ETHICAL BASES IN SCIENTIFIC RESEARCH AND ITS DISCLOSURE

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PRESENTATION

Scientific work, technology and innovation and their dissemination constitute an inevitable part throughout human history, but at present, it has particular characteristics, due to the boom in our communication media of our time. Daily we use products derived from scientific praxis and its technological manufacture, as well as we consume the information related to it in books, scientific articles, papers, documentaries, radio programs, multimedia, etc., enormous information that requires reflective discernment on the part of the receiver, but mainly from the person who prepares the communication and disseminates it, from the scientific disseminator.

Both the producer of science, technology and innovation and their communications, as well as the disseminator and the consumer of the same, converge in the personal reality and the shared social context, hence it is necessary to reflect it as human activities where rationality is inevitably present , volition, the exercise of freedom, intentionality, among other realities, all of them subject to ethical understanding and experience.

The present text entitled has been prepared thought to be a writing with clarifying content of the philosophical notions involved in ethics aimed at people interested in scientific research and its dissemination, who come formatively from various areas and disciplines of human knowledge: professionals of the health, professionals of the experimental sciences, experts in technology and social communications, as well as educators of various levels and modalities, all interested in scientific work and its dissemination, in such a

way that the text presented, in its preparation, has followed the recommendation of Ortega y Gasset: "clarity is the courtesy of the philosopher", and of course it is also the courtesy of any researcher of the different sciences and disciplines of knowledge.

The book is the product of an applied conceptual analysis investigation that seeks to fill a void regarding the ethics of research, particularly its disclosure, in which information is often biased and ideologized, and even invented with no other intention than to capture advertising with exclusive economic interests that depersonalize the scientist and the disseminator, turning science into a manipulable object of the market, so it is projected to motivate reflection and comprehensive training in humanistic competencies of those interested in these issues.

The methodological dynamics of the team that authored this work, led by Francisco Reluz, occurred in the first place by the design of a proposal for the dissemination of ethical reflections in research that seeks to be more reflective than informative, based on the expertise of each of the summoned authors, so that after a careful study, socialize the whole team in order to jointly analyze what was expressed and, in a second phase, collect the contributions made in the analysis and comments of the team, so that the final text , which you now have in your hands, dear reader, meet the requirements for clarifying information and reflective motivation on the need for ethics in research and its dissemination, hence the presentation of a casuistry that complements the text.

Based on what has been said, in the first part Wilder Chanduví reflects on the ethical bases of science and its dissemination, while Francisco Reluz addresses the issue of the person and their action in scientific dissemination in addition to reflecting on the principles, values and normative establishing their relationship with science and its dissemination, while Mirtha Cervera, Abel Ballena and Juan Moyano carry out a careful selection of cases for analysis and pose crucial questions that guide reflection, in such a way that readers can investigate and resolve by consolidating critical thinking.

The authors

CHAPTER 1

ETHICAL NOTIONS IN SCIENCE AND THEIR DISSEMINATION

This section seeks for the researcher and the scientific disseminator to understand the ethical bases of science, valuing the presence of will, freedom and reason being taken into account for the proper act in the exercise of their work.

1.1. Notion of ethics

Let's look at the different perspectives from which ethics can be defined or understood.

1.1.1. Etymological notion of ethics

The word ethics comes from the Latin ethĭcus, which in turn comes from the ancient Greek ἠθικός (êthicos), derived from êthos, which means character, way of doing or acquiring things, custom, habit.

On the other hand, we also speak of scientific ethics as a system of principles and values that guide scientific practice in all its stages (research and application), appealing especially to the principles of honesty, integrity, and social and environmental responsibility.

1.1.2. Semantic notion of ethics

Ethics, is the philosophical and practical investigation of moral conduct, that is, of human acts that come from deliberate will since man exercises control over his actions, through practical reason and will, from the faculties that act in close union.

On the other hand, it can be affirmed that ethics is also the philosophical and normative science that studies the ultimate causes or first principles of reality: moral conduct, through the light of reason.

The best way for man to lead himself towards the objectives he wishes to achieve is through freedom and reason, the freedom that will determine him towards the good, and reason towards the truth (Bernal *et al.,* 2017). This will give him the ability to govern his own conduct that is linked to moral responsibility: man can respond (give reason) for those actions and only for those that he has chosen, planned and organized himself, that is, he can only respond in the actions of which he is truly the author, cause and principle. Since for Aristotle action and good are correlative terms, all art and all research, all action and all choice, tend towards ben (Martínez, 2016). For this reason, it has been rightly said that good is that towards which all things tend. (Tozzi, 2008).

Ethics is concerned with distinguishing good and evil that we can also call virtue and vice, in such a way that the mission of ethics is to help us distinguish the true good from the apparent good, so that the will can address the former and avoid the second, that it is actually an evil.

1.2. Notion of science

The concept of science is presented to us with different meanings depending on philosophical currents, scientific interests, personal interests or small groups (Gadea *et al.*, 2019), but the most appropriate notions are the following, contributed from classical philosophers, since, we can present it from two senses: the etymological and semantic perspectives.

1.2.1. Etymological notion of science

The word science has its roots in the Greek episteme which means knowledge very different from the Greek term doxa which means opinion; episteme is a sought-after knowledge, that is, scientific knowledge. It also derives from the Latin word *Scientia* what does it mean to know, scientific knowledge.

1.2.2. Semantic notion of science

Science, in the current sense, is a set of knowledge (Vargas, 2006). Treaty that meets the following essential characteristics such as: Possess ordered knowledge, their knowledge is systematized, the knowledge has an object of study, the knowledge is obtained thanks to the use of the scientific method.

1.3. Notion of reality

Reality is everything real, it is everything that has existence, it is identified with being. Reality is also called the totality of things. To get closer to it, to be able to know it and to be able to understand it, that is, only for didactic reasons we present and divide it as follows: physical-material reality, metaphysical-immaterial reality and spiritual-immaterial reality, whose nature is unity, complexity and complementarity.

Figure 1

The reality and its implications.

Unique complex reality	TYPES OF REALITY	POWERS COGNITIVE	SCIENCES	Inter, multi and transdisciplinarity
	Physics, material	Senses.	Experimental	
	Metaphysical, Immaterial	Reason	Philosophical	
	Spiritual, Immaterial	Faith	Theological	
	Complementary			

Due to this nature represented in the previous table, the question that is presented to the intellect is: Will we be able to reach those last causes or first principles? The initial answer would be Yes. Many men have already experienced, they have lived this experience, and they have been called philosophers, the same

ones who have, with much reflection, critical judgment and creativity, have come closer to reality and have given the same answer.

1.3.1. Types of reality

Man has three faculties that allow him to gradually know reality (broad, unique and complex), even difficult to access and understand. Reality is presented to consciousness through different types of beings, which are perceived (specifically) by one of our cognitive faculties in a primordial way, and these are grouped as follows:

Physical realities. Constituted by the beings called also materials those that are perceived by our senses, such as: the table, a house, the forests, the air, the body of the man, the sea, etc. They are materials because they are made up of matter, the same ones that can be touched, heard, smelled, sniffed and liked; That is why man can have a sensible experience of these material realities.

Metaphysical realities. Constituted by the so-called immaterial beings, those that are perceived primarily by the cognitive faculty: reason; such realities as: the ultimate causes or first principles of reality, freedom, love, numbers, natural faith, etc. They are immaterial, metaphysical because they are not constituted by matter, the same ones that can be understood, understood, understood; That is why man can have rational experiences of these immaterial, metaphysical realities. Realities that are beyond, within the physical and material realities.

Spiritual realities. Constituted by beings called spiritually pure, those who are perceived primarily by faith, such as: prayer, the Church, the Sacraments, God, the angels, Christ, the spiritual soul of man, supernatural faith, etc. They are spiritual, immaterial, because they are made up of the spiritual soul, the same ones that can be believed; That is why man can have fiducial experiences, experiences of faith regarding those realities. Realities that are beyond metaphysical realities, realities that are not created by man but by a Higher Being who is in pure act and is a perfect creator and of which other beings participate in Him.

The different existing ones constitute different fields of a single broad and complex reality, but they are presented in a didactic way in order to better understand it (Morin, 2006; Luengo, 2018). Likewise, human cognitive faculties are closely linked and are complementary in order to achieve the only truth, for this nature they are not opposed, but rather form a cognitive unit in man, knowledge that is acquired through the exercise of the reason and the philosophical task.

Regarding the exercise of reason, this faculty allows man to cognitively penetrate material and physical reality to transcend this field and enter the metaphysical field, go from the sensitive field to the intelligible field through certain procedures or methods required by reality itself to If this is understood, only in this way will it be possible to achieve what is most typical of reality, the ultimate causes. And it is, from the philosophical sciences, due to its special character, that it demands not only reflective exercise, but also a special conduct in those who practice it and in those who dare to practice it, that is, a full way of life with a series of attitudes that all of us by nature are able to update them throughout our lives, in the personal and professional sphere.

1.4. Notion of knowledge

The question what is knowledge? It refers us to investigate its own characteristics, that object called knowledge presents itself to our understanding of two kinds, such are the following:

1.4.1. Common knowledge

This kind of knowledge is also called immediate knowledge, ordinary knowledge, vulgar knowledge. It is also called, in Greek, doxa; It is the knowledge that is obtained in an ordinary way, immediately with contact with reality, it is the direct relationship of the subject with the object.

1.4.2. Scientific knowledge

This kind of knowledge consists of the relation of the knowing subject with the known object. It is the knowledge obtained in a mediate way, because different means are used to achieve it, such as:

methodological strategies, cognitive processes, procedures, techniques, instruments, etc. This class of knowledge has three types:

Scientific-experimental knowledge. It is the one that is obtained by making prevail the cognitive faculty called: the senses; The external senses: sight, smell, touch, taste and hearing, constitute the sensitive cognitive faculty that are predominantly used by physicists, chemists, biologists, scientists who cultivate the natural sciences, science health, etc.

The senses are prepared to perceive sensibly and to know the surface characteristics that physical, material, tangible realities present and at the same time to demonstrate the truth or falsity of their statements, of course it is aided by technological instruments such as the microscope, the telescope, etc. and by methods and procedures such as the experimental method that begins with observation, formulation of the problem, formulation of objectives, formulation of hypotheses, experimentation itself, verification and generalization or formulation of the law.

Scientific-philosophical knowledge. Also called rational, it is one that is obtained by making prevail the cognitive faculty called: reason; Reason is another cognitive faculty that is present in all men in general and is particularly prevalent in philosophers, metaphysicians, ontologists, axiologists, gnoseologists, epistemologists, etc. All the sciences that address the study of immaterial, metaphysical and intangible reality.

Reason is prepared to perceive and know the essential characteristics of that reality and at the same time to demonstrate the truth or falsity of its statements, of course it is aided by the internal laboratory of man, such as reason, which is capable of going beyond of the physical until reaching the last causes or called first principles. Well, aided by rational methods, procedures and techniques, such as, for example, Socrates' mayeutics, Plato's Dialectics, Aristotle's Logic, Kant's Critical Phenomenology, Edmund Husserl's Transcendental Phenomenology, Martin Heidegger's existential phenomenology, Gadamer's hermeneutics etc.

Scientific-theological knowledge. Also called fiducial, it is one that is obtained by making faith prevail. Faith is the third cognitive faculty that prevails in theologians in general, in scientists who cultivate Christology, Mariology, Ecclesiology, Sacramentology, Eschatology, etc. That is, in all sciences where the study of immaterial, spiritual reality is addressed. Faith is prepared to perceive

and know the essential characteristics of that reality and at the same time to demonstrate the truth or falsity of its statements, of course it is helped by the internal laboratory of man such as faith, which is capable of going beyond of the metaphysical until reaching the origins and the first principles of that type of reality. Well, aided by fiducial methods, procedures and techniques, such as heuristics, etc.

1.5. Notion of truth

Truth is another very important concept to understand the philosophical science called Epistemology. It happens that there are many epistemology studies that emerge from philosophical-epistemological currents properly removed from reality and therefore from the truth that do a lot of damage to science and technology, rendering them meaningless, destroying the lives of people and society. Agnosticism, empiricism, rationalism, fideism, relativism, positivism, radical skepticism, etc. they constitute great errors for the sciences and for humanity. For this reason, it is that we will approach the truth from three perspectives that are of our complete interest: logical truth, ontological truth and moral truth.

1.5.1. Logical Truth

The truth, from this point of view, is the adequacy of the understanding to reality, adaequatio intellectus et rei. Reality is one thing and ideas, such as the judgments with which we think about reality, is another; reality is objective, ideas and judgments are subjective, made by the knowing subject with respect to reality. As we appreciate, they are of diverse nature, but reality is present in some mode in concepts and judgments, somehow the nature of reality is revealed in thoughts. Hence, we can discover the relationship that exists between thought and reality, when our judgments are true judgments, it is that there is conformity or correspondence.

It is understood then that the truth is predicable through a judgment, that judgment has correspondence, because the nature or attributive qualities of reality are revealed or made known through the judgments. Every judgment is made up of ideas, every judgment has a subject and a predicate, united by the copula it is, or separated by the expression it is not. If the judgment is true, the ideas will also be true, therefore, they must correspond to the realities that they signify. That is, only the formally true judgment, only the judgment is a formal correspondence to reality, and to the truth recognized and affirmed.

1.5.2. Ontological Truth

Everything that exists is true. The truth from this point of view is the identification with the being, therefore, the truth is the reality itself, the being itself. Hence, it can also be said that things are ontologically true insofar as they are, insofar as they are both the object and the cause of human knowledge. Ontological truth is the foundation of logical truth and moral truth.

1.5.3. Moral Truth or Veracity

Moral truth implies the correct use of words and signs, since moral truth is the correspondence of the external expression given to thought with thought itself. The correspondence of the external expression of thought with the thing as it is conceived by the speaker. Thus, a lie is an intentional deviation from moral truth, it is the external expression of a thought that is intentionally different from the thing as it is conceived by the speaker.

The habit of telling the truth (truthfulness or moral truth) is a virtue. Man is obliged to practice it for the following reasons:

Because man is a social being, therefore he naturally owes to others what a society does not endure without: telling the truth. Only in this way can men live together, can we live in community; otherwise chaos, crisis, disorder and self-destruction will be the consequence of the absence of the truth in our expressions, in our conversations.

Because speech has the purpose of communicating knowledge from one to another. Speech must be used to communicate the truth, that is its natural purpose, therefore, lies must be avoided since they are a misuse and abuse, of the gift of the word, because they destroy the trust in the veracity of their neighbor They tend to destroy the effectiveness of speech, communication, dialogue.

1.6. Cognitive faculties

The cognitive faculties are those potentialities that man possesses to know reality, they are also called ad intra natural resources belonging to the cognitive nature of man to get closer and closer to reality, his object of study. They are the following:

The senses. It is a cognitive faculty, a potentiality that allows us to know the physical, bodily, tangible reality. They are the senses that perceive, capture, apprehend, abstract the physical characteristics of material entities. They are the senses that animals also have: sight, taste, smell, touch and hearing with which we resemble them. Hence, animals also have sensitive intelligence.

The reason. It is a man's own cognitive faculty, it allows him to go to the knowledge of the noumenon, the essences, the ultimate causes of the immaterial, metaphysical reality, called thus by Aristotle, also intangible. With the use of reason, the thing itself is perceived, captured, and abstracted. This means that, thanks to reason, it goes beyond the physical, beyond the bodily reality.

Faith. It is another cognitive faculty of man, it allows him to go to the knowledge of the immaterial, spiritual reality: spiritual soul, the church, the Sacraments, God, Angels, the Commandments, the final judgment, the kingdom of God, among others. What is known as an act of faith is to believe, it is an act of the understanding, which agrees to a divine truth, by the rule of the will, which is moved by God through grace. Believe God, believe for God and believe in God, Believe God because the act of faith is about divine truth, that is, about God and everything related to Him. Believing in God because the reason for faith, that for which faith asserts to that divine truth, which escapes our understanding, it is the authority of God that reveals it. And to believe in God because that assent would not be possible without the intervention of the will moved by God through thanks, that is, because we want God and we entrust ourselves to him.

1.7. Notion of scientific dissemination

The word disclose, is a verb in action that designates to extend, to make available, to propagate. Scientific dissemination is the last stage of scientific research, it is the culmination of the aforementioned investigative activity. It is the stage that also requires verification, verification, that is, scientific investigation. Scientific popularization is the process of socialization, democratization and popularization of science and, therefore, of technology and entrepreneurship.

At this stage, it is possible to engage in inappropriate behavior, through mass media, such as: radio, television, social networks or specialized bodies. For this reason, it is necessary to make an analysis of the inappropriate behavior patterns that occur in the disclosure, in order to avoid their omission at the time of disclosing the results of scientific work.

It is possible that necessary measures are taken to generate, exchange, share and communicate science, scientific knowledge to together build a new knowledge society based on ethical values, such as: truth, solidarity and integral honesty. The sustainable development of society, people and science, as well as that of its products, such as technology and entrepreneurship is due to the use of science, from the entire scientific process to the results as well as its application, based in ethical values.

Society has hope in its scientists, in its disseminators of science who will socialize, democratize and popularize it so that citizens welcome and apply it in their reality, as an aid to their well-being and the solution of their social and personal problems.

The great educational task is expressed, training our science popularizers, who bring together conceptual, attitudinal and procedural knowledge; the competencies necessary for science and technology to truly fulfill its purpose: means for sustainable development.

CHAPTER 2

THE PERSON AND HIS ACTION IN SCIENTIFIC DISSEMINATION

In this section it is intended that the scientific disseminator understands the reality of the person and his actions in its multiple dimensions in order to revalue human dignity in scientific work and in its dissemination.

2.1. Notion of person

It is very common to understand the person also with the names of man, individual and subject. In the field of daily living, the denominations can pass as equals in their meaning, but the conceptual clarifications should not go unnoticed in the academic, legal and the same should happen in scientific communication, in the dissemination of research.

In short, it is specified that the name of man that in a restricted sense refers to the male and that in its extended sense also includes the woman, refers to the species name (Marcos, 2010; Jaramillo, 2020), that is, it refers to the biophysiological aspects of the human being.

Whereas, when referring to the individual, the aspect of "the unique thing" that each human being is is emphasized. Indeed, although common specific characteristics are shared (all human beings have the same organs and tissues, for example), each human being is unique and unrepeatable, even physiologically, as shown by studies on brain neuroplasticity, or more commonly the fingerprint digital, or the color of the iris

of human eyes ... not to mention the "unique" of psychological, affective and, of course, contextual traits. That is, each human being is individual, because he has his own characteristics that make him unique.

Depending on the term subject, this refers to the human being as a performer of activities, some inherent to their actions as a species (heartbeat, digestion, human neuronal activity, etc., do not occur in the same way as in the other species) and others that they carry out in their individual actions such as their decisions and behaviors, in which reason and will intervene, in the full exercise of their freedoms that are completed within the framework of the law.

Each of these terms are complemented and fulfilled in the concept of person, in terms of the relational character it contains. Etymologically, the term person comes from the Latin per-sonare, which means to resound, rumble, and this in turn from the Greek prósôpon (πρόσωπον), theatrical mask (Mattéi, 2009). The link between the meanings of resounding and of mask is found in the contextual and relational situation proper to human beings.

Due to our character as a person, it is that, at the same time, by preserving our individual identity, our particular contextual characteristics, we are unfailingly coherent with ourselves, linked to other people and even with other existing ones, with whom we are called to be and be responsible, living together harmoniously (Reluz *et al.,* 2020). In other words, the notion of person has a more integrating and integral character of the characteristics, dimensions and activities that include the notions of man, individual and subject. All these aspects allow us to understand the personal being in its systemic complexity, at the same time that it is situated both immediately and transcendentally.

2.2. Characteristics of being a person

Both thinkers and popular philosophical texts, particularly those that address issues of philosophical anthropology, release different inventories of what they consider the main characteristics of the person as an existing being. It must be understood that characteristics are called inherent essential qualities, which make a being exist specifically. Making a synthesis of them, the following are considered:

Conscious corporeity. This characteristic refers to the biophysiological materiality of the human person, being the aspect by which it is situated in the world in a singular way, giving it its own specific

nature, although some tendentiously ideologized understandings do not recognize it, and even try to deny it.

Self-conscious intelligibility. The person has an intellect capable of not only being aware of the outside world but also of himself, although he does not express it rationally, or many times more for convenience than for disorder, he denies this capacity, which requires him to be responsible for himself and his actions. in accordance with their stages of development.

Existence of functional relationship. The person is not a self-existent or self-referential being, but needs others from the beginning of their own life to the end of it, without this character they would not be fully realized, moreover, they would not survive or develop their properly human qualities. This characteristic allows the relationship with oneself, with the rest of the world, with other people in openness to transcendence, not only in terms of the 'natural' existential bond (relationship) but also in the 'decisive' existential bond (function). This characteristic also includes human language and the exercise of freedom.

Continual perfection. The person is a 'perfect' being in the original sense of the term, that is, he has in his being the ability to 'go on doing' 'to improve himself', inherently and latently possessing all the potentialities for self-realization. itself together with the heterorealization of its nature and condition. This characteristic allows and even requires the exercise of responsibility, since it puts in their hands the ability to be better or worse as people.

Seeker of knowledge and giver of meaning. This characteristic of the person refers to the capacity for wonder and inquiry that he has, and that has allowed him to achieve cognitive achievements both as an individual and as a species, both in his achievements and in his failures. In both situations, even where adversity rages, the quality of the person is the ability to make sense, that is, to orient themselves in their situation and existence, allowing cognitive and comprehensive improvement.

To conclude this section, it is pertinent to state, although it may seem unnecessary, that the expression of these characteristics refers to the human person, since also, from the perspective of faith, there is comprehensively the divine person, which is not the objective of this writing to address.

2.3. Person dimensions

Dimensions, from a philosophical perspective, refer to the aspects through which something manifests itself and makes itself known, that is why, from physics, it is understood as a measure or magnitude that allows defining a reality or a phenomenon. Dimensions should not be confused with features, because while these are qualities, those would be the environments where features are displayed.

The dimensions of the person, following Elgegren (2010), are:

Biophysiological dimension. It involves the aspects of human corporality, an essential aspect of being a person that allows its physical existence and its presence in the world. From this perspective, it includes genotypes (which are hereditary, genetic dispositions) and phenotypes (bodily traits resulting from genetic interaction with the environment). Due to the biophysiological dimension, traits are shared essential functionalities with other living animals (Food, respiration, circulation, excretion, response, self-movement, among others) but at the same time specifically and individually different.

Communicative-relational dimension. This dimension implies the aspect of human interaction, with its capacity for language that contributes to encounter, openness and dialogue through social bond. By this dimension the person is shown as vitally in need of the significant presence of others, without whom the emergence or maintenance of their existence would not be possible, both as a species and as an individual.

Psychospiritual dimension. It involves aspects of the mind such as knowledge, conscience, appetite and affectivity, complementing the spiritual as a comprehensive openness in the search for meaning, happiness and transcendence as ultimate self-conscious ends, also related to the experience of faith that women have. persons.

Historical-contextual dimension. It implies the spatio-temporal situation of the person, referred to the surrounding environment from where it receives and provides influence. The person, insofar as they are aware of their environment and self-awareness of their actions, is a creator of culture and history as a significant trajectory of their experiences.

2.4. The actions of the person: Acts of man and human acts

From an observation of the experience of each one of us, we simply infer that we carry out a series of activities, some shared with other living beings, breathing, feeding, reproducing, etc. However, even at that level, the actions of these activities are different from one living being to another, from one species to another, the person performing those same activities with their human uniqueness, in addition, they will carry out specifically human activities such as thinking, self-conscious reflection, the exercise of freedom, among others.

From what has been said above, the classification of the actions of the person into acts of man and human acts becomes. The former refers to those biophysiological human activities in which the rational and volitional human faculties do not directly intervene, while, in human acts, the aforementioned faculties are present. It is worth mentioning that both the acts of man and human acts are constantly interacting, constituting the multidimensional integrality of the person.

2.5. Action of the person in scientific dissemination

The characteristics of science can be classified as intrinsic and extrinsic. The first of them linked to his own work, while the second refer to the demands that society demands of him. Among the intrinsic characteristics are systematicity, logical coherence, objectivity, with a demonstrable empirical foundation, and of course, also fallible; While in the extrinsic characteristics it is found that every scientific fact or effect transcends itself, its knowledge is debatable, having the possibility of refuting itself, regarding its practice it must be legal and ethical (Alonso & Cortiñas, 2015); and finally, from the social factor, the information disclosed must be clear, precise and communicable.

On the other hand, scientific dissemination can be understood as a series of activities that, by investigating, analyzing and interpreting scientific and technological events, in dialogue with the scientific community, make such information accessible to society, particularly to those interested in understanding or learn about this type of knowledge (Zúñiga, 2020). By doing so, without losing objectivity and without degrading information and data, they make it possible for scientific knowledge to be disseminated and understood by a wide sector of society.

As can be inferred from the above, both scientific work and its dissemination refer to a series of activities located in the context of properly human characteristics, linked to the plane of rationality, volition, the exercise of freedom and ultimately with the field of consciousness, self-awareness and intentionality, aimed at the objective discovery of phenomena and their truthful communication, so that both the scientist and the disseminator have to be aware of these experiential aspects of reality, even more, they have to do feasible in their being and doing ethics so that their activities contribute to the common good and the integral development of people and society.

CHAPTER 3

PRINCIPLES, VALUES AND REGULATIONS IN SCIENCE AND THEIR DISSEMINATION

It should be sought that the scientific disseminator applies with criteria and discretion the principles, values and regulations in the search for scientific information and in the exercise of their communicative functions.

3.1. Notion of principle

This notion has several perspectives of understanding that can be differentiated in a metaphysical, a cognitive and a practical sense. Metaphysically, principle is understood as the beginning or beginning, that is, as what gives rise or causes something, while from a cognitive approach it is understood as a criterion of reason and evidence that bases and sustains a certain knowledge, having an axiomatic character. From a practical perspective, the principle or principles refer to a criterion of action (Jonas, 1995), which constitutes a guiding idea or fundamental rule of good behavior as deliberation of the person, so in this sense it is linked to ethics because it also characterizes interpersonal relationships in society (Reluz *et al.*, 2020). The three meanings are involved both in the process of inquiry as well as the elaboration and communicative dissemination of the scientific communicator.

There are diverse theories and perspectives that propose and support ethical principles both in scientific research and in its dissemination, but all of them coincide in one way or another in the ethical triad for scientific endeavor:

- Respect for the persons
- Charity
- Justice.

Based on the principle Respect for people, it implies that all scientific research must take into account human dignity, that is, take care not to manipulate them according to the objectives of the research, inform them of what the study will consist of, giving rise to their own decision-making to participate in it, additional and unique protection must also be provided to those who require it, taking care to inform in detail their tutor or direct person in charge of the implications of the investigation, such is the case of minors , older adults or people whose capacities for discernment and decision-making are not present or are diminished. For any case,

Based on the principle of beneficence, one starts from the understanding, perhaps for some idyllic, that all scientific research must seek not only not to do or cause harm (principle of non-maleficence), the reduction of risks or maximization of benefits, outlined in not a few ethics manuals in research, but, even more demanding, scientific research should be oriented to the realization of the integral well-being of people and society, to do good, without distinction of race, type of society, class , sex, gender, creed or age group, understanding humanity and life in its systemic complexity as a common good.

Regarding the principle of justice, although basically comprised of the equitable distribution of responsibilities in investigative work and the economic benefits that they may generate, the principle of justice is subrogated to that of beneficence and the principle of respect, that is, not only involve or involve researchers, but humanity as a whole, including, of course, the new generations. For justice, all people must be treated in equity to access the opportunities and benefits that the research develops, also with respect to the distribution of resources that are often scarce.

These three principles are oriented to the realization of an investigative praxis that guarantees good practices with quality of all the processes involved in it with honesty and integrity.

3.2. Values and virtues

Although the values and virtues are linked to the principles, it is important to know that they are not synonymous, much less refer to the same thing as they are usually understood on a daily basis. We already know that in a practical perspective, the principle (s) are criteria of correct action based on the good due, while the values are structural qualities (Frondizi, 2016). that give meaning to the executive action of the principle, and as such qualify or catalog it, sometimes in a circumstantial or contextual way; Consequently, it is more linked to the cognitive aspect, which precisely differs from virtue, since this comes to be the putting into practice, to put it in some way, the “taking of body” or realization of the principles and values, making them experience.

For example, a scientific disseminator, on principle takes into account that the data that he reports and communicates must be objective and truthful; However, in his professional practice he may feel attracted by the leading role winning sensationalism, misrepresenting the content of his information, generating distorting biases (Ratzinger, 2003). The question then arises from the scientific popularizer himself, why should I be objective and truthful with what I report? The answer is given by the assessment you have on the objective and on the truth, and with the values linked to them such as knowledge and honesty, for example. But, as you may have realized, both principles and values can be understood and even held, but that they would not be effective if they are not executed,

Another clarifying case can be exemplified with a corrupt judge who is an expert in the principles of law and the values that sustain it, but that the practice, with his action, denies what he knows, originating by the way the classic justification of "error" or "lack ethics”, but which, in addition, taking into account the intentionality, the context and the facts, constitutes criminal acts.

It is important to consider that every human act is not only done with valuation, but is also valued perceived, in this sense it can be affirmed of an axiological transversality (Peterson & Seligman, 2004), and just as there is an axiological taxonomy in general: values Ethics, material values, moral values, religious values (Reluz, 2017), among others, there are also the values of scientific research and, in addition, the values of scientific dissemination can be added. Among the values contextualized to scientific research we

can designate the following: truthfulness, knowledge, objectivity, parsimony, honesty, perseverance and confidentiality, among others no less important. Let's briefly reflect on each of them.

Scientific truthfulness understood as a search for truth, not so much understood as an end but as a process, for this reason scientific truth is also known as certainty. What would the scientific endeavor be without the search and orientation towards the truth? Without a doubt, just a fun game. The veracity in the investigation prompts the scientist in all his methodological effort to find certainties, that is, sufficiently grounded knowledge not only empirically but also argumentatively.

Knowledge in scientific work is the value that transversally underlies the research process. All research assumes substantiated prior knowledge and, in the end, new knowledge obtained is reached, assuming that knowledge is a generational construction, which also implies the humility of acceptance when knowledge is insufficient or wrong, which allows the increase of knowledge, not only of the scientific community, but of humanity itself.

The value of objectivity is paramount in research. It refers to the weight of reality discovered by the scientific community. Objectivity is opposed to subjectivity in the sense that it requires right intention in the generation of knowledge, since in scientific work it is not about what "I want it to be" according to one's own opinion, but about acceptance of what the evidence and how much it can contribute to people's well-being.

For its part, the value of parsimony refers to attention to detail, meticulousness at all levels, from observation, data collection and processing, experimentation, demonstration and communication of the results obtained. The research process is a process that requires meticulousness even in the manipulation of instruments, materials, and of course, with greater demand in intervention with people.

Depending on the honesty value, scientific research requires it with a greater presence in the process of reviewing theoretical sources, the appropriate use of funding and in the preparation of reports for the communication of results. Honesty in research requires due recognition of intellectual authorship and the rejection of all forms of academic usurpation.

The value of perseverance in research praxis is linked to the fact that the researcher and his team must be constant and patient in the effort of their work. Perseverance contributes to the development of continuous motivation to achieve satisfactory results, and even, if these are not, they give you the attitude of a new beginning and the due appreciation of what has been achieved.

Finally, in scientific research, the value of confidentiality is found in terms of secrecy and confidentiality with the personal data of those who participate in the research (O´neil, 2002). It must be stated that confidentiality is the prudent exercise in handling information that should not be confused with secrecy, which, instead of consolidating the research team in the objective achievement of results, disintegrates it.

With the explanations expressed about the values, it is necessary to state that they would not make any sense if each member of the team, each researcher does not make it their own and practice it; Well, as has been stated, the virtues is the putting into practice of the principles and values them. It is understood, then, the fundamental importance of understanding the principles, values and virtues for personal life in all aspects, and, consequently, also in the exercise of investigative work, our professions and functions.

3.3. Regulations and legislation

The regulation comes to be a systematization of precepts or rules whose compliance allows the adequate realization of social life and its harmonious functioning. For this reason, it is worth mentioning that when “social life” is mentioned, it is that it implies in a general term organization of all types and dimensions.

The characteristic of a regulation is its mandatory nature, so its non-compliance not only generates organizational and social disagreements, but also a sanction determined by the norm itself or the uses and customs. Likewise, the regulations, before the punitive sanction, also have prevention as an objective to avoid socially undesirable behaviors because they threaten the person in their various aspects.

On the other hand, the regulations in historical perspective, were not always provided in a documentation, but occurred implicitly by use and customs, constituting this aspect in the first guarantor that sustains it, subsequently requiring the presence of an executing authority that guarantees its fulfillment, bringing with it the need to fix them at the same time to raise them based on the facts and contexts, emerging the legislation.

Legislation, in its broad sense, is understood to be the process of creating laws or regulations, at the same time their constitution and study in its most specific sense. The legislation process, in principle, must be to have clear and concise regulations that facilitate the purpose of its existence: harmonious social coexistence. But sometimes, in search of this alleged precision, it has been taken to the extreme of

technicality that they have made the understanding of the rules more complex, and, consequently, the need to interpret them, even more so in complex organizations and societies such as the of our time.

As in all human interaction, scientific work and also its dissemination need the rules and legislation processes (Díaz, 2016). There are advances in these aspects, however, due to the complexity of the instruments, means, processes and understandings of the current world, it can be said that the path is being made by walking. There are more advances regarding the regulations of scientific practice, but regarding scientific dissemination and the ethics that support it is in the making, so this material hopes to be a contribution on this issue (Alonso & Cortiñas, 2014).

In the field of scientific research, there are international declarative and recommendation documents assumed globally, and at the same time, each country, depending on its needs and context, specifically legislate and regulate. Among the international declarations are the Declaration of Helsinki, Universal Declaration on Bioethics and Human Rights - UNESCO, Belmont Report, the Declaration in Singapore on integrity in research, and the Guide of ethical guidelines in educational research - BERA - AERA.

The Declaration of Helsinki was proposed by the eighteenth assembly of the World Medical Association (WMA) in 1964, and has been updated in its assemblies in Tokyo (1975), Venice (1983), Hong Kong (1989), Somerset West (1996), Edinburgh (2000), Seoul (2008) and Fortaleza (2013). This declaration, mainly of a medical nature, stipulates good treatment and quality treatment in patient care, as well as in medical research on human beings, evaluating risks, costs and benefits, where what should prevail is the unrestricted well-being integral and the dignity of the people.

In its structure are separated as the general principles which stipulate the purposes of medical work both at the clinical and investigative level; likewise, the section on costs, risks and benefits, in which a careful prior evaluation of these aspects is recommended before a medical or investigative intervention. The sections where the nature and intervention of the Investigative Ethics Committees and the protocols and requirements that must be applied are also highlighted.

It is worth mentioning that the Declaration of Helsinki is exhaustive regarding the care of the person and their dignity. It explicitly refers: "In medical research, it is the duty of the doctor to protect life, health, dignity, integrity, the right to self-determination, privacy and confidentiality of the personal information of the people who participate in research." (World Medical Association, 2017 n.9).

The United Nations Educational, Scientific and Cultural Organization-UNESCO, worked and proposed in 2005 the Universal Declaration on Bioethics and Human Rights based on the Declaration of Human Rights (1997) and the International Declaration on Human Rights. human genetic data (2003) as well as other no less important international documents. In this document, although it starts from a biomedical perspective, it is more inclusive in that it includes the social, legal and environmental dimensions that are involved in life sciences and the use of technologies. Likewise, the presence of what it considers fundamental principles is rescued: Human dignity and human rights, Benefits and harmful effects, Autonomy and individual responsibility, as well as Consent. Finally,

Regarding the Belmont Report, which was prepared by the Department of Education, Health and Welfare of the United States in 1978, which includes good practices in medical research with humans, this because of the famous Tuskegee case that occurred between 1932 and 1972 where experimented with African-Americans on untreated syphilis, flatly violating human dignity and contravening all sense of humanity and ethical exercise of medical practice, as this population group was tricked into receiving the supposed 'treatment' against syphilis, manipulated with food donations and all without giving them any information, or requesting their consent. In this sense, the Belmont report was constituted in an accurate response,

The Belmont Report (1978) presents the three principles that should govern all biomedical research: First, and being the most important for what it implies, Respect for people, ensuring their autonomy and dignity, protecting those people with greater risks and even more so with susceptible groups (children, women, people with disabilities) always providing information and giving their consent. The second principle, that of Beneficence, which seeks to do no harm and achieve comprehensive well-being directly to those involved in the research, seeking that the positive effects benefit the entire society. Finally, the third principle, that of Justice, which seeks a balance between the beneficiary or beneficiaries of the investigation and who carries out the efforts or suffers from the effects of the investigative processes.

Going to the Declaration in Singapore, which was enunciated in the framework of the 2nd World Summit on Integrity in Research in 2010, becoming a global guide to exercise responsible conduct in research. The aforementioned statement is structured in two parts: First, the principles, where mention is made of honesty in all areas and moments of the investigation, responsibility in its execution, courtesy and professional impartiality, as well as the exercise of good management and administration of the resources used for it. The second part is constituted by the derived responsibilities, specifying thirteen aspects, among

which the integrity, the recognition of authorship in the publications, avoiding conflicts of interest, stand out. (World Conferences on Research Integrity, 2010).

The British Educational Research Association (BERA) Ethical Guidelines Guide, which, in 2018, being its fourth expanded and revised edition, clearly establishes the guidelines and responsibilities in the practice of educational research. Among the guidelines are consent, transparency, the right to withdraw from those who initially participating in the research decide not to continue in it, incentives specifying that they should not affect the free decision to participate, advising against the economic incentive, regarding the damages derived. of the investigation and how they should be approached and cared for; Likewise, privacy and data storage are being treated confidentially and anonymously in such a way that the privacy of the participants is respected and,

On the other hand, a very important part of the BERA Guide refers to responsibilities, making the triad explicit: Responsibilities of the parties interested in the research, then towards the scientific community that investigates and the one that benefits from the results of the research. research, and of course, the responsibilities with the well-being and development of the researchers themselves, who must also harmonize their investigative task with their own physical and psychological well-being as an urgent ethical accomplishment (British Association for Educational Research, 2019).

Although the aforementioned documents are not the only ones, they are the essential ones to take into account when conducting an ethical investigation. What constitutes a challenge is to specify ethical statements regarding scientific dissemination.

CHAPTER 4

SELECTED CASES IN SCIENCE, TECHNOLOGY AND INNOVATION FOR ANALYSIS

Next, select cases in science, technology and innovation and their dissemination are presented, analyze them taking into account the notions explained in this book, your own knowledge and your personal and professional experience, in such a way that you consolidate your knowledge, skills and competencies of people, researchers and scientific disseminators. Likewise, these cases can be discussed in reflective groups, in each case answer these four basic questions and then socialize, discuss and clarify whenever required, seeking objectivity as much as possible.

It is important to mention that each case is extracted from a reliable source, deciding to maintain its content in integrity, not having been paraphrased in such a way that, respecting the authorship of the original sources, the readers of this book can resort to them for a greater depth if so it requires.

The authors pose the following guiding questions: What is the central ethical problem addressed by the proposed case? What are the controversial positions? Likewise, infer three key notions involved in the case that allow your understanding and possible solution. Build your situational application. It is also worth asking for which of the controversial positions would they assume to defend? Why? Finally, if you were appointed as mediator of the dispute, what are the criteria that you would take into account to exercise that role? How would you justify it? However, at the end of the presentation of each case, specific questions are posed that motivate the analysis and the most careful reflection.

4.1. Case one. Chance discovery of a new species of dinosaur

The case cited below was presented as news in El Periódico (Europa Press, 2019; párr., 1 - 6).

A new species of dinosaur has been discovered by chance by a doctoral student at the University of the Witwatersrand in South Africa, after being misidentified for more than 30 years. The team from this institution led by Kimberley Chapelle has recognized that the fossil not only belonged to a new species of sauropodomorph, long-necked herbivorous dinosaurs, but to an entirely new genus. The specimen has been renamed Ngwevu Intlokowhich which means "gray skull" in the Xhosa language, chosen to honor South African heritage. It has been described in the academic journal PeerJ.

30 years of deception. Professor Paul Barrett, Chapelle's supervisor at the UK Natural History Museum has explained the origin of the discovery: "This is a new dinosaur that has been hiding in plain sight. The specimen has been in the collections in Johannesburg for approximately 30 years, and many other scientists have already examined it. But they all thought it was just a strange example of Massospondylus. "

New family member. Chapelle also pointed out why the team was able to confirm that this specimen was a new species: "To make sure that a fossil belongs to a new species, it is crucial to rule out the possibility that it is a younger or older version of a species already This is a difficult task to accomplish with fossils because it is rare to have a complete series of fossils from a single species. Fortunately, the Massospondylus is the most common South African dinosaur, so we have found specimens ranging from embryos to adults. In Based on this, we were able to rule out age as a possible explanation for the differences we observed in the specimen now named Ngwevu intloko".

The new dinosaur has been described from a single, fairly complete specimen with a remarkably well-preserved skull. The new dinosaur was bipedal with a fairly thick body, a long, thin neck, and a small, square head. It would have measured ten feet from the tip of its snout to the end of its tail and was probably omnivorous, feeding on both plants and small animals. The findings will help scientists better understand the transition between the Triassic and Jurassic period, about 200 million years ago.

Known as a time of mass extinction, the latest research seems to indicate that more complex ecosystems flourished in the Jurassic earlier than previously thought.

The Massospondylus was one of the first predominant dinosaurs at the beginning of the Jurassic period. Found regularly throughout southern Africa, these reptiles belonged to a group called sauropodomorphs and eventually gave rise to sauropods, a group characteristic for their long necks and huge legs, like the famous Diplodocus. In the wake of the find, researchers have begun to take a closer look at many of the putative Massospondylus specimens, believing that there is much more variation than previously thought.

Guiding questions from case one

1. What is the importance of understanding the archaeological reality of a certain geographic space in scientific endeavor and in its dissemination?
2. Is it necessary to periodically carry out a critical analysis with the participation of other scientific specialists to verify conclusions assumed to be true and obtain other findings?
3. What are the advantages of having a large number of samples available for hypothesis testing?

4.2. Case two. Scientific dissemination and its communication models

The case presented was published in the Colombian Journal of Social Sciences, written by Escobar-Ortiz y Rincón-Álvarez (2018; pp., 135-154).

> The idea that scientific dissemination can serve as a strategy for science teaching has spread with great vigor in the Ibero-American environment. Examples of this are the portals of the Organization of Ibero-American States (OEI) such as Iberciencia and Iberdivulga, the inclusion of educational topics in the biennial meetings of the Network for the Popularization of Science and Technology in Latin America and the Caribbean (RedPOP), and some academic works published in specialized magazines dedicated to education and science issues. However, despite this recognition, little has been reflected in this context on the problem of communicative models of scientific dissemination.
>
> To that extent, our purpose is not to directly offer concrete proposals and actions for science teaching, but rather theoretical reflections that serve as conceptual support for these concrete proposals and actions. And for this, our starting point is the study of the dichotomy between deficit and democracy.
>
> The justification for focusing on this aspect is that this dichotomy has been taken almost by default as the fundamental category of analysis in contemporary popular science studies. In the first place, it is assumed that such a dichotomy does not exist, since some communicative models can be described at the same time as democratic and deficient. Secondly, and as a consequence of the foregoing, that there is a much more fruitful category of analysis than said dichotomy, namely: the contrast between the unidirectional character and the multidirectional character of the communication process.
>
> In this article, scientific dissemination is understood as a specific form of public communication of science and technology. (…) We thus take the term 'scientific dissemination' as a hyperonym of other terms such as scientific popularization, scientific popularization, scientific dissemination, among others. The central point is to understand scientific dissemination as a form of public communication of science and technology, regardless of the term used, since the arguments that we present in this article apply equally to the other terms mentioned in the debate.

Deficit or democracy? The vestiges of an obsession. Those who have dealt with science popularization from a more theoretical than practical point of view often postulates as an almost self-evident truth the existence of an apparently irreconcilable dichotomy between a deficit model and a democratic model of science popularization. … Perhaps the most influential position in this regard is due to Durant (1999), who explicitly relied on dichotomy to describe both models. In the first place, Durant (1999) affirms that the deficit model is characterized by three central aspects:

- A simplistic view of science as a finished and definitive body of knowledge.
- A negative identification of the public as profane people in the knowledge of the experts.

The attribution of the cause of the disagreements between science and the public to ignorance or misunderstanding on the part of the latter.

Durant explains that, to counteract this model, interest in an alternative model began to grow in the 1990s; This is how the democratic model appears, whose purpose is to understand the relationship between science and the public in terms of a pluralist democracy, and whose main characteristics would be the following:

- The establishment of an equal relationship between scientists and non-scientists that emphasizes dialogue as a precondition for resolving disagreements between experts and laymen.
- The recognition of multiple and sometimes conflictive forms of expertise that can be articulated with each other through public, open and constructive debate.
- The understanding of the relationships between science and the public not only by reference to purely formal knowledge, but also by other factors such as values, power and trust.

In some cases, the emphasis is on the deficit side, offering more sophisticated versions of the first model. In other cases, the emphasis is mainly on the side of democracy, and for this, versions are

offered that highlight various aspects of the democratic model such as context, dialogue and participation, but to immediately underline their opposition to the deficit model. In all cases, and no matter where the emphasis falls, whether on deficit or democracy, the common point is always the same: there is an irreconcilable opposition between the deficit model and the democratic model. In other words, both models would be mutually exclusive, and for that reason it is necessary to make a decision between them.

The problem is that it is possible to identify communicative models that can be classified as deficit and democratic at the same time. For that reason, the dichotomy is irrelevant as a category of analysis in this field. The argument he offers to reach such a conclusion is built on two basic ideas.

Hence our affirmation that, contrary to what is usually thought, the center of the debate is not properly the opposition between deficit and democracy, but the attempt to find options that limit the political and epistemic power of that single issuer, and that they achieve this by introducing other social actors in the communication processes. Whether these options are termed democratic, dialogue, participatory, or some other similar way, they all share the common assumption that the circumstances of form and place that apply to the public must apply equally to the experts. And for that reason, not only the answers to the questions what, how, where, when and for whom it is said, but also to the question who says it, must be rethought here.

These responses thus rethought involve the simultaneous presence of a large number of issuers, each of them with their own interests, budgets and objectives. And this has the consequence that the transit of scientific and technological knowledge in society can no longer be conceived in a unidirectional way. It is necessary to consider a great multiplicity of directions in which this knowledge must travel. And this multiplicity leads to the conclusion, perhaps unexpectedly, that it is not necessarily only scientists who decide what counts as scientific and technological knowledge and how it should be communicated. They are not the only experts. On the contrary, this decision can also be in the hands of society.

Guiding questions from case two

1. To what extent can popularization of science serve as a strategy for science teaching?
2. What are the theoretical reflections that we could have on the problem of communicative models of scientific dissemination? Which ones could serve as conceptual support for these concrete proposals and actions?
3. What is the relevance for scientific dissemination of having as a starting point the study of the dichotomy between deficit and democracy? Research case examples from both perspectives.
4. Who can decide what is valid as scientific and technological knowledge and how it should be communicated? What is the role of scientists and what is the role of society?

4.3. Case three. The biggest scientific scams in history

The following case is taken from the popular science magazine Muy Interesante, written by González (2019; párr.,1-15).

Science, like everything else, is not exempt from fraud, plagiarism and all kinds of cheating, as the Retraction Watch portal attests, which each year echoes between 500 and 600 retractions of articles published in prestigious scientific journals. There are several reasons that lead a publisher to withdraw one of its publications: use of unconfirmed or invented data, copies of other works, misuse of statistics.

Throughout the history of science there have been very famous cases of fraud such as that of the Piltdown man, a supposed missing link in evolution, but scientific traps are the order of the day. The consequences of these deceptions go beyond the anecdote, since they create confusion and hinder the progress of it. For example, and returning to the Piltdown man: during the more than 40 years that the deception lasted, anthropologists found themselves at a dead end and important findings such as fossils were ignored. Australopithecines of the Taung child, inconsistent with the line of study that the supposed British fossils opened.

In addition, scams in the field of medicine can be extremely dangerous, since in many cases the results of fraudulent work have been used to develop clinical protocols and treatments for many diseases. They can also lay the basis for movements or beliefs that pose a danger to public health: this is the case of anti-vaccine movements, which are based, among other arguments, on a false work that linked autism with the administration of the MMR vaccine. Scientific fraud is also a waste of research funds. Many great hoaxes have to do with such hot and sweet topics as cloning, stem cell research or the search for vaccines and treatments against diseases such as AIDS.

Why are they cheating? What leads a scientist to falsify his data? In addition to the pursuit of prestige or financial gain, the topic of fraud opens the debate on the enormous pressure that today's researchers have to publish. Both to progress in his scientific career and to obtain projects and funds that cover the expenses of his research, the merit that has the most weight is that which refers to

scientific production. Many publications and in high impact magazines, that is the summary of a successful resume. A very repeated saying among scientists already says: 'publish or perish' (publish or perish).

Are publications really the only thing that shows the validity of a scientist? We know that science is a very slow process, that in certain areas the experiments can take several years ... and that there are also many studies that have a negative result, that do not verify a new hypothesis, and no journal publishes this data despite the enormous effort and investment behind. For this reason, and although obviously nothing justifies a trap, it is possible that many of the hundreds of scientists who falsify their data do so as a desperate means to be able to continue investigating.

Who wins from scams? On the other hand, there are confirmed cases of supposed scientific journals that do not follow a rigorous method of reviewing their works but that require an economic fee to publish in them (something very common in scientific publications). They enrich themselves by attracting young scientists eager to publish and whose work has been rejected in more prestigious journals. We are going to review some of the most notorious scientific scams in history.

Hwang Woo-suk and the cloning of human embryos. In 2004 an article published in the prestigious journal Science went around the world. In it, the South Korean scientist Hwang Woo-suk announced that he had succeeded in cloning a human embryo. In another subsequent study, the researcher claimed to have managed to extract stem cells from it, a historic finding that fueled hopes of finding new treatments for many diseases such as Parkinson's or diabetes. A short time later, the finding was proven to be fraud and Hwang was sentenced to two years in prison for fraud and embezzlement of research funds, although he did not eventually have to serve his sentence. The merit of Hwang that does seem to be true is the first cloning of a dog, in 2005.

Yoshihiro Sato, at least 33 fraudulent articles. Japanese osteologist Yoshihiro Sato committed suicide in January 2017, a year after the journal Neurology published an article showing evidence of fraud in 33 of his works, of which, to date, only 21 have been retracted. de Sato is one of the most recent and scandalous, since the Japanese published more than 200 studies on how to reduce the risk of bone fractures. Studies that were later used as a basis for meta-analysis and whose conclusions have consequences in clinical practice.

Sato's prolific scientific activity was what began to arouse suspicion, as in his articles he reviewed very high numbers of patients collected in a very short time and in a very small city. In 2012, a team of scientists conducting a meta-analysis with studies looking at the effect of calcium on hip fractures made the decision to omit the Japanese data as it was too good to be reliable: rather they seemed made up.

Another Japanese has the dubious honor of being one of the biggest fraudsters of our time. This is Yoshitaka Fujii, a research physician in the field of anesthesiology who is believed to have falsified at least 183 scientific papers. In fact, work is still going on today to 'clean' its fraud: in 2018 alone there have been 21 retractions of Fuji's articles, 17 of them from the journal Clinical Therapeutics.

Again, the "too good" results of their research made other scientists suspect the veracity of their data. Fujii was very ambiguous when giving details in his publications about the dates of the studies and the names of the institutions where they were carried out. In addition, it included scientists from other entities as co-authors - many of them did not even know that their names were on these documents - thus giving the impression that the data was collected from different hospitals and it was more difficult to trace the fraud.

Piltdown man, the missing link. We are going to Europe at the beginning of the 20th century. In a continent full of tensions prior to the outbreak of World War I, the discovery in Germany of a jaw belonging to what would later be named as a new species, Homo heidelbergensis, puts the British on guard, who also do not want to be less in the race of anthropological discoveries. In 1912 archaeologists Charles Dawson and Smith Woodward claimed to have discovered the missing link between apes and humans and showed the world a set of fossils supposedly found at Piltdown, near London.

Andrew Wakefield, autism and vaccines. This is another example of the terrible damage that scientific fraud can do. In 1998 the ex-surgeon Andrew Wakefield published a work that related the administration of the MMR vaccine with the appearance of autism. It is more than proven that it was a publication with falsified data, but even today this is one of the main arguments used by the anti-vaccine movement, which has more and more followers and poses a danger to public health. (…)

Dong-Pyou Han and HIV. Dong-Pyou Han was sentenced to prison for embezzlement of public funds. The Iowa State University researcher became rich after announcing the development of a vaccine that managed to create antibodies against the HIV virus in rabbits. Soon after, what seemed like a scientific milestone was shown to be nothing more than a trick: Han had apparently mixed blood from the rabbits with samples of human blood containing the antibodies. (…)

Plagiarism, the order of the day. Another of the most classic scientific fraud consists of copying the works of others. One of the latest investigators accused of plagiarizing a colleague's data is, according to Retraction Watch, the American Gilbert Welch. It seems that the scientist included plagiarized data in an article published in 2016 in the New England Journal of Medicine in which he warned about how mammograms tend to over-diagnose tumors and lead to the initiation of unnecessary treatments.

Guiding questions from case three

1. Why is science not exempt from fraud, plagiarism and all kinds of traps? What would be the reasons why a scientist falsifies his data? How to avoid it?
2. Why are there a large number of retractions of published articles? Are publications really the only thing that shows the validity in the work of a scientist?
3. What is the impact of the anti-vaccine movements on society? How does it affect society economically?
4. Who wins from scams? Why do some scientific journals not follow a rigorous method of reviewing the articles to be investigated?
5. What is the impact of information plagiarism on the scientific community and on society?

4.4. Case four. Five years after the pandemic

With a futuristic vision, dated 2025, Scaliter (2020) visualizes what life will be like in the new normal. The article is titled The Other Life of Pi: The Transport of 2025 and was published in the virtual magazine N+1 (párr., 1-7).

> Since the pandemic began almost five years ago, the reality of Pi has completely changed. His partner, who almost always worked from home, now does everything from home and is permanently connected, thanks to 5G, with his office (about 30 kilometers from home) but also with India, where the programming is carried out, with the United States, where the products are stored, and with the engineers from Germany. But Pi cannot afford that luxury and has to go to the office almost daily: he can telework only one day and that day is almost always spent on the phone answering calls that are referred to him.
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> A year after the pandemic, the Intergovernmental Panel of Scientists on Climate Change petitioned the UN to ban private vehicles. The initial shutdown caused by the lockdown had reduced pollution to levels similar to the pre-industrial era and was an opportunity not to be missed. So, Pi has few alternatives to going to the office. But the ones it does have, almost did not exist in 2020.
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> A year after the pandemic, the Intergovernmental Panel of Scientists on Climate Change petitioned the UN to ban private vehicles.
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> The first is to use one of the autonomous car rental services. Due to the ban on the sale of private vehicles, many brands merged and succeeded in accelerating the creation of novel technologies. This is how they managed to adapt and produce a huge fleet of autonomous cars that roam the city. Just download the BMW-WV, Toyota-Nissan or Renault-Citroën app to find out where one of your vehicles is and request a route. Being electric cars, they do not pollute and as you do not have to drive; Pi can continue working during the trip.
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> The other option, very popular in flat cities, are bicycles, also autonomous. Today we are almost used to the landscape, but a year ago, when the first bike lanes were inaugurated, it attracted a lot of attention. The implementation was not easy. Today's cycle lanes work like chairlifts on ski slopes: a

closed and connected circuit that runs through much of the city. Pi didn't have to adapt any of his bikes for it. All you have to do is pay for one of the bikes at the chosen stop, ride it on the lane and it takes us to our destination ... or at least very close. With this, a large number of accidents have been avoided, travel times have accelerated and the amount of information generated has allowed cities to be more efficient and greener.

Today's cycle lanes work like chairlifts on ski slopes: a closed and connected circuit that runs through much of the city.

The third option that Pi has is one of the most popular: buses or autonomous subways. As we share a space with other people in these means of transport, the development has been very different. Every time a passenger approaches the stop or station, they are scanned to see if they have a high temperature or shortness of breath. The seats and handrails are coated with silver nanoparticles, to prevent the proliferation of bacteria and viruses and every half hour, at the end of its journey, the vehicle is completely disinfected by means of an ultraviolet light treatment.

Right now, Pi is working on a new technology, already known in 2019 but little used. These are roads that also allow the vehicle to be charged with electricity as it travels. Wireless technology, developed by ElectReon Wireless, has begun to be installed in Sweden, Israel and some cities in the United States. Pi hopes that soon they will be able to make roads that are charged by solar energy, to produce electricity.

Guiding questions from case four.

1. How have our activities and interpersonal relationships changed in terms of the dissemination of information since the pandemic began?
2. Is it possible to find a direct relationship between the amount of information generated efficiency within cities?
3. What post-pandemic reflections could we consider in relation to new technologies?

4.5. Case five. The failures of artificial intelligence and its rethinking

The case presented below was taken from El Confidencial and written by Broncano (2019; párr., 1-9), who is a professor at the Carlos III University in Spain.

> It is common to find articles and books on the digital society and artificial intelligence that begin or end with the mantra of "Are we ready for the changes that artificial intelligence will introduce?" Perhaps it is time to change the question to this other: "Is artificial intelligence prepared for the changes that we will have to introduce in the world and society in the near future?"
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> Artificial intelligences have broken into all domains of the economy, public management and everyday life, installing themselves on multiple devices and controlling a huge number of processes with very diverse characteristics: from avionics to financial risk prediction, from the detection of possible breast cancers to the creation of personal profiles of political or commercial interest. It is not risky to say that artificial intelligences have produced a second technological revolution after the one that led to the spread of digitization in the eighties. In fact, the digital space, with its immense flow of data, and artificial intelligence feed off each other and both constitute a new scenario that has been called the Fourth Industrial Revolution.
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> A first consideration that should not admit of replication is that artificial intelligences are very efficient devices. They are designed to solve problems and they solve them quite well, much better than humans in most cases, who are not prepared to accomplish similar tasks at the speeds that a program can do. The speed of response to an online purchase request by any of the current platforms such as Amazon, which carries out the act of purchase, the charge to the card, the detection of the address and the shipping order, is so fast that it has sunk to online sales companies that do not have these computer tools. Amazon lives on the human desire to "I want this and I want it now."
>
> Our daily life is already immersed in the application of artificial intelligences. They are the ones that control the electrical networks, the telephone networks, the traffic light systems ..., in short, many of the structural columns of our society. The dissemination of its successes has generated a scenario that ranges from fears of the control of machines over our lives and the end of human work to the

conviction that technological innovation will solve the vast majority of our complex problems. There is a whole propaganda industry spreading some notable successes of so-called "deep learning" and promising a near future of radical transformations. Thus, for example, the AlphaZero program developed by Deep Mind achieved a first-order mastery level in chess without any programming, just playing with herself. If we compare it with Deep Blue, a classic program that managed to beat Kasparov in 1996, but which contained almost all the wisdom of humanity about chess, the feeling of revolution is immediate.

The propaganda industry talks about successes and not failures. And these failures teach us very deep lessons about what is intelligence, what is artificial intelligence, and what is human intelligence. The case of Tesla's semiautonomous car was well known, which in 2016 suffered a fatal accident when it collided with a truck that crossed on the road and the sensors did not distinguish it due to the effect of sunlight. The driver was a fan, a tech hooligan who was absolutely confident in the power of technology and probably didn't have his hands on the wheel (that's disputed in the later trial). The fact is that his confidence led him to a fatal end. Humans, due to the effect of evolution, are quite clumsy animals in skills. We need a long and painful apprenticeship to solve very specific problems like playing the guitar or doing cartwheels. However, we are beings specialized in transversal or general intelligence.

We quickly understand jokes, connect information of a distant nature, such as metaphors, and solve problems in very open environments. Artificial intelligences (and the use of the plural is important), like animals, are much faster in learning special abilities. What we call "deep learning" has to do with the ability to pick up patterns much faster than humans, and produce efficient results. But neither animals nor artificial intelligences are good at solving problems in environments that require connecting problems.

In its early days, artificial intelligence as research tried to capture this human characteristic by converting human knowledge into well-articulated procedures. Philosophers give the name GOFAI (Good old fashion artificial intelligence) to this line that tried to imitate our cultural mind by capturing concepts, plans, scripts and action schemes. In the nineties another line emerged that dispensed with humans, so slow and complex, and learned directly from the data of the environment. There has been a huge number of devices that learn very quickly from data. But they have enormous limitations,

as the Boeing 737 accidents have shown, when artificial intelligences are unable to correlate data of a heterogeneous nature.

The psychologist Gary Marcus has raised in a recent book this problem that is not minor (it can cost many companies their existence) and advocates a return to an old line of artificial intelligence: begin to learn from human intelligence, slow, time consuming, full of contradictions, but able to cross-connect direct knowledge, rather than blindly relying, like Tesla's driver, that systems designed for well-defined purposes and in almost artificial environments can solve the complexity of life. Perhaps it is time to transform the questions and generate research strategies, which should be part of public policies, that go on the path of accommodating artificial intelligences to the complexity of life, in which humans are quite efficient animals,

Guiding questions from case five

1. What are the differences between artificial intelligence and human intelligence? Why do humans need long and often difficult learning to solve problems?
2. How prepared are we for the changes that artificial intelligence will introduce?
3. Considering the application of artificial intelligences in the structural columns of our society, could we say that our daily life is "controlled"? What would be the main advantages of using artificial intelligences?
4. What is "deep learning" and what is the impact of the propaganda industry on it?
5. Faced with the proposal to transform the questions and generate research strategies in public policies, where artificial intelligences have an advantage in the face of the complexity of life, what viable examples would you propose in this regard?

4.6. Case six. The science journal scam is coming to an end

The present case was taken from El Diario in collaboration with The Guardian, written by Monbiot (2018; párr., 1-21).

"Taxpayers fork out twice: first to fund the research and then to read the work they have sponsored. Maybe there are legal justifications, but there are no ethical justifications "

Never underestimate the power of a determined person. First it was Edward Snowden, with the state security system; then the British journalist Carole Cadwalladr, with her research on Big Data and Facebook; and now Alexandra Elbakyan, the young Kazakh scientist who has turned a multibillion-dollar industry upside down thanks to payment barriers to knowledge. Sci-Hub, the web crawler Elbakyan founded in 2011 to publish restricted-access articles, has done more than any government to tackle one of the biggest scams of the modern age: the one that turns public investigations that belong to us into private profit. everybody.

All people should have the freedom to learn and knowledge should be disseminated as widely as possible. It would not occur to anyone to say that they disagree with these statements. However, governments and universities have allowed large academic publishers to deny those rights. Academic publishing may seem like an old, dark affair, but its business model is among the most ruthless and profitable of all.

The famous con man Robert Maxwell was one of its pioneers. When he saw that scientists needed to be informed about all the significant developments in their field, he understood that the journals that published academic articles with these advances could become monopolistic, charging exorbitant fees for the transmission of knowledge. He called his discovery the "perpetual finance machine." Maxwell also realized that he could appropriate other people's work and resources for nothing. Governments funded the research that Pergamon, his company, published; and the scientists wrote, revised, and edited the magazines for free. Its business model was based on putting a barrier to public and everyone's resources. Or to use the technical term, a robbery in broad daylight.

When his other ventures ran into trouble, Maxwell sold Pergamon to Dutch publishing giant Elsevier. Like all its great rivals, Elsevier has maintained the business model to date, with benefits that remain spectacular.

Five companies publish half of all the research done in the world: Reed Elsevier, Springer, Taylor & Francis, Wiley-Blackwell and the American Chemical Society. To gain access to their magazine packages, libraries shell out fortunes. Those who do not belong to the university system are required to pay 20, 30 and sometimes up to 50 dollars for the reading of a single article. Although open access journals have grown a lot, researchers still need paid articles from trade journals. Many have no alternative but to publish their research with these companies because the people who finance, reward or promote their work evaluate them by the scope of the journals in which their papers are read.

This year I was diagnosed with cancer and had to choose from several alternative treatments. Before making a decision, I wanted to document myself. That is, read scientific articles. If not for the pirated material I found on Sci-Hub, I would have had to spend thousands of pounds. But like most people, I don't have that money, so I would have given up before acquiring the necessary information. I can only speculate what would have happened if I had not had access to those papers that influenced my decision, but it is possible that Elbakyan, whom I do not know, has saved my life.

Like many scientists from countries with poorly endowed research programs, Elbakyan realized that he could not finish his neuroscience research without pirated articles. Outraged by the knowledge barrier raised by the journals, she used her hacking skills to share the papers with the community. Sci-Hub allows free access to 70 million papers that would otherwise be locked behind payment barriers. In 2015, Elsevier sued her and won $ 15 million in damages caused by copyright infringement. In 2017, and due to a lawsuit from the American Chemical Society, he was fined 4.8 million dollars.

Both were civil cases, relating to civil matters. Elbakyan's actions are considered by the US courts to constitute copyright infringement and information theft, but for me his work is a way of putting things that we own and have paid for back into the public domain. In the vast majority of cases, investigations reported as hacked have been paid for by taxpayers. Most of the writing, proofreading, and editing work is done at universities and with state funding. But this public good is captured, packaged, and

sold back to taxpayers for disproportionate fees. Public libraries pay the most for them. Taxpayers disburse twice: first to fund the research and then to read the work they have sponsored. Perhaps there are legal justifications for this practice. Ethical justifications there are none.

Alexandra Elbakyan lives in hiding. Away from the jurisdiction of the US courts, it changes domain to Sci-Hub as the page goes down. He is not the only person who has challenged the big publishers. The Public Library of Science was founded by researchers who opposed the way in which industry prevents public access to knowledge. They also protested the slowness, clumsiness and age of a publication process that slows down scientific research. They have shown that you don't have to pay to have great magazines, with advocates like Stevan Harnad, Björn Brembs, Peter Suber and Michael Eisen changing the public's perception on the subject.

Aaron Swartz, the brilliant Internet innovator, attempted to share 5 million scientific articles in the public domain. He took his own life when he was faced with the possibility of spending decades locked up in a US federal prison for that selfless act.

Libraries now feel capable of taking on the big publishers. They can refuse to renew contracts because they know that their users have alternatives to avoid the payment barrier. Now that the system begins to creak, state funding agencies are finally finding the courage to do what they should have done decades ago: demand the democratization of knowledge. A European consortium of these bodies (among them, the main investigative agencies of the United Kingdom, France, the Netherlands and Italy) published last week its Plan S. From 2020, they insist, the investigation that has already been paid with Tax will no longer be blocked. All researchers who are funded by these organizations must publish their work exclusively in open access journals.

Publishers are enraged. Springer Nature has argued that the plan "could undermine the entire research publishing system." Yes, that's the idea. The editors of the Science series argue that it "would disrupt academic communications, harm researchers, and have a negative effect on academic freedom." "If you think the information shouldn't cost anything, use Wikipedia," says Elsevier, inadvertently reminding us of what happened with the commercial encyclopedias. Plan S isn't perfect, but it should be the beginning of the end for Maxwell's scandalous legacy. Meanwhile, and as a matter of principle, I did not pay a penny to read an academic article. The ethical choice is to read the stolen material published by Sci-Hub.

Guiding questions from case six

1. What is your opinion on the private benefits of public investigations that belong to all of us? Could it be that our freedom to learn and the knowledge that should be disseminated as widely as possible are being curtailed?
2. What is the responsibility of governments and universities for the economic benefits of large academic publishers?
3. Do you justify the use of Sci-Hub? Do you consider that the proceeds of the information search on Sci-Hub constitute copyright infringement and information theft and would therefore be classified as pirated material?

4.7. Case seven. Current information, scientific dissemination and risk discourse

The case is taken from the Amnis Scientific Journal of the French Institute for Contemporary Culture and Society Studies in Europe and America, written by Lorente (2015; párr., 1-33).

> Current information incorporates the drifts of reality into the order of discourse, constructing the narrative of events from narrative procedures that, while ensuring their intelligibility, are governed by criteria of immediacy, exceptionality and informative impact, all of this in concurrence with other news and information media. The current information thus gains in relevance and newsworthiness what it loses in relevance in relation to the communication and dissemination of knowledge about the circumstances, reasons or consequences of the events that are the subject of the informative interest. In this context, Informational strategies aimed at mobilizing public opinion in relation to the need to take urgent measures in the face of the main global risks collapse the reader's ability to contrast alternative procedures for action and participation in solving the problems that potentially affect them. . On the other hand, these same informational strategies guide public opinion towards the confidence that specialized techno-scientific knowledge will solve the problems in whose definition and deliberation the citizens have not participated.
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> Scientific knowledge reported by the media is projected, as well as a dissuasive form of social order, conducting the affairs of public life, but at the cost of avoiding the ethical and political dimension of the solutions adopted and the distribution of costs and associated benefits. The informative dramaturgy applied to UNESCO resolutions in relation to the declaration and confrontation of the risk of pandemic, in the case of the N1H1 virus (2009) and the spread and mortality of the Ebola virus (2014), together with the treatment news applied to the reports of the Intergovernmental Scientific Panel for Climate Change (IPCC) or to the account of urban and financial crises of global scope, it highlights immediate and inescapable risk horizons, but dissuasive against other voices that,
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> The informationalist approach to the communication media privileged the idea that they behave as instruments of transmission and mediation between the events that take place in a foreign space –reality– and the social space –the public. The mediating notion was based on a concept of information

in which objectivity constituted its backbone, while at the same time trusting that good information practices consisted in letting the facts "speak for themselves."

However, the transformation of reality into something intelligible can only be the result of a productive activity and a series of discursive manipulations. Making something known, informing it, means precisely putting it into shape, subjecting it to the logic of a narrative construction following the criteria of newsworthiness and the political and market strategies that the media privilege in the process of production of the news reality. The order of information is thus the order of the construction of reality, the product of a social and intersubjective activity through which the real and unintelligible is subjected to the work of language and the order of discourse.

Current information, when it accounts for possible dangers or threats, uses the discourse of risk to provide credibility to the account of adverse future scenarios of various kinds, be it pandemics, radical changes in the climate and ecosystems, financial crises. or urban, with consequences in the definition, measurement and management of risk. Scientific dissemination cooperates with the risk discourse in these informative scenarios, discriminating the type of relevant knowledge and the competent subjects to participate in its confrontation.

The risk scenarios. Risk is a way of producing present descriptions of the future and of deciding between alternative courses of action. Given that any decision can produce unwanted and unsuspected effects, risk cannot be conceived as something attributable to reality. If risk implies a device for rationalizing indeterminacy, it is necessary "to think of it as a mechanism, as a socio-political technology, collectively configured, to provide certainty to the contingency of various events, although this does not eliminate risk, properly speaking" or as Ulrich Beck warns, "today's society finds itself confronted with itself in relation to risks ..., with the risk society, the self-production of social life conditions becomes a problem and an issue."

In this context, one of the ways favored by current information to ensure the legitimacy of statements about risk is the use of mathematical and statistical treatment to calculate risk and the projection of statistically consistent futures. The procedure is based on the belief that mathematical calculations have no limits in assessing and establishing future risks. However, probability calculations are very problematic when they concern human behavior, where opinions, expectations, fears and beliefs converge that cannot be treated as objective magnitudes: "There is a very difficult factor to predict,

the irrationality of the response", warned an epidemiologist from the Center for Disease Control and Prevention (CDC-USA), indicating that the anticipation of the risk of expansion of the avian flu pandemic, as of the spread of Ebola and other health threats, does not consist only in knowing the "natural" system of replication of the virus, but also has an eminently social foundation . Both the definition and the calculation of health risk have a strongly subjective and interpretive component that infiltrates social relationships and these in turn actively participate in determining the risk threshold that members of a group are willing to assume.

… The understanding of risks is thus inseparable from the historical and social configurations from which the different human societies and collectives conceptualize and represent danger, which are inextricably linked to symbols, to imaginary, to forms of intersubjective relationship and to the narratives that, like current information, societies have to elaborate the discourses of both natural, social and individual events.

In the case of information on the health risk unleashed by the N1H1 virus, since its appearance on the media scene and long before the WHO determined its spread as a "pandemic in June 2009, the term was already used by the press to describe the scope of the outbreak of the so-called "influenza A" and its devastating effects. At the same time, an imminent global health catastrophe was looming, without an established scientific basis, and the consequent urgency to mobilize public opinion against the new common enemy, in anticipation that "everything would go wrong", warning the skeptics and the possible discordant voices that “N1H1 mortality appears to be low. But the WHO works on darker scenarios: that the virus mutates, collapses the economy or unleashes panic.

For its part, current information on environmental risk, published in the most widely disseminated Spanish press during the latest international conferences on Climate Change (UNFCCC), related to the renewal of the Kyoto protocol (2009-2012), have projected a catastrophic scenario characterized by the imminence and inexorability of environmental hazards. To this end, the worst forecasts of the IPCC have been taken as a reference, delegitimizing political dissent in the face of the urgent need to adopt technical, global and efficient measures, with the consequent demobilizing effect on citizens and skepticism about their own ability to participate in their activities. coping.

All in all, these processes have been carried out in the absence of a significant social response due, to a large extent, to the way in which the social communication media have contributed to the

production and dissemination of discourses and narratives that projected risk scenarios under the premise of the urgency and the need for technical and efficient measures for their mitigation, to the detriment of other voices that could question the definition of the framework of intelligibility of these problems, as well as the way to manage and face the risk.

Guiding questions from case seven

1. In what way do scientific journals gain relevance and lose relevance?
2. Does staying as researchers justify authors and editors publishing texts of low quality and little relevance?
3. What would be the main ethical problem of predatory magazines?
4. How can the ethical principles of scientific dissemination be maintained in a highly commercialized context of scientific research and publication?

4.8. Case eight. Tay fiasco, Microsoft's racist and misogynistic artificial intelligence

The case presented below was taken from the Economy section of El País in its electronic version, written by González (2016; párr., 1-4).

> … Microsoft launched publicly, and through the microblogging platform Twitter, with its artificial intelligence project Tay. A unique project, capable of learning from the conversations it has with humans, and that has encountered serious problems in its development and learning path, and has just been withdrawn for the second time since its original launch, after the Redmond firm had than to issue an official statement apologizing for the racist and xenophobic responses of their 'robot'. This time, the second Tay stops responding on Twitter, spam has taken over Microsoft's robot.
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> Computer software similar to Siri, but according to the Redmond company itself, created especially for interaction with an audience between 18 and 24 years old, for which it had already predefined some responses and was programmed to continue learning based on these interactions. However, Microsoft's experiment has indeed learned from all the responses of its followers, and not all of them are admissible. The dramatic situation of Microsoft's artificial intelligence has reached the point of responding with phrases like 'I hate niggas', or launching allegations against feminism. Microsoft apologizes, but blaming Twitter users because "there was a coordinated effort by some users to abuse Tay's conversational capabilities, to make him respond inappropriately."
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> But the tool has been relaunched, and again Tay has had to be withdrawn due to problems to maintain his normal activity on the social network Twitter, where he allowed interactions publicly and through private messages. The first time they had to temporarily cancel the public project, Microsoft already announced that Tay would be 'rescheduled' to return to Twitter, and they did not originally offer a specific date. Finally, Tay had recovered and without prior notice he had returned to activity, but again he is not available, and at the moment Microsoft has not released a statement about it, although they are still working on their artificial intelligence tool.

Guiding questions from case eight

1. Does Microsoft's experiment have ethical controversies? which would be?
2. In what way could artificial intelligence be considered a "double-edged sword" considering some contemporary social ideologies?
3. What would be the motivations for which some groups of netizens verbally and graphically attack others? What could companies like Microsoft or Google do about it?

4.9. Case nine. Chinese scientist who edited twins' DNA may have caused unwanted mutations

This case was written by Bruno Vaiano (2019; párr., 1-7) and published on the Super Interesante website in its Brazilian edition, there it refers:

> An unpublished document leaked by the Massachusetts Institute of Technology (MIT) revealed that the unauthorized use of the CRISPR technique to immunize babies against HIV in November 2018 may have generated side effects in other parts of the children's genome. In November 2018, the Chinese researcher He Jiankui announced in a YouTube video (https://youtu.be/th0vnOmFltc) the birth of two twins whose DNA he had edited using the CRISPR technique. The scientist's goal was to exclude a part of the CCR5 gene to turn it into a variant called Delta 32. This variant makes babies immune to HIV. It is known that Delta 32 occurs naturally in less than 1% of the European population, and that these people are resistant to the AIDS virus.
>
> The Chinese scientist He Jiankui (2018) had revealed, in Hong Kong, the alteration of the embryos of seven couples during fertility treatments, one of the successful pregnancies. The genetic modification was done on two twin girls whose DNA the scientist claims to have altered through a technique called CRISPR / Cas9. According to the researcher from the Chinese university, the goal would not be to cure or prevent any hereditary disease, but to try to provide embryos with the ability to resist a possible HIV infection. The technique used in gene editing is called CRISPR-Cas9, a technique created in 2012 that allows DNA to be altered, that is, to include and disable genes or correct genetic mutations involved in diseases.
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> In an interview with the Associated Press, the scientist had stated that the parents of the babies in question did not want to be identified, so he could not reveal where they live or where the procedure was performed (Marchione, 2018). "I feel a great responsibility to make it not just the first time and to become an example," He Jiankui (2018) told the Associated Press. "Society will decide what to do next," he added, referring to the prohibition (or not) of such practice. He Jiankui has turned off the CCR5 gene, which allows the virus that causes AIDS to enter a cell. All the men who participated in the experiment were infected with HIV, unlike the women, and had the infection controlled by drugs for the virus, writes Lusa of the virtual magazine Public.

According to The Telegraph, an American scientist claims to have been part of the team that carried out the procedure in China. Human gene editing is banned in the United States and in most countries, as changes in DNA can pose risks to future generations, unpredictable side effects, and this technology is still in the experimental phase, they say. some scientists (Greely, 2018), "It is inconceivable ... it is an experiment in humans that is not morally or ethically defensible," said Kiran Musunuru, an expert in genetic manipulation at the University of Pennsylvania (USA) cited by the The Guardian newspaper.

Despite good intentions, the idea was to prevent the father, who has the virus, from transmitting it to his daughters, it was a serious ethical violation, received with outrage by the international scientific community. CRISPR is a fledgling technology. It has yet to pass pre-clinical testing in animals, and it is not close to being approved for clinical use in human infants. There is a risk that, by targeting one gene, researcher Jiankui may have accidentally modified others. A single change in the DNA sequence of a gene can trigger a number of problems, some undetectable, such as congenital syndromes that manifest only in adolescence or adulthood.

At the end of 2019, through an anonymous source, the Technology Review magazine of the Massachusetts Institute of Technology (MIT) accessed the scientific article that reports on the procedure. The document has not yet been published anywhere. The information contained there allows us to assess whether the procedure was performed correctly and whether the twins are at risk. And the answer to this question is yes. Four professionals consulted by MIT - specialists in gene editing, embryology, artificial insemination and law - agreed that the intervention was carried out by leaps and bounds. "The claim that they reproduced the variant in the CCR5 gene is a completely misinterpretation of the data and can only be described as a deliberate lie," said Fyodor Urnov of the University of California at Berkeley. "What the article shows is that the team could not reproduce the variant."

The CRISPR system evolved by natural selection in bacteria, as a defense mechanism against parasites. It is able to detect a specific piece of DNA, belonging to a virus, and then use a protein called Cas9 to cut that part like scissors. Therefore, the microbe cuts the virus and escapes infection (a clarification: not only humans get sick from viruses. Bacteria themselves are victims of them). Geneticists learn to manipulate this mechanism to use it to our advantage. In the case of twins, the

idea is to teach CRISPR how to detect the sequence of the CCR5 gene that is present in most of the population and cut it out to make it the HIV-resistant Delta 32 variant. In theory, it's beautiful, but in practice, the potential for error is immense. The problem is that CRISPR may end up finding and cutting other pieces of DNA that are not the initial target, simply because the code for these other genes is similar to the code for the gene that is the target of the procedure (Cyranoski, 2019, 2020). Without individually checking each cell of the embryo before implanting it in the mother's uterus, it is impossible to know if such an accident has occurred.

People with AIDS suffer many prejudices in China and do not have access to artificial insemination. If an infertile couple with HIV wants to have a child, it is unlikely that a clinic will agree to perform the procedure. Therefore, it is likely that the couple agreed to participate in the unethical experiment just to have a chance to have a baby. The eggs were fertilized in vitro and the intervention with CRISPR was performed before the embryos were placed in the mother's womb. The fact that the couple who agreed to participate in the experiment likely did so because they were in dire straits worsens the seriousness of the charges against the study authors. Fortunately, the babies are already one year old with no apparent complications.

Guiding questions from case nine

1. What other examples would you propose relating ethical and moral issues to scientific disclosures on YouTube?
2. Does the legislation of our countries contemplate the problem of genetic editing in humans? Would you be for or against this procedure and on what conditions?
3. Would you agree with what was expressed by the expert in genetic manipulation Kiran Musunuru, that the experiment carried out in humans "is not morally or ethically defensible"? Depending on your answer, please provide your arguments.
4. In cases similar to the one described, should the punishment be restricted to the main researcher and his team, or is there a reprimand for couples participating in this type of experiment? Would your participation be justified by the desire to have a baby?

FINAL THOUGHTS

Reality is as wide as it is complex, whoever only understands it factually does not broaden his mind towards new and unsuspected horizons, limiting himself to knowledge without creativity, without solutions to new challenges. Scientific knowledge is expanding in tune with the breadth of what our integral being can achieve. In this context, the search for truth is not a relative chimera, it is the imperative of encounter and objectivity, of solutions to problems. This is the context in which people are situated.

People are social beings and as such we must learn to live together, building solid and constructive interactions, understanding that our particular acts necessarily bring social consequences, and even more so, when they involve scientific work and research processes, since they are the central axes to solve various problems. Practical philosophy, particularly ethics, complements this task and consolidates interpersonal relationships.

Ethics is not a theory or just a philosophical corpus, ethics is knowledge for life, it must be constituted, from that perspective, in reflection for coexistence and social well-being, the same in the exercise of citizenship, that of our professions, and of course, also scientific research and its dissemination. Science without ethics is doomed to failure, since it will only seek knowledge as a power of dominance, lacking power as a capacity for service and improvement of society, becoming concrete in the quality of life of each person on foot.

The researchers authors of this book, who are at the same time university professors, are convinced that scientific research and its dissemination must be impregnated with ethical bases, not with a minimum ethic - not to do evil - but with a maximum ethic, that is, to do the best possible good. That must be our challenge and commitment.

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