

RaAM 2014

Intellectual property of (metaphors of) DNA

Ivo Silvestro
ivo.silvestro@unimi.it

Outline

- ❖ Metaphor
- ❖ Metaphor of DNA
- ❖ Myriad Genetics case
- ❖ Metaphors in Myriad case
- ❖ Conclusion

Metaphor

- ❖ Conceptual Metaphor (developed by Lakoff and others)
- ❖ A metaphor is not linguistic, but cognitive: it is about the way we think, not the way we speak
- ❖ With a metaphor we understand a conceptual domain (or frame) in terms of another conceptual domain
- ❖ A metaphor can highlights some aspects and hide others

Example: 'Love is a journey'

- ❖ 'Our relationship is off the track'
- ❖ 'We are at a crossroads'
- ❖ 'We may have to go our separate ways'

Example: 'Love is a journey'

- ❖ The source frame (journey) is mapped on the target frame (love):
 - ❖ lovers correspond to travelers
 - ❖ love relationship corresponds to the vehicle
 - ❖ lovers' common goals correspond to their common destination on the journey
- ❖ Unmapped concepts (e.g. the passion of love) are hidden

DNA

- ❖ Ordinary citizens don't have specific biological expertise
- ❖ Ordinary citizens (and judges and lawyers) know the DNA only through metaphors used by scientist and science communicators
- ❖ Problems like the intellectual property of the genome are faced in terms of these metaphors

Metaphors of DNA

- ❖ In the debate about the patentability of the DNA I have identified 3 types of metaphors
- ❖ DNA is information
- ❖ DNA is a blueprint
- ❖ DNA is the soul or essence of the individual

DNA is information

- ❖ Simplest metaphor
- ❖ DNA is a text, a sequence of 4 letters (A, T, G, C)
- ❖ DNA is a text that contain information (about protein biosynthesis)
- ❖ This is (partially) a neutral metaphor

DNA is a blueprint

- ❖ DNA is the blueprint of the individual
- ❖ This metaphor is coherent with mechanical metaphors often used in biology (the body is a machine, the cell is a factory)
- ❖ Every gene determines a trait and every trait is determined by a gene

DNA is a blueprint

But...

- ❖ We have regulatory genes (unmapped in these metaphors)
- ❖ We don't have "genes for" complex traits, like intelligence and obesity (but also for eye colour)
- ❖ A blueprint doesn't interact with the environment
- ❖ A blueprint usually has an architect (intelligent design)

DNA is the essence

- ❖ The DNA is the essence, the soul of the individual
- ❖ In the DNA we find the core features of the individual (secondary characters are not important and maybe related to environment)
- ❖ The essence is not the sum of single traits, but a holistic and non-mechanistic (and vague) property of the individual

DNA is the essence

Two 'ancestors' of these metaphors in the 19th century:

- ❖ Vitalism: the existence of a non-physical element that characterize living organisms
- ❖ The pervasive “blood rhetoric” of eugenics: worthy parents have necessarily worthy children, feeble-minded parents necessarily feeble-minded children

MARTIN KALLIKAK

He dallied with
a feeble-minded
tavern girl

He married a
worthy Quakeress

She bore a son
known as "Old Horror"
who had ten children

She bore
seven upright
worthy children

From "Old Horror's"
ten children came hundreds
of the lowest types of
human beings

From these seven worthy
children came hundreds
of the highest types
of human beings

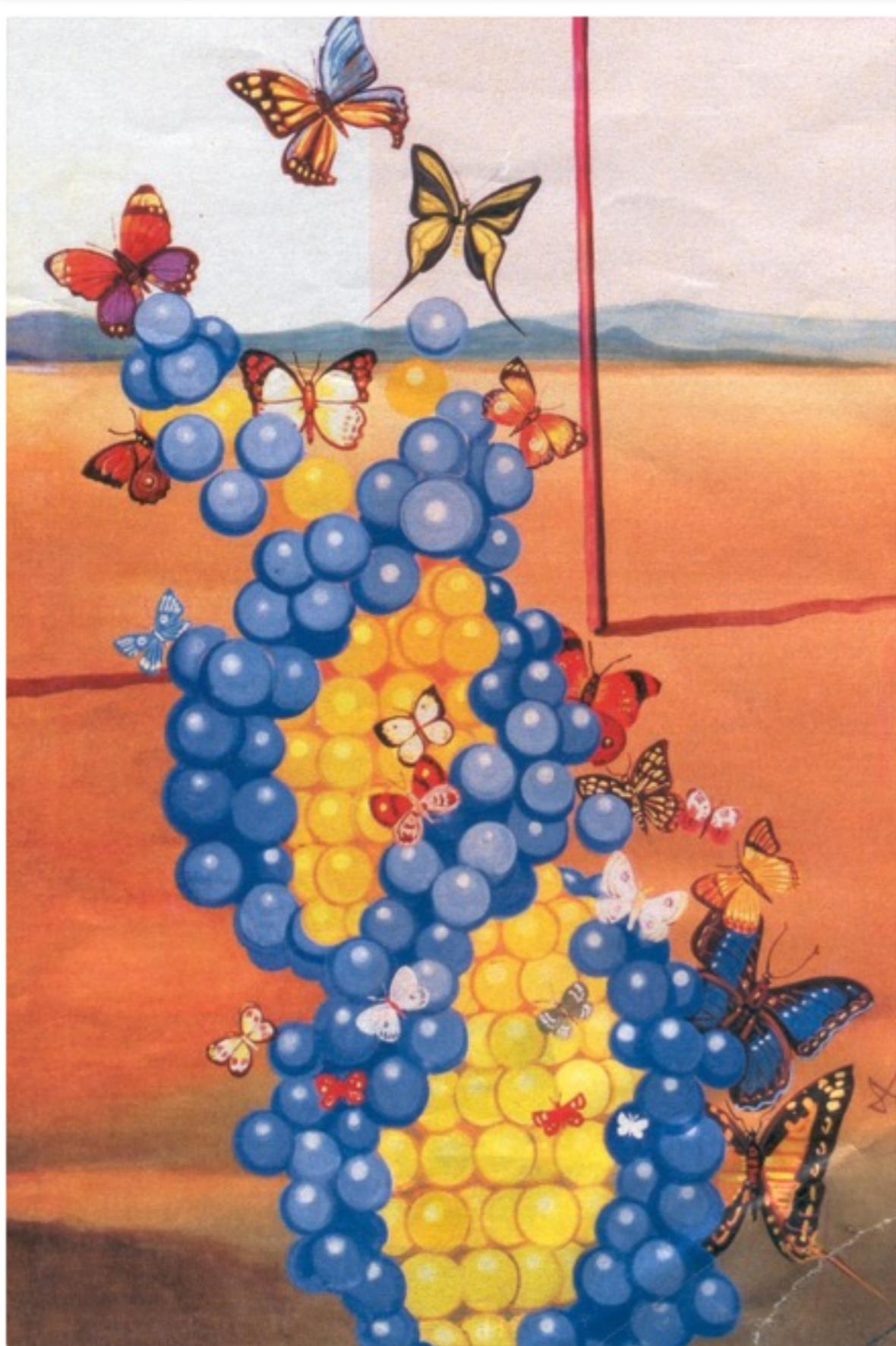


DNA is the essence

The equivalence DNA=essence is also used in 'reversed' metaphors, where the DNA is the source and not the target.

A short search on the web: italians have in their DNA

- ❖ corruption
- ❖ opera (of course Giuseppe Verdi, not Wagner)
- ❖ savings
- ❖ tax evasion



“The external environment is still a key factor in defining Swiss Private Banking and BSI’s business model. Today, our dynamism as well as our ability to innovate and adapt to change are more and more critical. Nonetheless, we remain true to our DNA and the values that have been inspiring us since 1873.”

Renato Santi
CEO BSI Switzerland

Metaphors of DNA

Recap

- ❖ Blueprint frame: mechanic, engineering, analytical, artificial
- ❖ Soul frame: vague, holistic, natural
- ❖ These aspects are mapped on the DNA

Myriad Genetics case

- ❖ 1994 / 95: Myriad Genetics filed patents requests on two human genes (BRCA1 and BRCA2) associated with breast and ovarian cancer.
- ❖ 1996: Launch of BRACAnalysis, a predictive medicine product
- ❖ 1997 / 98: The patents on BRCA genes are granted
- ❖ Myriad decides to not license the test: the only BRCA test available is the (expensive) test by Myriad

Myriad Genetics case

- ❖ 2009: American Civil Liberties Union and Public Patent Foundation filed a lawsuit charging that Myriad's patents are unconstitutional and invalid
- ❖ 2010: The BRCA patents are declared invalid
- ❖ 2011: On appeal, the verdict is reversed
- ❖ 2012: The Myriad case goes to the Supreme Court

Myriad Genetics case

- ❖ The key question of the Myriad case is: an isolated DNA sequences is patentable as composition of matter?
- ❖ In other words: the isolation of a gene is an act of human ingenuity? An isolated gene is natural or artificial?

(Spoiler: no, isolated DNA is not patentable, though complementary DNA is patentable)

Metaphors in Myriad case

Reading the documents of the Myriad case in search for metaphors...

Metaphors in Myriad case

Opinion of the Supreme Court: DNA is information

- ❖ “Myriad did not create or alter any of the **genetic information** encoded in the BRCA1 and BRCA2 genes”.
- ❖ “The claims understandably **focus on the genetic information** encoded in the BRCA1 and BRCA2 genes”.
- ❖ “Genes and the **information** they encode are not patent eligible”.

Metaphors in Myriad case

Opinions against patentability of isolated DNA

- ❖ “[Patented genes] occur in nature and serve the **functions dictated by nature**” (Ass. Molecular Pathology).
- ❖ “Genes are chemicals, but they are unique because **they are much more**; they embody the information and instructions the body uses to function” (AMP)
- ❖ “Because human genes are unique and convey information about the **essence of being human**, they should not be patented” (James Watson).

Metaphors in Myriad case

Similar concepts are in comments submitted to the US Patent and Trademark Office for the revised Utility Examination Guidelines:

- ❖ “Several comments state that patents should not issue for genes because the sequence of the human genome **is at the core of what it means to be human** and no person should be able to own/control something so basic”.
- ❖ “One comment suggests that the USPTO should not allow the patenting because it would violate the **Thirteenth Amendment**” (which abolished slavery!)

Metaphors in Myriad case

The strategy of Myriad is to consider the isolated DNA as a chemical compound, so we find few metaphors in the Myriad's arguments.

- ❖ “The claims are not directed to functions, information, or printouts. They claim **precisely defined molecules** – compositions of matter – having a specific, non-naturally-occurring structure” (Brief for Respondents)

Metaphors in Myriad case

But in other documents we find some engineering metaphors.

- ❖ “Genes are the ‘basic units of heredity’ that enable organisms to transmit to future generations the **blueprint** for making all essential proteins.” (Brief for the United States as Amicus Curiae)
- ❖ “The majority of genes act by **guiding the production** of polypeptide chains that form proteins” (US Court of Appeals for the Federal Circuit).

Conclusion

- ❖ Soul metaphors are the main strategy to show the inadmissibility of DNA patents
- ❖ Supporters of DNA patents have instead two different strategies:
 - ❖ consider the DNA only a molecule
 - ❖ use blueprint and engineering metaphors

References

Metaphors and DNA:

- ❖ Nelkin, Dorothy (2001) “Molecular metaphors: the gene in popular discourse”, *Nature Reviews Genetics*, vol. 2, 7, pp. 555-559
- ❖ Rovira, Sergi Cortiñas (2008) “Metaphors of DNA: a review of the popularisation processes”, *Public Understanding of Science*
- ❖ Keller, Evelyn Fox; *Making Sense of Life, Explaining Biological Development with Models, Metaphors, and Machines*, Harvard University Press, 2009

Myriad case documents are available online:

- ❖ <http://www.scotusblog.com/case-files/cases/association-for-molecular-pathology-v-myriad-genetics-inc/>
- ❖ <http://www.unipv-lawtech.eu/il-brevetto-di-geni-umani--il-caso-myriad.html>