MIT], 2015). When the paper was assigned to multiple reviewers, none of them responded. Such withdrawal by reviewers is not uncommon when they feel that they cannot adequately review a submission. Callaos himself could not make sense of it but, given the resumes of the authors, decided to accept it for presentation at the conference—communicating clearly to the authors that it was unreviewed.

The result was a media storm, with outlets including Boston Globe, CNN, and the BBC picking up the story (MIT, 2015). The detail they omitted was the "unreviewed" part.

Given the nature of the conference, I am not at all surprised that the authors were invited to present. The whole purpose of the conference is to inspire communication. Given the credentials of the authors,

allowing them to present their work would—hypothetically—offer the opportunity to provide them with feedback on how to communicate their ideas better. The decision was not, as the media implied, a failure of the peer-review process.

The fallout from the episode was severe. Attendance at subsequent conferences fell between 80 and 90 percent. Despite the setback, the conferences and journal continued, although never returning to their prior attendance levels. In the subsequent years, Callaos directed much of his focus on issues that relate to academic communications, particularly peer review. To make the peer review process more effective, he instituted a two-stage process. First, an author would need to get one or more colleagues to review the manuscript and attest to its quality. The manuscript would then go through the more traditional double-blind peer-review process. Finally, he would check over the manuscript himself. In cases where the manuscript was deemed to be particularly outstanding, authors were offered the opportunity to present at a plenary session on a topic of their own choosing.

Personal reflections

I have had the opportunity to participate in the IIS conferences at least 15 times over the past 10 years, mainly as a plenary speaker and discussion leader. My observation is that the 2005 incident resulted from a complete misunderstanding of the nature of the conference by the students involved. In engineering-related disciplines, conferences are often the principal means through which new knowledge is disseminated. In many cases, these conferences are highly competitive and count as much as journal publications (or more). Thus, it is somewhat understandable why an engineering conference "having loose standards" (MIT, 2015) might be of concern, and perhaps even targeted for ridicule.

The IIS Conferences, however, are not engineering conferences, nor do they intend to be. Rather, they were set up to provide a venue for different disciplines to communicate with each other. The first day of each conference is generally set aside for workshops and "conversational sessions" where participants gather in a room and discuss communications-related topics such as the validity of peer review and breaking down the barriers between academic research and practice. The remainder of the conference is devoted to paper presentations and numerous plenary sessions. The latter are presented by invited speakers and by researchers whose submissions were singled out as being outstanding, as noted previously. Given these objectives and structure, such a conference needs to be evaluated in a manner entirely different from how one might judge an engineering or management research conference.

My experience has been that the conference offers content that is both thoughtful and extraordinarily diverse. Presenters that I have found particularly interesting include a Japanese professor of medicine and engineering who brings his students to the conference each year to present their work, a veterinary oncologist who travels the country to visit with rottweilers that have lived unexpectedly long lives so as to understand the aging process better, a digital custodian of the record of Alexander von Humboldt who talks about the remarkable career of this explorer/scientist and how it is being made accessible to the global community, a physicist who has built his pattern detection software based on our understanding of how the brain works and seeks to understand better how music impacts our thinking, a group of U.S. and European researchers who are applying the principles of cybernetics to understanding science. And many more.

Participation in the conference has also proved to be an asset to my professional career. In the late 1990s, Dr. Callaos hosted a track on informing science at his conference, located in Venezuela at the time. That

was the debut of informing science at a conference venue. In 2010, he asked Eli Cohen, the founder of the Informing Science Institute, to give a plenary presentation at the conference. Co-hen, in response, sent him a copy of a book I had just published with the institute (Gill, 2010) and suggested that I be invited as well. Callaos was so taken with the book that he created special conference track built around it. When I later published a book on the case method, he created a track for cases as well.

The tracks created for the conference proved invaluable to me. For example, one of the presenters—a professor and later dean of a prestigious Central American business school—talked about the potential impact of discussion cases on practice. He also attended a workshop on case writing that I facilitated. Subsequently, he served as the editor of a special section of the journal *Informing Science* focusing on the impact of cases on practice. He also served as the editor of a special issue of the journal *Management Decision* honoring my contributions to the field (Ickis, 2014). A faculty member from the Naval Postgraduate School in Monterey attended the conference after reading about informing science. He later invited me to a unique field event that brought together active-duty military personnel, academics, and individuals with unclassified technologies that might have applicability to the armed forces or emergency services. Subsequently, I was awarded a DoD grant to study the event as an informing system. During both my NSF case development grants, the conference was offered as a venue for the case writing workshops that I had promised to deliver. During one of these early workshops, a faculty member from Vietnam invited me to speak at a Ho Chi Minh City conference and offer an extended version of the workshop. A year after the presentation, I served as editor of a collection of cases developed by the faculty and students at his institution, published in book form (Gill, 2014). This experience served as the inspiration for the Fulbright project that I subsequently proposed, described in the previous case.

In terms of the journal, I published one article in the *Journal of Systemics, Cybernetics, and Informatics* cited eight times and two others in the conference proceedings, one cited 28 times, and one cited four times. None of these counts represent particularly major achievements. Still, I would also note that the journal has published one article with nearly 1000 citations and has garnered over 4400 citations overall, according to Google Scholar. According to a search performed with Harzing's Publish or Perish, approximately 94% of the 419 articles identified as published in the journal have at least one citation. This is well above the 50% of articles typically cited across journals that have been labeled as predatory (Björk et al., 2020).

DISCUSSION

There is no doubt that some journals and publishers intentionally mislead authors and violate numerous good research and publication practices. A considerable difference of opinion remains concerning the use of the label "predatory" and the process by which journals and publishers should be classified as such. In this section, I look at the pros and cons of classifying journals as predatory through the lens of Type 1 vs. Type 2 errors, then provide five recommendations for improving the process.

TYPE 1 VS. TYPE 2 ERROR

Assuming for the moment that it makes sense to compile a list of offending journals/publishers, the key question is the degree to which we tolerate Type 1 errors (i.e., mistakenly classifying a valid journal as predatory) compared to Type 2 errors (i.e., failing to include a predatory journal on the list). In deciding the weight given to each type of error, it makes sense to assess the relative cost of each type of error. This is likely to vary considerably by discipline. In disciplines where a predatory article can have a serious

impact on the underlying science and the broader community, Type 2 errors present a clear and present danger. Currently, the use of lists such as the revised Beall's list would be consistent with this view, its high potential for Type 1 error aside (e.g., Keller, 2019). On the other hand, Type 1 errors can lead to serious career and financial costs to researchers, journals, and their editors. Where the cost of Type 2 errors is low, or the probability of Type 1 errors is very high, it would make sense to be extremely cautious in applying the predatory (or some alternative) label to a journal.

Cost of Type 2 errors in business and information systems research

Because the relative weights of Type 1 and Type 2 errors are expected to vary considerably by discipline, I focus my attention here on my research areas: business and information systems. I expect that some of these arguments could be applied more broadly to research in the social sciences.

The typical cost of Type 2 errors is difficult to compute for a variety of reasons. Looking at it in terms of cost per article, factors that need to be considered include:

1. The typical cost of an article that is inappropriately published by a predatory journal.
2. The typical cost of an article that is inappropriately published by a non-predatory journal; this may be substantially higher than item (1) since the predatory journal article is likely to be cited much less widely (Frandsen, 2017).
3. The probability that an article in a predatory journal is invalid.
4. The probability that an article in a non-predatory journal is invalid.

None of these costs or probabilities can be determined with any accuracy. To get a general sense, I consider them with respect to the stakeholder communities presented earlier in Table 2.

Science and Community Stakeholders. Within business and information systems research a good case can be made that the costs (1) and (2) are likely to be quite low with respect to the external "science" (i.e., the broadly defined business/IS research body of knowledge) and "community" (i.e., business and information systems practice) stakeholders. The source of these costs could arise from both the findings presented in an article and through the adoption of improper methodologies inspired by an article.

Invalid Findings: For the "science" stakeholder, a key issue is the degree to which the research findings—however high quality the research itself may be—are likely to replicate. In business research, it is widely recognized that context is a very important factor in determining how various factors (e.g., independent variables) impact a particular outcome (e.g., dependent variable). Perhaps for this reason, relatively few attempts to determine if relationships generalize across contexts exist. On the rare occasion where such efforts have been made (e.g., Hubbard & Vetter, 1996), the degree to which findings have failed to replicate has been appalling. This makes any proposition that a predatory paper will impact our science moot.

In the broader social sciences, greater control of context can be achieved through well-planned laboratory experiments. Thus, we would expect the degree to which they replicate to be much higher. To test this, a study of 100 well-known and widely accepted psychology studies was conducted by the Open Science Collaboration (2015). The researchers made systematic attempts to replicate each study as faithfully as possible. Although 97% of the original studies had statistically significant findings, only 39% of the findings replicated. When the new results were combined with the original results, the 97% dropped to 68%. What is critical to note here is that these were "classic" studies, ones that appeared widely in psychology textbooks and were largely treated as fact.

In considering the potential cost of an inappropriate article to the broader community, the most relevant question is the degree to which the invalid findings articles are likely to impact that community. While I have no means of estimating the impact on the overall social sciences, I have argued at length elsewhere that the impact of business and IS academic research on business practice is negligible (Gill, 2010). While not repeating those arguments here, they mainly derive from the fact that academics are primarily rewarded with respect to their ability to communicate with other academics. We measure the effectiveness of such communication mainly through the tier of the journals we publish in and the degree to which other researchers cite our research. This system provides little incentive for devoting time to impacting practice. It also means that if an article were to report findings relevant to practice, it is only likely to do so if published in a very small set of practice-targeted journals, such as the Harvard Business Review.

Invalid Methodologies: Excepting research directed towards the scholarship of teaching and learning (SoTL), business researchers are unlikely to be in situations where they would directly apply the findings of their own research. Costs might be incurred when subsequent authors are influenced to adopt an invalid methodology detailed in an improperly published article. The research I surveyed did express concerns about the methodological weaknesses found in predatory journal publications (e.g., Kurt, 2018). Nevertheless, I could not find any report of subsequent methodological irregularities inspired by the publication of an article in a predatory journal. I can speculate on a couple of possible explanations. First, to adopt a methodology from an article necessarily requires careful study of that article. To the extent that the article suffers from the deficiencies attributed to predatory publications, the researcher should quickly detect these and reject the article as a source of inspiration for research design. Second, if authors were to seek out a methodology to imitate, it would make sense to choose one published in the top tier of journals rather than one they just happened to come across in some random journal. Thus, the cost to science of Type 2 error resulting from the diffusion of poorly constructed methodologies seems likely to be low.

Author, Publisher, and Institution Stakeholders. For authors and publishers, costs of Type 2 errors are likely to be dwarfed by those of Type 1 error. The authors' major risk seems to be that an illegitimate journal that is not labeled as such (Type 2 error) is later correctly labeled, thereby placing the authors' reputation at risk and causing their previously published research to be ignored. For both publishers and authors, there is also a potential opportunity cost: through submitting to a journal that is, in fact, predatory, authors lose the opportunity to have their article published in a legitimate journal more likely to garner citations; legitimate journals lose the opportunity to review and publish the authors' articles.

For institutions, the potential cost of Type 2 error is clear cut. Beall (2017) speculates on these costs particularly forcefully:

I think that, since the advent of predatory publishing, there have been tens of thousands of researchers who have earned Masters and Ph.D. degrees, been awarded other credentials and certifications, received tenure and promotion, and gotten employment – that they otherwise would not have been able to achieve – all because of the easy article acceptance that the pay-to-publish journals offer. (p. 275)

As mentioned earlier in Table 2, McLeod et al. (2018, p. 121) presented a specific example of the impact of not knowing that journals are predatory (which is the equivalent of Type 2 error) in a promotion and tenure case where the candidate's entire research package consisted of pay-to-play journals.

The McLeod et al. (2018) example raises some interesting questions. The full version of the earlier quote is as follows:

The department tenure committee, the dean of the college, and the university president were all impressed with the applicant's tenure packet, which listed 15 articles in prestigious-sounding journals. In addition, the professor was well liked by his colleagues and his department chair. His teaching was only "adequate," but no one seemed to mind because so many of the tenure decisions at his school depended upon an applicant's publication record—in this case, a seemingly stellar one. The recommendations from the review bodies were consistently favorable, and the professor was awarded tenure in the spring semester. No one noticed the fact that all 15 of the articles listed in his application appeared in "pay-to-publish" journals—publication outlets that masquerade as serious, legitimate scholarly periodicals but in reality are mostly financial scams. In short, the professor had bought his way to tenure. (p. 121)

There are two distinct possible interpretations of this example at the extremes, assuming that it is accurately presented. The generous interpretation is that the faculty member in question had published some strong research but had perhaps been unwise in choice of outlets (several of which were improperly categorized as predatory, since such errors happen). In this interpretation, the tenure committee examined the articles, as they would be expected to do, and the external evaluators did the same—as would be their responsibility in accepting the task. Based on this analysis and their direct observations of the individual during the roughly 5-year pre-tenure period, the faculty member's research was judged to be of sufficient quality to make up for only adequate teaching.

The other extreme alternative is that the institution in question was run by the village idiots and deserved the consequences. Under this interpretation, the faculty member in question did, in fact, buy tenure by publishing work that was not good enough for respectable journals using pay-to-play outlets. For this to happen, both the promotion and tenure committee and the external reviewers must have ignored the articles' actual content and where they were published in their decision processes. This casual attitude towards content would be indicative of collective insanity at a research-intensive university. On the other hand, any other category of university that would willfully ignore sub-standard teaching in their promotion and tenure decisions and base their decision on mere article counts suffers from seriously misplaced priorities.

The question of which extreme interpretation is closer to the truth brings us to the earlier mentioned factors (3) and (4), the relative probabilities that an invalid article will be published by a predatory journal vs. a non-predatory journal. Central to resolving this question is the relative validity of their respective peer review processes.

Peer Review. Of all the criticisms raised against predatory journals, the inadequacy of their peer review processes is the most described. The typical scenario is described as follows: to acquire APCs from authors, predatory publishers mislead (or collude with) authors by claiming rapid peer review but, in fact, faking such reviews or sending it out to reviewers that will always accept a submission with few or no required revisions. Under this process, the quality control element of peer review and the opportunity for authors to improve their article by responding to constructive comment from the reviewers are totally absent from the process.

I do not doubt that the typical scenario just described is precisely what happens in those journals that are truly predatory. The problem arises when you accept that Type 1 and Type 2 errors in classifying journals exist. It is further compounded when weaknesses in the peer review processes of non-predatory journals are considered. I have looked at the deficiencies of peer review in greater detail elsewhere (Gill, 2010), so I will limit myself to one example.

William Starbuck (2003, 2005) was the editor-in-chief of one of the most prestigious business research journals, *Administrative Science Quarterly*. He conducted an analysis that looked at the level of consensus between peer reviewers in their rating of 500 manuscripts submitted to that journal. What he found was a correlation of 0.12, statistically significant but nearly meaningless for practical purposes. Running a simulation using data from ASQ and other journals, his midpoint estimate of the percentage of articles published that were not in the top 20% in terms of intrinsic value was 57% (Starbuck, 2005, p. 197).

While this high level of error in top-tier journals does not excuse the blatant disregard of peer review processes in true predatory journals, it does suggest that considerable randomness exists in whether a top tier journal ultimately accepts a manuscript. Thus, neither the publication nor the rejection of a manuscript by such a journal can be taken as indisputable evidence of its quality. Similarly, we might expect that journals labeled as predatory may have some good reviewers as well as some weak or bad reviewers.

In summary, the costs of Type 2 errors are paid primarily by the institutional stakeholder. Universities make decisions to award degrees and decisions to hire and promote under the assumption that certain journals are reputable. If they are not, the decisions are being made using false assumptions. However, what is also true is that institutions can put processes in place that minimize the likelihood of serious damage from Type 2 errors. These mainly involve looking beyond journal lists in evaluating research. As suggested by the San Francisco Declaration on Research Assessment (DORA), these mainly involve paying more attention to the actual quality of the articles themselves (Cortegiani, 2020).

Cost of Type 1 errors

Unlike Type 2 errors, the costs of Type 1 errors are paid primarily by author and publisher stakeholders. As illustrated by the Informing Science Institute and IIIS cases presented previously, there is a heavy price to be paid for even the possibility that a publisher, journal, or conference is predatory. In the case of IIIS, the impact of the 2005 incident with MIT students is still being felt more than a decade and a half later. In the Informing Science Institute case, several authors have withdrawn papers because of concerns related to how their employing institution might react. Moreover, inclusion on a predatory publishing list often leads to removal from key indexes. Such removal can have a serious impact on authors. For example, to get credit for a publication at most South African universities, the journal needs to be included in the Scopus index (Hedding, 2019). A journal dropped from that index will lose its ability to attract authors from many countries and many universities. This is precisely why a Type 1 error can be so damaging.

More broadly, Type 1 errors serve to undermine the legitimacy of all open access publishers by overstating the presence of bad actors. By virtue of the same reputational effect, these same errors may work to benefit the for-profit publishing sector. These same publishers often own or work closely with the very indexes that are quick to drop open access journals as predatory.

For authors, Type 1 errors can be equally damaging. Being listed as an author on an article can hurt an author's reputation (Richtig et al., 2018) should the publication be unfairly labeled as predatory. As shown in the Informing Science Institute case, just being on the editorial board of a journal labeled predatory can impact you and your colleagues. And, because the labeling process fails every conceivable test of transparency, there is no recourse.

Balancing the error types

So how do we balance the different two types of errors when classifying predatory journals? As I stated earlier, it is likely to vary by discipline. In research domains where results are expected to replicate and where research findings can significantly impact the science or the broader community, it may make sense to be cautious. To avoid spurious research impacting the science and the broader community, minimizing Type 2 error at the expense of accepting the damage caused by Type 1 error might be the best compromise. In domains where results are highly context dependent and where reviewers rarely agree on the merits of a manuscript, reducing collateral damage to reputation and careers through minimizing Type 1 error may be the better choice.

Naturally, in the ideal world we would seek to minimize or eliminate both types of error. Unfortunately, there are tens of thousands of research journals and to make a reasonable determination of a journal's merit can, or at least should, take a considerable amount of time and careful deliberation. As noted in Table 3, one proposal has been to establish a "predatory rank" based upon a journal's characteristics (Dadkhah & Bianciardi, 2016), acknowledging that the degree to which a journal is predatory is not black and white. Unfortunately, my intuition suggests that the more predatory a journal, the more likely that it will lie about its characteristics. That means a time-consuming verification process would be required to make an accurate determination.

RECOMMENDATIONS

Given that objective, unbiased and systematic third-party validation of all journals—probably the best solution to the problem of predatory journals—is unlikely to be financially viable, what other possible solutions can be proposed? I now turn to some possible recommendations, both gathered from the literature and my own.

#1 – Drop the predatory label

A particularly creative approach to the question of predatory publishing involved taking the five stages of predation—detection, identification, approach, subjugation, and consumption—and applying them to the predatory publishing process:

the 'detection' consists of finding authors who have published in other journals; 'identification' consists of getting their contacts; the 'approach' is stage starting with the CFPs' and ending with the author paying no attention or being subjugated; 'subjugation' is the submission stage; and 'consumption' coincides with charging the author. (Petrișor, 2016, p. 2)

The problem with the analogy is that it can be applied to practically any publisher (with the possible exception that consumption might involve requiring the authors relinquish their copyrights for those journals that do not charge an APC). Also, it fails to distinguish between those journals that intentionally mislead and exploit authors—journals that I would happily label as predatory—and those that are simply inexperienced, inept, or have a different mission (a topic I will return to later). This concern was noted in

the literature several times (e.g., Cortegiani et al., 2020; Eriksson & Helgesson, 2018). Labeling a journal as predatory also implies the authors that submit to the journal are "prey". While there are many examples in the literature of authors were unaware of the nature of the journal to which they submitted (e.g., Cobey et al., 2018; Memon, 2018), there are also cases where authors are willing co-conspirators (Bagues et al., 2019).

My recommendation would be that the term "predatory" be dropped and that a distinction be made between legitimate and illegitimate journals. What would distinguish an illegitimate journal would be that it intentionally misleads authors and institutions. For example:

- It may intentionally hide its fees from authors.
- It may be vague or simply lie about its peer review practices.
- It may intentionally publish plagiarized work.
- It may pad its editorial board with individuals that have not consented to serve.
- It may lie about its metrics or the indexes it is listed in.
- It may fail to take action in cases where reviewer misconduct is identified, such as stealing another authors ideas while it is under review.

These practices and others have all been observed and mentioned in the literature. What makes a journal illegitimate is that it engages in such practices by intent.

#2 – Evaluate the quality of peer reviews

In my analysis of Type 1 vs. Type 2 error, I argued that the main cost of Type 2 error would be paid by institutions through hiring, promoting, or rewarding researchers whose publications were "pay for play." Thoughtfully evaluating the work (as opposed to where it was published) in the scholar's port-folio would arguably be the best solution. Alternatively, as a shortcut, applicants for jobs and promotion and tenure could be required to include copies of the peer reviews they received for each article they published along with the articles themselves. The quality and depth of those reviews—which can be relatively easily assessed (based on my experience as an editor)—would almost certainly allow nearly all blatantly illegitimate journals to be identified immediately. In addition, authors could be encouraged to withdraw the submission from any journal that did not provide substantive reviews before the manuscript reaches the revision and publication stage.

This recommendation parallels the open peer review (Dobusch & Heimstädt, 2019) solution proposed in the literature. While the open peer review would certainly be better at making a journal's weaknesses in peer review public, it might also raise serious privacy concerns. Many journals could refuse to participate. Authors, however, will necessarily have access to the reviews of their own submissions. Privacy and participation concerns would not be an issue in the more limited approach I recommend. It would also not be too great a departure from existing practice. At my institution, we frequently encourage job applicants to provide access to student comments from their teaching evaluations along with numeric scores.

#3 – Mission categories for journals

Within higher education, it has long been recognized that different institutions have different missions. It would not make sense to judge a university established to help a previously underserved constituency become better prepared for the workforce using the same criteria as we would for a well-funded university whose success is judged principally by its contributions to scientific research and the number

of Nobel laureates on its faculty. To deal with the problem of differing missions, enlightened agencies base their decision to accredit an institution on the how an institution's practices fit with its mission. For example: the institution (1) has a mission appropriate to higher education, (2) has resources, programs, and services sufficient to accomplish and sustain that mission, and (3) maintains clearly specified educational objectives that are consistent with its mission and appropriate to the degrees it offers, and that indicate whether it is successful in achieving its stated objectives. (SACSCOC, 2017, p. 3).

Many of the problems associated with the so-called predatory/non-predatory distinction might be alleviated if legitimate journals were to specify their mission, using a list of mission categories that they were striving to achieve. I propose the list of categories shown in Table 4 as a starting point.

Table 4: Proposed Categories for Journals

Category	Mission	Criteria for Assessing Success
Competitive	To have high impact on the scientific community.	High rejection rate, high citation rate, scrupulous adherence to accepted principles of peer review, high profile authors and editorial board from research universities, coverage of research topics with expert reviewers, high survival rate.
Developmental	To develop the research, writing and reviewing skills of participants while contributing to knowledge.	High rate of transforming manuscripts into acceptable research papers, supportive and constructive peer review, diverse board and authors that includes both high profile researchers and researchers from underserved communities, support for learning activities such as research and writing workshops, modest citation rate with occasional highly cited outliers.
Exploratory	To develop a new research area and build its visibility.	Nurtures development of a research community, citations or references to the area within mainstream disciplines, awareness of each other's research (e.g., citations to each other's papers; participation in supported activities, such as conferences), early-stage pivots to policies and mission to be expected.
Translational	To foster communication between separate communities, such as distinct disciplines or between the research community and practice	Clarity of articles, balance in membership in editorial boards and authors across the targeted communities, collaboration between authors in the targeted communities, peer review conducted by both expert and non-expert reviewers to ensure clarity, support for alternative paths of communications, such as conferences and books.

Consistency with mission could lead to a dramatic difference in how journals are operated—and what activities are considered "legitimate." For example, a journal that presents itself as competitive would likely:

- 1) Take pride in a high rejection rate.
- 2) Enforce policies to reduce potential favoritism or conflict of interest, such as:
 - a) Ensuring peer review was fully anonymous.
 - b) Avoiding overlapping editorial boards.
 - c) Preventing individuals from reviewing others from the same institution.
 - d) Preventing individuals from reviewing others that they have co-authored with in the past.
- 3) Only assign reviewers to a manuscript with high levels of expertise in the subject area.
- 4) Encourage many rounds of review before a manuscript is accepted.
- 5) Prevent citation counts from being gamed with policies such as:
 - a) Discouraging self-citation.
 - b) Avoid encouraging authors from citing each other, particularly pre-publication in situations such as papers being collected for a special issue (a practice that has been referred to as a "citation cartel"; P. Davis, 2014).
 - c) Refusing to publish research whose results have been published elsewhere in a different form.

Policies like these make sense if you view research as a game and you want to be sure that no one has an unfair advantage in scoring—as measured by citation count. The problem is that (1) is a terrible idea if an important element of a journal's mission is to help authors develop their research and writing skills; (2a) and (2c) just add red tape to the development process—while implying that our re-viewers are not trustworthy—and (4) would discourage authors until most drop out. (3) would be awful for a journal with a translational mission since papers promoting communication between distinct communities need to be readable by non-experts. (5b) would greatly limit authors trying to build a community in a new research area. I am not sure that (5a) makes sense in any context except when citations are solely a means to keep score. (I would rather feel that I am reading the authors' mature thoughts rather than their first stab at the topic.) (5c) ignores that different audiences are likely to attend to different communications channels and respond to different formats.

The ability to target one or more of the missions could also be of great benefit to the journals involved. The practices of the competitive mission can be very limiting. For example, I refer to the Engaged Management Review (EMR), the journal of the Executive DBA Council. Announced in 2014, the open-access journal sought to enter a new space—practitioner-scholarship—and sought to foster communication between business research and practice communities. Natural mission categories would therefore have been exploratory and translational. The journal's policies, however, rigorously adhered to the rules of the competitive category. The founders put together an editorial board of top scholars from the business research community. They scrupulously adhered to the practices of strict peer review. By the standards of competitive journals, they did everything right.

What were the results? Almost all their first 20 submissions were either rejected or the authors dropped out, consistent with a high rejection rate. (I believe two may have eventually been published). The peer review process—in which I participated as a reviewer—seemed like a never-ending series of cycles. More than six years after their announcement, they had 14 articles published, 8 of which had a founding editor, managing editor, or senior member of the editorial board as author or co-author. Of EMR's 61 Google Scholar citations, 44 were for an article that had been widely circulated before the journal's launch. Of the 25 authors that contributed, 23 were either alumni or affiliated with one of two institutions: Georgia State University and Case Western Reserve University. We cannot know how EMR would have evolved had they adopted practices better fitted to exploratory and translational missions at the outset. However, given its limited reach, it seems that the journal is far from reaching its full potential.

The proposal that journals be allowed to specify their own mission and then tailor their processes to that mission would likely be controversial. Many researchers, particularly at more elite institutions, are likely to subscribe to a philosophy like "Researchers hold an ethical obligation to (1) publish their findings and (2) to publish their findings in high-quality scholarly journals." (Strong, 2019, p. 664). I doubt that many developmental journals would pass that test. But it would be a huge mistake to equate the journal's prestige with the potential value of the underlying research. Researchers in the developing world may lack the funding, access to top-tier conferences, and extensive training to ease their way into highly competitive journals. They may also have access to some of the most interesting and societally meaningful research contexts. With the proper mentoring and encouragement, such research may provide a valuable contribution to the literature, just as exploratory journals may one day disrupt the status quo and translational journals may provide a means through which our research informs other disciplines and even practice.

Unfortunately, there are still plenty of bad actors in the world of open-access journals. A mission-focused system will not make them go away—although forcing them to state their mission (most likely "competitive", to attract unwary authors) should make it easier to debunk their claims. It should also make it easier to avoid Type 1 errors for journals that truly are developmental, exploratory, and/or translational in their goals.

#4 – Institutional portfolio of journal missions

Over my thirty years as an academic, I have seen universities increasingly rely on lists directing their faculty where to publish. As an institution grows in research stature, those lists tend to get shorter. At my institution, for example, a journal must be included in Financial Times list of 50 journals (FT50) or the University of Texas Dallas list of 24 journals (UTD24) if it is to count favorably towards promotion, tenure, and significant course release. Since the two lists overlap considerably, that is a very small number of journals out of the many thousands of business journals. And, of course, they are all highly competitive.

The use of lists like these could be interpreted as a commitment to rigor. That is, of course, how we would prefer to interpret it. There is another interpretation, however. Since our focus is strictly on competitive journals, we must not care about:

- Helping authors from underserved communities with few resources develop their research skills. In this context, it is worth noting that one of the complaints raised against labeling journals predatory is that it disregards the needs of, and prejudices us against, researchers from developing countries (Eriksson & Helgesson, 2018). Shouldn't our senior faculty provide service by helping mentor these researchers instead of being penalized if they participate in a journal with a non-competitive mission?
- Exploring new research areas. It has been argued that major departures from prevailing paradigms can lead to the label of crackpot (M. Davis, 1971) and that reviewers from top-tier journals are inclined to be overly conservative (Pfeffer, 2007). Are we discouraging academic entrepreneurs by discounting startup journals in new areas?
- Communicating our research to practice. Since there is scant evidence that our current academic research publications are ever reaching practice, at least in business and information systems, should we not be publishing in outlets specifically intended for such purposes, whatever their academic rank?

Framed in this way, a case can be made that each institution or department would do well to establish a portfolio target for its publications. For example, a 60-20-10-10 target might mean that it would like to see 60% of its research activities directed towards competitive journals, 20% towards developmental journals (e.g., editing, reviewing, and co-authoring with local researchers), 10% towards exploratory research, and 10% towards research intended to inform practice.

Under such a portfolio system—whose specific goal percentages would vary dramatically depending upon the nature and mission of the institution—individuals would be free to choose where they wanted to expend their efforts. For example, those researchers who were most concerned with increasing their value on the academic job market and reducing the time they spend teaching would, quite naturally, focus on competitive publications. However, that would be fine since it would make more room for other researchers who wished to pursue alternative objectives. Over the long run, institutions could also move towards their targets through their hiring decisions.

Unfortunately, there is no obvious way to require institutions to adopt such a system. For faculty, particularly a school's most prolific researchers, the current system works just fine. The most likely path through which such a system could be instituted is at the behest of the accrediting agencies. Such a path is not out of the question since these agencies are currently emphasizing the consistency of a college's policies and practices with its stated mission.

#5 – Crowd-sourcing journal ratings

At the beginning of this section, I suggested that the best way to minimize the threat posed by illegitimate journals would be to have each journal periodically evaluated by an independent agency. Effectively, this process would mirror the process used in institutional accreditation.

Realistically, I believe such a plan is impractical. The number of journals likely outnumbers institutions by an order of magnitude. Unlike universities, journals frequently come and go. Institutions seeking accreditation pay for the process. Few open access journals have the resources necessary to pay for the in-depth inspection needed if Type 1 and Type 2 errors are to be minimized. Assuming 50,000 journals and a bare minimum of 20 hours to do a careful evaluation—as suggested by the cases I have presented, such an evaluation would need to go well below each journal's surface features—across the entirety of academia we could be talking about a hundred million person-hours at a likely cost in the hundreds of millions USD.

A less objective but more plausible approach would be to crowd-source journal evaluations, analogous to what was proposed by Cobey et al. (2018). Regrettably, such a process would be rife with opportunities for manipulation and fraud. Nevertheless, similar challenges with rating systems face sites such as those used for restaurants (e.g., Yelp), products (e.g., Amazon), and sellers (e.g., Amazon, eBay).

Some degree of control could be achieved by practices such as:

- Including some journal-supplied statistics as well as reviews.
- Requiring raters to register with the crowd-sourced site.
- Verifying status for certain types of ratings (e.g., author ratings, reviewer ratings, editor ratings). For example, only someone who had an article published in the journal would be able to provide a rating, and written response to a question like "How helpful was the review process?"
- Requiring a username on all reviews.
- Allowing users to rate other reviews as helpful or not helpful.
- Allowing journal officers to reply to reviews.
- Moderating review content before public posting.
- Providing a mechanism for banning individuals found to deceive or abuse the review system knowingly.

To keep the site from turning into little more than a beauty pageant, rating criteria would vary by each journal's self-classified mission category or categories. That way, a criterion such as "percent of initial submissions ultimately achieving publication" might have a slightly negative weight in an overall rating for a competitive journal while having a slightly positive weight for a developmental journal.

I suspect that the initiation of such a system would be opposed by organizations that already provide indexing and rating services, such as the Journal Citation Report (JCR) published by Clarivate Analyt

ics. However, part of what these services do is substantially limit the number of journals that are indexed. In doing so, they avoid many illegitimate journals. They also eliminate many legitimate journals that simply have an alternative mission.

In the long run, I believe that indexing services that capture nearly all articles, such as Google Scholar and Microsoft Academic, can achieve a competitive advantage through the network effect. Thus, if a crowd-sourcing system for rating journals were to be developed, Google or Microsoft could benefit by developing or underwriting its development. Other plausible developers might include research portal sites, such as Researchgate.net. These sites already collect information on papers and researchers.

CONCLUSIONS

Nobody wants shoddy or falsified research to compromise the science of their discipline. It, therefore, seems almost scandalous to suggest that the individuals volunteering their time to identify so-called predatory journals may be doing more harm than good. The question revolves around the relative costs of making Type 1 errors (classifying a legitimate journal as predatory) versus Type 2 errors (failing to identify a predatory journal). These costs are likely to vary considerably according to discipline. I, therefore, confine my arguments to my own research areas—the business and information systems literatures—where the impact of academic research on practice is arguably minimal. For these:

- The cost of Type 2 errors is low. There is virtually no hard evidence that existing so-called predatory journals damage the overall body of disciplinary research—mainly because they are largely ignored. Where damage may be occurring is to institutions that do not recognize journals as illegitimate and weigh them heavily in their recruiting and promotion, and tenure decisions. It may sound harsh, but if a university places such a heavyweight on research in its hiring and P&T decisions, then they should—at least—read the research that is the basis of their decision.
- The cost of Type 1 errors is high. There is strong evidence that a misapplied predatory label can be devastating to a journal or publisher, as illustrated by a couple of cases. The same applies to authors that have published in the journal, even if they did so before the label was applied.
- Current approaches to identifying predatory journals are superficial at best. They are also not transparent and provide little or no means of appeal. Because journals can exist for many purposes, a proper determination that a journal is illegitimate should be done carefully.

Despite these concerns, the fact remains that a great many illegitimate journals exist, engaging in many deceptive practices to acquire revenue or prestige. While their existence may not jeopardize the world of science, they can and do exploit those researchers who can probably least afford it. Just ignoring these journals is therefore not a very satisfactory solution.

I offer five recommendations that could help minimize the problem caused by illegitimate journals:

1. Stop referring to journals as predatory and focus on identifying only those journals that are indisputably illegitimate. Illegitimacy can be determined by intentional acts such as lying on their website, knowingly failing to live up to standards they have promised to uphold, violating intellectual property rights, engaging in what amounts to identity theft by listing editors that have not agreed to serve, hiding their fees, and so on.

2. Have authors include copies of all the peer reviews that their published articles have received whenever a significant career decision is being made. Because the common thread spanning nearly all illegitimate journals is their weakness in providing constructive peer reviews, the quality of reviews is a far better indicator of a journal's legitimacy than whether or not it appears on a list.
3. Require journals to specify what specific mission(s) they intend to fulfill and how their editorial policies are consistent with their stated mission(s). I proposed an initial set of mission categories: competitive, developmental, exploratory, and translational. I argue that a journal's policies need to vary substantially according to a mission, and that some policies that might suggest illegitimacy in a competitive journal may be viewed as best practices in a category such as developmental or translational.
4. Have institutions or departments specify portfolio targets for different categories of journals. A university would be well within its rights to indicate that it only wanted its faculty to publish in competitive journals. But that would only be consistent with an overall mission that ignores helping less fortunate colleagues in developing countries improve their research, exploring ideas that fall outside prevailing paradigms and seeking to impact practice with their research.
5. Crowdsourcing journal ratings. Because creating a set of objective agencies to rate journals and identify illegitimate ones would likely be unacceptably expensive, using crowdsourcing with a variety of built-in safeguards might provide a reasonable approximation at a cost several orders of magnitude less. Consistent with recommendations (3) and (4), the items on which each journal was rated would depend on its mission.

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