

The metaphors in science communication
analysis of the metaphor "the book of life" in techno-scientific contexts

Juan Carlos García Cruz

Posgrado en Filosofía de la Ciencia,

Universidad Nacional Autónoma de México

j.carlos.garcia.c@gmail.com

Abstract

The use of metaphors in the communication of science is the subject of interest not only for their cognitive and philosophical value, but also by their role as communication tools, linking various speeches and providing a basis for the public understanding of scientific topics. In this aspect will discuss the metaphor "the book of life", generally used by the media to replace the human genome.

This research part of the review of two important theories of the metaphor: the replacement approach and comparative approach. To end the interaction theory of metaphor proposed by Max Black, in which understanding and involvement the receptor leading to multiplicity of interpretations. Subsequently, is presented a historical review of the origins of metaphor and analyzes the implications of the metaphor "the book of life" in the visions of science that reproduce the Human Genome Project in the mass media. Finally, this analysis leads to review the commitments that have the science communicators to transfer metaphors, which obviously should not be chosen by interests, fashions, likes and levels of hearing, but should audience to a rational exercise in the pursuit of objectivity and professionalism in the communication of scientific topics.

Introduction

Since it was launched the Human Genome Project has been constant the emergence of information about this 'new genetics', both in the scientific literature and in the media, information that has been increasing, especially since the announcement of the

sequencing the human genome on June 26, 2000 by Bill Clinton and Tony Blair, then President of the United States and Prime Minister of England, respectively. Possible therapeutic applications of the new genetics in the treatment of health and disease have aroused the interest of the general public but also the expectations have grown due to disproportionate image that some journalists and popularizers of science have passed when they reveal progress in every moment. The triumphalist news reports in the press have helped spread little accurate information as they have presented as "certain" issues are still just mere hypothesis. First it provides an overview of the news related human genome, published in Mexico newspapers.

The second part of this article focuses on studying the metaphor "the book of life" used repeatedly to discuss the human genome. In this sense, will be described from an historical analysis of where does the concept "book" and its metaphorical use at different times. Subsequently, we will review the main features of two important theories of metaphor such as the replacement approach and the comparative approach, and finally, within this section, I will describe the theory of interaction in the metaphor proposed by Max Black, in which understanding and involvement in the receptor lead to multiple interpretations.

The last part to develop is clear from the implications of the metaphor "the book of life" in the visions of science that reproduce the Human Genome Project through the mass media in Mexico. Finally, I shall describe some commitments that we must take the science communicators to transmit this type of metaphors, which I have great influence in society.

The news

"Today, we have learned the language that allowed God to create life" (Ap, DPA and Reuters, La Jornada, June 27, 2000). With that expression Bill Clinton announced that the human genome map ended on June 26, 2000. The president then entered the East Room of the White House, closely followed by two men: Craig Venter and Francis Collins. The objective of this event, which was organized with great haste, was jointly announce the obtention of the first draft of the Human Genome Project, an international

consortium of research laboratories working with public funds, led by the U.S. and Celera Genomics, a private company the same country. Both made the announcement finally mapping the first sequencing of the human genome had been completed. Craig Venter, director Celera, referred to it as "this is a historic day in 100,000 years of human history, it is the first time that the human being is able to read the letters of his own text." Not to be outdone, the director of public consortium, Francis Collins called the mapping of the human genome, as "the revelation of the book of life" (Davies, 2001, p. 318).

In a conference via satellite from London, the then British Prime Minister Tony Blair, described this as "the first great triumph of technology of the century XXI". Clinton congratulated the leaders of the genome projects, public and private. Clenching his jaw, as was typical of him, then President chose to use a theological picture: "Today we are learning the language in which God created life and felt even more overwhelmed by the complexity, the beauty and wonder of the gift most divine and sacred to God". Alluding to 99.9% similarity of the genetic code of all human beings, Clinton added: "Modern science has confirmed what we knew before by ancient religions. The most important act of life on this earth is our common humanity" (The White House, 2000).

Francis Collins, who spoke after Clinton insisted on the biblical theme. "For me it is a humbling and at the same time, an inspiration, to understand that we have seen the first glimpse of our own instruction book, previously known only to God" (Davies, 2001, p. 322). Ideally, now check what the news that appeared in Mexico a day after the announcement prompted the East Room of the White House. To explore object of study conducted a research based on newspapers in national newspapers with the largest circulation: Milenio, La Jornada, Reforma, El Universal and Excelsior. Which informed the news the day after the dramatic announcement of Clinton and Blair. The objective is to analyze what metaphor is mentioned by newspapers June 27, 2000 which is more recidivism. A brief table of the results is shown.

Periódico	Encabezado en primera plana	Encabezado en el interior	Autor o fuente de la noticia	Metáfora recurrente
Milenio	“Anuncian el mapa de Genoma Humano” El logro del mapa del genoma humano, paso clave para la conversión de nuestros genes en un libro abierto.	“Genoma: el libro de la vida” Diez años de investigación, más de mil científicos en casi todo el mundo y casi dos mil millones de dólares de presupuesto, han sido necesarios para poder descifrar el código genético humano.	Agencias	“El libro de la vida”
La Jornada	No aparece en primera plana	“Científicos de seis países divulgan el mapa de 97% del genoma humano” Clinton: se ha descifrado el código que hace única a cada persona.	AP, DPA y Reuters.	“El libro de la vida”
El Universal	“Descifran 97% del genoma” El mapa final estará listo en 2003, anuncian. Propone Clinton programa conjunto para analizar las implicaciones legales, sociales y éticas de este avance científico.	“Presentan “borrador” genético” Los científicos logran descifrar 97% del genoma humano. Es la más grande contribución tras el descubrimiento del antibiótico.	Reuters, AFP, EFE, AP y DPA.	“El libro de la vida”
El Reforma	“Descifran mapa humano”	“Listo primer borrador del genoma” Los líderes científicos y políticos de la carrera por el desciframiento del código genético anunciaron ayer la consecución de una “versión de trabajo del instructivo molecular de la vida.	Javier Cruz	“Mapa Humano” “El libro de la Vida”
El Excelsior	“Descifran 97% del Mapa Genético Humano; Revolución en la ciencia: Tony Blair” Hoy aprendemos el idioma con el que Dios Creó la Vida, afirma William Clinton; Hazaña equiparable al descubrimiento de	“Medicina adecuada a cada persona; Pietra-Santa”	Agencias	“El libro de la Vida”

Fig. 1 Comparison table on the news appeared June 27, 2000

We can see that the five selected newspapers report the metaphor: "The Book of Life" constantly, therefore, appropriate to review the impact it has on the reader and this type of metaphor where rate his historical conception.

History book of life

To fully enter to the first objective of this article is appropriate ask where arises the metaphor of the "book of life". To answer broadly, we should go back in time, go through the sacred books of Christianity, Islam, Judaism, until the ancient Orient: Western Asia and Egypt. Here the writing and the book had already centuries before our era, a divine character: in the hands of a priestly caste, and its function was to convey religious concepts. There were "heavenly", "sacred" and "liturgical" books. The very act of writing was considered a mystery, and writing enjoyed special privileges (Curtius, 1975, p. 425).

In ancient Hellas in Greece, we note that the concept of the book is not very clear, there is almost no idea of the sanctity of the book, as there is also a privileged priestly caste in charge of writing. This explains why Greek poetry is foreign to the metaphorical use of writing and the book: conceived a memory as a write (Curtius, 1975, p. 426).

Meanwhile, Rome in its flowering period, it served little book of metaphors. However, at the time of Sulla was a fertile influence of literature and the Alexandrian-Hellenistic culture. The concept we had the book, described it as something beautiful. Exemplified in the poem in which Catullus dedicated the collection of his poems to his friend and compatriot Cornelius Nepos:

¿A quién daré ese libro hermoso y nuevo,
con pómez, árida recién pulido?
A ti, Cornelio, porque tú solías

juzgar de algún valor mis pasatiempos... (Curtius, 1975, p. 433)

With the coming of Christianity, the book reached its maximum glorification. Christianity was a religion's holy book; Christ is the only God who is represented in

ancient art with a roll of paper in his hand. Later in the Old Testament contained a large number of metaphors of the book, let's review some taken Curtius:

“Las tablas de la ley están escritas con el dedo de Dios” (Éxodo, XXXI, 18). En una visión escatológica se dice “plegarse a los cielos como un libro” (Isaías, XXXIV, 4). El Antiguo Testamento conoce también “el libro de la vida” escrito por Dios (Éxodo, XXXII, 32; Salmo LXVII). El profeta recibe órdenes divinas (Éxodo, XVII, 14), (Curtius, 1975, p. 439).

The humanism of the twelfth century, is delighted with the wealth of the world and life, that is where a series of metaphors about the book will be reflected. In this regard, it is pertinent to review some concepts of the time cited by Curtius, primarily a theological vision. "A Bible and experience continues to Guibert tells us in all natural things can be allusions to the truths of religion; but it is also possible to find them in a book "(Curtius, 1975, p. 447).

A favorite commonplaces of popular conception of history is to say that the Renaissance dust shook the old parchments to achieve read in the book of nature or the world. But even this conception comes from medieval Latin. Alain de Lille speaks of the "book of experience" every creature is, for him, a book. Later, in Spain, Fray Luis de Granada (1504-1588) used in his book Creed expression "philosophizing in this great book of criaturs" developing it eloquently (Curtius, 1975, p 448.):

¿Qué es todo este mundo visible sino un grande y maravilloso libro que Vos, Señor, escribiste y ofreciste a los ojos de todas las naciones...?

Somos como los niños que, cuando les ponen un libro delante con algunas letras iluminadas y doradas, huélganse de estar mirándolas y jugando con ellas, y no leen lo que dicen y tienen cuenta con lo que significan. Así nosotros..., habiéndonos puesto Vos delante este tan

maravilloso libro de todo el universo para que las criaturas de él, como por letras vivas. Leyésemos y conociésemos la excelencia del Creador..., no hacemos más que deleitarnos en la vista de las cosas tan hermosas y tan acabadas, sino unas como letras quebradas e iluminadas, que declaran bien el pintor y la sabiduría de su autor (Curtius, 1975, p. 449).

Philosophy also draws from the XII century, metaphors of the book, Hugo of St. Victor integrates the book and writing within systems; divides world history into three periods:

El de la *lex naturalis*, el de *lex scripta* y el del *tempus gratie* (PL, CLXXVI (156), cols. 32 B, 343, 347, 371); la creación y el hombre Dios son “libros” de Dios (*ibid.*, cols. 644 D ss.). Hugo de Folietta convierte la metáfora del libro en todo un sistema teológico en miniatura. Según él, existen cuatro libros de la vida: el primero se escribió en el paraíso, el segundo en el desierto, el tercero en el templo y el cuarto en la eternidad; el primero lo escribió Dios en el corazón humano, el segundo lo escribió Moisés en las tablas de la ley, el tercero lo escribió Jesucristo en la tierra, y el cuarto lo compuso la divina Providencia (Curtius, 1975, p. 450).

Nicholas of Cusa adopts metaphors of medieval philosophy and mentions that certain saints conceived the world as a book written; He, meanwhile, says that creation is “representation of the internal verb”. Sensible things are, he says, “books” of God, teacher of truth, it serves to manifest itself to us (Curtius, 1975, p. 451). Exposes Curtius, a debate between a lawyer and a layman, it is wiser not come because their knowledge of school books, but of the “books of God”, he “wrote with his own finger”. Thus the idea that the world and nature are like a book became sacred oratory, then the mystical-philosophical speculation of the Middle Ages and finally the general language. The book of the world acquired sometimes profane sense away from its theological origin although

this did not always happen as we see with Paracelsus who regarded the book as “given, written, taught and arranged by God himself” (Curtius, 1975, p. 453).

The metaphors of the book also pass Renaissance thinkers. For Montaigne, the book world is quintessence of reality contained in the history and life. More significant still is the phrase of Descartes, towards the end of the first part of the Discourse on Method, where it has decided how to give up reading books for materials delivered to the study itself and the great book of the world and experience.

Galileo gave the metaphor of the book is new and very meaningful sense. Curtius mentions that the creator of the exact physics speaks of the great book of the universe that is constantly before our eyes, but can not be read only by those who have learned their writing, “is written in mathematical language, and the signs are triangles, circles and other geometric figures” (Curtius, 1975, p. 455). Accordingly, since it is not given to anyone reading the book of nature.

In the history of modern literature, the Spanish Siglo de Oro stands out for fullness and attractive metaphors for the book. In the field of decision documents Calderón de la Barca expressions as “faithful transfer”, “faithful translation”, “record”, and may also apply to men. The book, in short, is a symbol of wisdom, and this sense can be called Christ “the sovereign book, the science of sciences”.

Calderon de la Barca compared to the book with Christ. So called “book of the universe”, says the sky is a bound book has eleven sheets of sapphire (eleven spheres), (Curtius, 1975, p. 485). With this brief description of the design of the book for different times, we can see that the metaphor of the “book” is not new nor neutral, but responds to multiple interpretations and beliefs; however, we can see that when it evokes, it is claimed as sacred and written by the hand of God. Therefore, we question arises what is the vision that the then President William Clinton and his counterpart Tony Blair also scientists Criag Venter and Francis Collins? Not a neutral view of science, but it appeals more to a theological view of it, in which science has all the answers from the Book of God and its discovery was only possible because of the great finds in Celera Genommics and the Human Genome Project. This will be my second point to develop.

Analysis of metaphor: The Book of Life

The aim of this section is an analysis of the metaphor "the book of life" used to refer to the "human genome". In this sense, will be reviewed from the viewpoint of *interaction approach* by Max Black. To fully enter see how is applied the metaphor "The Book of Life" using the *substitutive approach*, the focus of the metaphor "book" is replacing "genome".

The *substitutive approach* indirectly tells us something about the book but what?, refers to a similar text to the shape of a book that has millions of letters. This brings us to presented context, the focal word "book" reaches a new meaning, which is not at all or the meaning of their literal uses on a regular or which could have a literal substitute any book: the new context (the "frame" of metaphor) tackles the focal word to an extension of its meaning. Therefore, the reader must realize such an extension, that is, has to meet together the old and the new meaning that it could raise the book.

And this sense does not refer to the basic conception we have of a book, but presents a new language with its own alphabet. And as a new book, its genome alphabet has four letters, or bases of DNA, formed by very simple chemical compounds called adenine, cytosine, guanine, and thymine, represented respectively by the letters A, C, G, T. Each letter is paired with a complementary letter of the opposite strand of DNA. Thus, C always pairs with G, A always with T. These "base pair (bp)" are rungs of the spiral of DNA, the famous double helix. This characteristic pairing was an essential factor in the discovery of the double helix and has extraordinary biological importance. Before a cell can divide, their genetic instructions to be copied so that each daughter cell can have a full instruction manual. As the double helix is going unfolding, each daughter strand acts as a template to generate a new complementary strand that is identical to the original. Comparative argues that this manual presents some comparison between "the book and the genome"; and opposing both our "thoughts" about the "book of life" and "human genome" are "in simultaneous activity" and by "interaction" give rise with a resultant meaning of it (Black, 1962, p. 38).

So, when the reader is forced to "connect" the two ideas is found in much firmer ground: in this "connection" reside the secret and mystery of metaphor as we said Black. Since, in speaking of the "interaction" of two minds "in simultaneous activity" (the same

"mutual illumination" or cooperation) is a metaphor used to emphasize the dynamic aspects of the reaction of a reader to a trivial metaphor. To which we will observe now how you can connect these two approaches. Try, for example, look at the metaphor *interactive approach* as their first point in the case of "the book of life." We can say that there are two issues here: the principal, "the book" and the alternative, "life."

However, the metaphorical phrase in question provide the meaning intended her to a reader who does not know much about it; and what is needed is not so much that it knows the normal meaning, the dictionary, the "book" (or be able to use this word in its literal sense) as you know what you call *system accompanying topics*, Black as mentioned in the second point of analysis.

Let us imagine that ask a layman in the topic on "book" that say, especially without thinking about it, what they think about the books true: the resulting set of statements will approach a set of topics that accompany the word "book"; and assume that any culture given the responses of different people to this would agree quite well test, and even an occasional expert who might have some knowledge deprecated about this issue, know certainly from the point of view of the person aware, the *system of topics* may include many half-truths or single or simple errors; but what is important to the effectiveness of the metaphor is not that common points are true, but are provided and spontaneously evoke.

Literal uses of the word "book" are governed by syntactic and semantic rules whose violation produces absurdity or contradiction; which adds to the suggestion that the literal uses of that word normally lead the speaker to accept a standard set of beliefs about the books that are a common position among the members of a linguistic community. Therefore, the effect produced by metaphorically call "book" to "genome" is to evoke the *system platitudes concerning* the book therefore think what "book" means a set of many sheets of paper or similar material, bound, form a volume. Which can treat multiple issues which express one or more ideas but sometimes authors are anonymous. The third point of the analysis based on the *system implications* relating to "book" will lead to an appropriate listener to build another system relating to the subject matter and corresponding thereto; but these implications will not be covered by the topics that the literal use of "life" *usually* implies: new implications must be determined by the

configuration of the accompanying literal uses of the word "book", so that any human traits that can talk without excessive aggression in a "language of books" I will be featured, and not susceptible of such an operation will be rejected to the bottom - the book metaphor suppresses some details and accentuates others saying otherwise, *organizes* our view of the genome, although it can be totally deformed.

Nor should we despise the displacement of attitude that often result from the use of metaphorical language. So, a book-conventionally-an object that provides knowledge, so call to book genome imply that it is also those things related to the book.

Conclusion

As we can see "the metaphor is an intellectual process through which we get to grasp what lies further from our conceptual power." The metaphor holds an alternate science and not, as in poetry, a constituent office job. But also, the scientific metaphor is based on a "metaphorical backwards use instrument," because instead of asserting identities between concrete things, holding identities between abstract parts of things. The poetic metaphor goes from least to most; scientific, from most to least. The fact that the metaphor is used in the art and science should do not forget, according to Ortega, its function is different in each case.

In this sense, for the Spanish philosopher José Ortega y Gasset, "metaphor is an indispensable instrument of mind, is a form of scientific thought." However, it is important not to interpret the metaphorical expression verbatim or vice versa. With this caution, the use of metaphor is, as Ortega y Gasset, *fully* justified. However, although we agree in principle with Ortega, consider carefully not only can we justify metaphors. That is, today more than ever the messages broadcast media have a major impact on the population, ie, the origin of a metaphor as the "book of life" which replaces the "human genome" has to do only informational interest, but is a series of practices leading science and technology today, among which are the justifications technoscientific large projects as called Javier Echeverría (2003). Therefore, the communicator of science must understand the language or metaphors used to prepare a note, column, reporting and other journalistic genres should not be based with objective *rating* or misinformation, but

should appeal to a number of arguments about the boundaries that have research in science and technology.

So far, we note that when used the metaphor "the book of life" in Mexican newspapers, theological language where the concept "book" has the ability to solve various problems deliberately selected, and only read enough to find solutions to various problems such as those related to health. Among the likely benefits of the genetic map of *molecular medicine* that may improve disease diagnosis, early detection of genetic predispositions towards ailments, and generate a rational design of drugs mentioned. However, some issues raised by the human genome arise, with regard to genetic information and other issues arising from it.

As is widely noted, the possibility of knowing the genome itself can trigger important reactions for both individual lives and for those who may have access to that information, whether it be the genome of individuals and human groups and populations specific. As analyzed throughout this work, metaphors can reinforce or, on the contrary, hinder the understanding of science by different social sectors. Everything depends on the ability to have coders and scientific and media-to "filter" their terms. Also depends, of course, the other group: those who have to decode the message, the audience to whom it is addressed. Finally, we consider important that it should be clear that future science communicators have important creative tools as metaphors; however, we must use them correctly and objectively, appealing to ethics so forgotten these days in the journalistic profession as it is of vital importance in a society where the impact can be catastrophic if the data processing is invalid, the unfounded hopes that creates evil by the media.

Thus, I believe that the new professionals must assume an ethical and critical attitude towards the generated science news by the mass media, ie neglecting the scandalous headlines in order to have more retractions or exaggerate some discovery for the benefit levels of hearing or sensationalism. Another fundamental commitment of science communicators must reflect the information we receive from the agencies, as we saw in the transmitted in Mexico a day after the announcement of the sequencing of the human genome news: over 90 percent of news originate in the various international agencies-, therefore, is the duty and responsibility of science communicators review and reflect on the content to be published, since information will fall society.

References

Black, Max. *Models and Metaphors*. Ithaca-Cornell University Press, New York, 1962.

Camacho, J. (2001). "Entre la filosofía y la ciencia (Entrevista a Carlos López Beltrán)", *¿Cómo ves?*, No. 29, p. 29.

Curtius, E. (1975). *Literatura europea y Edad Media latina*. México: Fondo de Cultura Económica, 1ª reimpresión.

Davies, K. (2001). *La conquista del genoma humano*. México: Paidós.

Fourez, G. (2000). *La construcción del conocimiento científico. Sociología y ética de la ciencia*. Madrid: Narcea.

González, J. (2005). *Genoma humano y dignidad humana*. México: Anthropos-UNAM-Facultad de Filosofía y Letras.

Olivé, L. (2000). *El bien, el mal y la razón. Facetas de la ciencia y la tecnología*. México: Paidós-Universidad Nacional Autónoma de México.

Newspapers and agency

Agencias. *Descifran 97% del Mapa Genético Humano; Revolución en la ciencia; Tony Blair*. En: *Excélsior*, 27/06/2000, en primera plana.

Agencias. *Medicina adecuada a cada persona: Pietra- Santa*. En: *Excélsior*, 27/06/2000, p. 14-A.

Agencias. *Genoma: el libro de la vida*. En: *Milenio*, 27/06/2000, p. 36.

Agencias. *La era de la medicina personalizada*. En: *Milenio*, 27/06/2000, p. 37.

Ap, Dpa y Reuters. Científicos de seis países divulgan el mapa de 97% del genoma humano. En: La Jornada, 27/06/2000, p. 29.

Cruz, Javier. Descifran mapa humano. En: El Reforma, 27/06/2000, primera plana.

Reuters, AFP, EFE, AP y DPA. Presentador “borrador” genético. En: El Universal, 27/06/2000, p. A24.

The White House, Office of the Press Secretary, (En línea), <http://www.whitehouse.gov-WH-New-html-20000626.html>. (26 de Junio de 2000).