Digitalisation and organisational innovation

Lesson 6. Inventors and creativity

Introduction

1. Genius or puppet
2. The professionalisation of inventive activity: on the shoulders of giant
3. The professionalisation of inventive activity: the “discovery” of inventors
4. The psychology of creativity
5. Conclusion

1. Genius or puppet

- As we discussed in previous lessons, **innovation** has recently returned to the center of debates on **economic development**.

- Most studies, however, have focused on its **economic value**, while giving little attention to the **actors** and generative **mechanisms** behind it.

- Following **Schumpeter**'s ideas, **innovative entrepreneurs** have attracted most of the attention, while **inventors** have received much less.

Who are the protagonists of invention and innovation?

- Approaches in the social sciences oscillate between two opposing views:

1. An **individualistic perspective**, which gives a central role to particularly **creative individuals** with specific **personal characteristics**.

2. A **holistic perspective**, which emphasizes the importance of **contextual conditions** that shape innovation: such as, market or social needs, and the cultural, territorial, or organizational characteristics of specific **environments**.

The «individualistic» perspective

- The individualistic perspective has deep roots in **Western culture**, which often celebrates great innovators and creative **geniuses**.

- For example, in the modern era, pioneers of technological innovation (such as **James Watt**, the inventor of the steam engine that powered the First Industrial Revolution), are portrayed as **heroic figures**, representing the rise of the industrious middle class.

- The importance given to highly creative individuals was further consecrated by the so-called **Lotka's Law**. In 1926 statistician Alfred Lotka discovered that most scientific production came from a small number of individuals.

- By analyzing publications in chemistry and physics, Lotka proposed a **general rule**: scientific productivity follows an inverse square distribution, meaning that only a few scientists produce the majority of research output (if we take 100 scientists publishing in a given field, about 60 publish only one article).

- This distribution of scientific productivity was later tested and confirmed in **several creative fields**, including publications in the humanities, patents by American inventors, the inventive productivity of researchers in U.S. semiconductor firms, and German companies in the electrical, chemical, and mechanical engineering sectors.

- **Historiometric research** — the quantitative study of historical phenomena — relaunched by Dean Simonton in the 1970s, shows that half of all innovation in any field is produced by only 10% of its practitioners.

- These studies therefore reveal a highly asymmetric distribution of scientific productivity and creative capacity.

- This supports the idea that invention and innovation are driven by individuals with **exceptional qualities** and has led researchers to study creativity as a personal trait.

The risks of an holistic perspective

- Certain personality traits surely play a role in the creative process, but they must be understood within their proper **context**.

- But we should avoid the opposite mistake — typical of **functionalist approaches** — which explain invention and innovation as **predictable** (necessary and automatic) responses to market or social needs, or to specific contextual conditions.

- Such an interpretation risks becoming a **deterministic approach**.

- What is needed instead is an **integrated analytical approach** that considers not only **individual factors** — such as the social background and personal traits of inventors — but also **relational factors** (social networks) and **institutional** ones (territorial, sectoral, and organizational conditions) that shape inventive processes.

- We will then focus on two aspects:

(A) the **professionalization of inventive activity**

(B) the research by **psychologists on creativity**

2. The professionalisation of inventive activity: on the shoulders of giant

- There are only a few systematic studies on **inventive activity**. As a result, **inventors** and their inventions have often been overlooked.

- This underestimation is partly due to the **decline of independent inventors** that characterised the Fordist model of development, followed by the growing **socialization and formalization of innovation processes** (collective research teams, higher education levels, codified knowledge, standardized project evaluation procedures, and the routinization of research).

- In fact, although with national, sectoral, and territorial differences, the twentieth century saw the **rise of corporate research** (in the laboratories of large industrial firms), universities, and public funding, which reduced both the role of **individual inventors** and the **"market" for technological innovation**.

The social and professional figure of the inventor

- The **social and professional figure of the inventor** emerged in the nineteenth century, with the Industrial Revolution and the creation of a market for technological discoveries.

- Much of the productivity growth in late eighteenth-century in England was linked to **continuous technological improvements** in production processes. A **complex wave of innovations** that transformed an economy based on agriculture and artisanship into one driven by industry and machinery.

- Those were the years that saw the rise of the factory system and the invention of new materials, which expanded the range of products available (for example, iron gradually replaced wood).

- Although intellectual curiosity and the creativity of talented individuals played a role, it is impossible to ignore the **constellation of interests** and **collective commitment** behind each stage of the discovery process.

- The **steam engine**, for example, was created to solve a practical problem that was limiting Britain’s development: the need to pump water out of coal mines.

- By the late seventeenth century, demand for fossil fuels had grown rapidly. Massive deforestation, caused by using wood for both heating and production, made coal the main alternative energy source for emerging British industry. This required digging deeper mines and finding ways to remove the water that accumulated in them.

- In the second half of the seventeenth century, several inventors had already started using steam energy to design and patended mechanical systems for pumping water from wells (Thomas Savery in 1698 and Thomas Newcomen in 1712).

- And about fifty years later, in 1765, **James Watt** made a major improvement (the separate steam condenser) and in 1783, built a new version of the engine. It quickly became popular, and most of the 500 engines produced were used in the textile industry (the driving force of the Industrial Revolution).

- In the early nineteenth century, other inventors applied the steam engine to **transport**, creating the first locomotives and laying the foundations for the modern railway system. (cfr. Schumpeter)

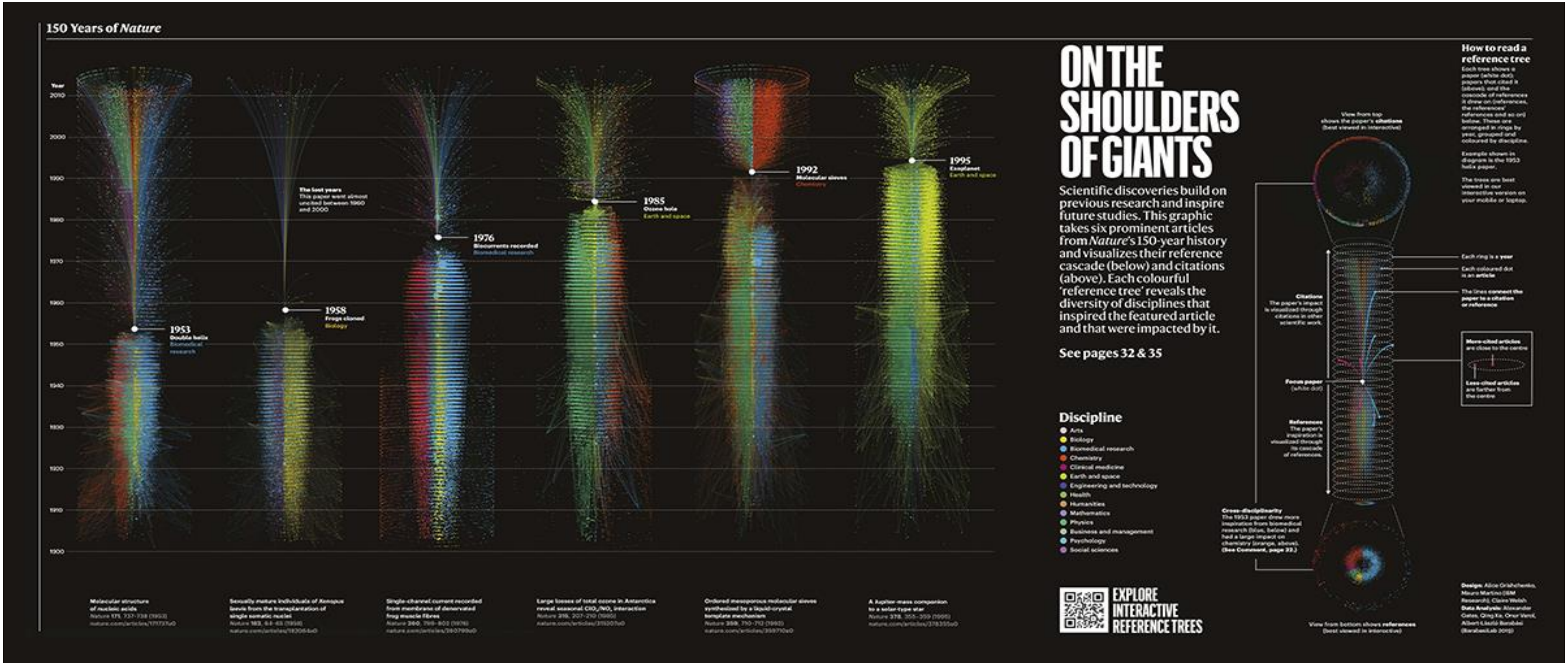
- The history of the steam engine clearly shows two things: its discovery was part of a **complex socio-economic process**, and James Watt's invention resulted from a **broader, collective development of knowledge**.

- In other words, **invention does not take place everywhere**. It emerges in specific places and contexts, and it is not the work of an isolated individual.

- At the same time, it is not created by just anyone: it requires knowledge, passion, and determination.

- Many technological advances that shaped our modern world came from from the work of men of great talent, who improved on **existing knowledge** and designs.

- In doing so, they often achieved innovations of great importance. As **Isaac Newton** said, the best discoveries are made “**on the shoulders of giants**”: even when linked to one person (or a few individuals), most inventions are the result of collective effort.



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3. The professionalisation of inventive activity: the "discovery" of inventors

- This raises a second question: ***who were the main figures behind the technological innovations that accompanied Britain's industrialisation process?***

- Most inventions came from **operatives**.They were mainly artisans, skilled workers, or foremen, supervisors, and managers employed by factories.

- Some inventors managed to improve their **working conditions**, gaining higher wages, profit shares, or even company ownership.

- However, in most cases, the high **cost of patents** and **limited financial resources** prevented workers from fully benefiting from their discoveries (role of institution).

- In fact, **uncertainty** about the possibility of enjoying the benefits of their inventions made employees and artisans reluctant to reveals and share their findings.

- They feared their inventions would benefit their employers rather than themselves, since it was the employers who had the resources to develop and patent new ideas.

The "golden age" of the independent inventor

- The period from the **first Industrial Revolution** to the **early twentieth century** is often described as the "**golden age**" of the independent inventor.
- The rise of inventors as an **independent social group** (which followed an entrepreneurial logic) was supported by the creation of a **real market for technological innovation** and, closely linked, to the development of **patent systems**. (institutional condition)
- British patent law is the oldest in the world, first introduced in 1624 with the Statute of Monopolies.
- However, it was only in the second half of the nineteenth century that reforms simplified procedures and reduced costs to make patents more accessible to working-class inventors and to strengthen the bargaining power of "ingenious workmen."

- This reform was also influenced by the **American example**. In the first half of the nineteenth century, the United States had already developed a large market for technological knowledge.

- The U.S. created a highly effective system for protecting intellectual property, with much lower access costs than in Europe.

- It also used **transparent procedures** that granted patent rights only to those who had truly made an innovative discovery. In addition, the system **protected inventions** from anywhere in the world.

- In the U.S. system, every invention was checked in advance by a technical committee, which verified both its originality and its legality.

- Most **European countries**, instead, used a simple registration system that only confirmed whether the administrative steps were done correctly.

- The American model worked well and greatly reduced the “**transaction costs**” of technological innovation.

- <u>Careful evaluation of originality</u>, combined with <u>strong protection of intellectual property rights</u>, **lowered uncertainty** about the <u>economic value of a patent</u> (Spillover).

- This system made it easier for inventors to receive funding for their research and, more importantly, to **commercialise** their discoveries.

- Studies on early nineteenth-century patents show that inventors in the United States came from **diverse social backgrounds**, and the share of inventors from the economic elite was much lower than in Britain.

- Even the typical “great inventor” often had little formal education and came from modest social origins.

The “patent field” growth

- As technology transactions increased, the number of **specialised professionals** working in the “patent field” grew quickly.

- New roles emerged, including: journalists and publications focused on patents, lawyers in intellectual property, and consulting or brokerage agencies that helped with the submission of applications and the marketing of licences, etc (ecosystem).

- In the United States, the rise of mechanised production and a modern patent system, supported the creation of a **real market for technological innovation**.

- At the same time, it helped form a **new social group** of “**independent inventors**”: research specialists who could earn an income from their patents and often achieve upward social mobility.

- The number of patents grew sharply from the 1840s onward and kept rising until the end of the century. At the same time, more inventors began to **specialise** only in research and patenting.

- The way in which inventions were used also changed. In the early nineteenth century, inventors often exploited their discoveries directly by **creating new firms**.

- In some cases – as a complementary activity –, they also **sold** or **licensed** their **patents** on a <u>limited scale</u>, usually in regions where they did not run their own business (regional scale).

The growing socialization of innovation processes and the decline of independent inventors

- In the second half of the century, the role of the inventor became more **professional**. Not only did the number of **specialised inventors** increase, but the **commercial use** of patents also expanded.

- On the one hand, inventors became more skilled at mobilising **ex ante funding** for their research in exchange for future patent rights; on the other, they became more willing to sell their rights to companies with which they had **no long-term connection**.

- These inventors specialised in research and new ‘discoveries’, acted like **entrepreneurs** in the technology market, and enjoyed high **geographic and contractual mobility**, thanks to legal protection for their ideas.

- Their activity was highly concentrated in the most economically developed areas of the north-central Atlantic coast, especially southern New England and New York State.

- However, at the beginning of the twentieth century, the “golden age” of independent inventors began to decline, both in the United States and in other countries.

- Their **autonomy quickly decreased** as they started forming **long-term, exclusive relationships** with specific companies, to which they would “sell” their ideas.

- This process took different forms across **regions**: in the Northeast, inventors often became employees in large firms, while in the Midwest they were more likely to start their own companies or, more often, form partnerships with firms that used their inventions.

- This **territorial variation** was linked to differences in each state’s institutional context, especially the structure of local financial markets.

- In the Northeast, venture capital was highly concentrated, and the New York Stock Exchange mainly financed large, established companies.

- By contrast, in some Midwestern cities, such as Cleveland, a more dynamic local venture capital market — with investors willing to support new technology firms — gave inventive individuals greater entrepreneurial autonomy.

- Besides these regional differences, one key trend remained: from the early twentieth century, the number of independent inventors declined, and the number of patents they registered fell as well.

- At the same time, the role of the “**employee inventor**” grew, as more research was carried out by highly educated staff working inside large private firms or public organisations.

- So, the first decades of the twentieth century marked a major change in the “**social organisation of invention**”.

The fordist era

- With fordism science and technology played a more central role in development and became more responsive to economic needs.

- The production of new knowledge became then more closely linked to decisions made by actors that reacting to market pressures and stimuli.

- Companies, especially large ones, began to invest in research and created **big industrial laboratories**.

- Large diversified firms — such as General Electric and DuPont in chemicals, IBM in data processing, Westinghouse in electricity, and General Motors in automobiles — became industry leaders by massive investment in **R&D**.

- Their laboratories tested many different innovations and were financed with large amounts of capital raised from private investors.

- The rise of **industrial research** had major effects not only on **new technology**, but also on **scientific progress** that sometimes emerged from these activities.

The Bell's Labs

- The most famous example is Bell Labs. From 1925 onward, Bell Telephone Laboratories carried out research that made important advances in both basic and applied science.

- Their work led to several groundbreaking discoveries — in radio astronomy, laser technology, information theory, operating systems, and more — and earned company researchers seven Nobel Prizes.

- Bell Labs became especially famous for inventing the **transistor** in 1947, created by three of its researchers. This device made it possible to miniaturise electronic circuits and later transformed electronic equipment and computers.

- Moreover, Industrial laboratories did more than produce **new research**. They also gave companies the **skills** to understand scientific knowledge coming from universities and to track how new discoveries might affect the market.

Public and private funding

- Scientific and technological research was also carried out in **universities** and **research centres**, funded by governments or by private philanthropic foundations (such as Rockefeller, Guggenheim, and Carnegie in the United States).

- **Public** and **private funding** became a major factor shaping the direction and intensity of inventive activity in the post-war period. For example, in the early 1950s, the U.S. federal government financed more than half of all national R&D spending.

- This was especially true in fields where public benefits were much greater than private profits.

- The rise of large private and public research techno-structures changed both the **social role of the inventor** and the **generative mechanisms of invention**.

- Research began to focus on **big organisations** and on the **economic and organisational aspects of innovation**: funding, division of labour, specialised knowledge, and economies of scale of the research.

- In other words, attention shifted to the "**visible hand**", with a clear divide between public and private knowledge.

- The **scientific community** (mainly in universities, driven by reputation) promoted open knowledge and the free circulation of results, while the **technological community** (based in firms, driven by profit) promoted proprietary knowledge, using secrecy and patent protection.

The dualistic structure in American industrial research

- Other scholars have offered different explanations for the spread of large industrial laboratories.
- David **Mowery** highlights the high specificity of industrial research, which must be closely integrated with productive activities and adapted to specific company's needs.
- He then stresses that firms need a strong supply of human capital to **absorb and use external knowledge**.
- Mowey also notes the difficulties of defining and enforcing research contracts with **external partners**, especially when confidentiality of the results must be guaranteed.
- In short, the need for <u>internal absorptive capacity</u>, combined with the high <u>transaction costs</u> of using the market, led companies to **internalise** much of their strategically important research.

- This did not completely eliminate the use of external agencies, but it reduced their role.

- Mowery identifies a **dualistic structure** in American industrial research during the first half of the twentieth century.

- Alongside internal company laboratories, many private research institutes were created — around 350 in total — employing up to 5,000 researchers and engineers.

- A relationship of **complementarity** was formed between these two sectors.

- **Private research** institutes focused on routine and standardised tasks (such as materials testing), taking advantage of economies of scale. They served many industries and offered generic services that did not require company-specific knowledge.

- **Company laboratories**, instead, concentrated on more complex and strategic projects, tailored to the specific needs of each firm — in other words, firm-specific research.

- In short, when technological innovation became central in sectors such as communications, transport, electricity, steel, and chemicals, its **economic** and **organisational costs** also began to rise.

The institutionalisation of the employee inventor

- The growing amount of resources needed, together with the uncertainty of projects at the technological frontier, changed the preferences of all **actors involved in innovation** (entrepreneurs, investors, and inventors).

- Technological innovation was becoming increasingly **capital-intensive**. This gave a **competitive advantage** to large firms that began to organise and diversify their own research and launch projects carried out by in-house technical staff.

- This led to a new socio-organisational structure in the private sector: the **institutionalisation of the employee inventor**.

- Large companies became the main holders of both the **human** and **financial capital** needed for innovation.

- They could attract **independent inventors**, who saw the chance to continue their work in well-funded industrial labs, and they also created a **job market** for technical and scientific graduates (cfr UK).

- At the same time, they attracted **investors**, who felt better protected in this environment than in investing in high-risk individual projects carried out by small companies or independent inventors.

The bureaucraisation of research: the Xerox PARC

- The growth of these large industrial research structures also had drawbacks.

- Research activities were often slowed down by a process of **bureaucratisation**, which in many cases limited the ability to produce truly innovative results or failed to exploit them to their full potential.

- A classic example is **Xerox Palo Alto Research Center** (Xerox PARC), a research centre based at Stanford University and funded by Xerox, the leading producer of office machines, such as photocopiers.

- Created in **1970** with large human and financial resources, the centre produced several major innovations in its first five years: the first personal computer prototype, the mouse, icons and drop-down menus, local area networks, and the laser printer.

- However, Xerox decided to commercialise only the laser printer and allowed **other companies** to develop and profit from the remaining inventions.

- This story is told in a book with a very meaningful title: *Fumbling the Future: How Xerox Invented, and Then Ignored, the First Personal Computer*.

- The **geographical** and **cultural distance** between the California lab and Xerox's headquarters in Connecticut led the management to undervalue many of PARC's revolutionary inventions, because they still thought of Xerox mainly as a photocopier company.

- The company's **hierarchical management** style also clashed with PARC's informal and horizontal organisation.

- The different **work culture** and **lifestyle** on the West Coast made it harder to transfer new technologies to the East Coast headquarters.

- However, **Steve Jobs** from Apple visited Xerox in 1979 and immediately saw the potential of PARC’s work. He later **hired several of the researchers**.

- After five more years of development, Apple launched the Macintosh in 1985, an innovative personal computer for business use — and it became a great success.

- In addition, the increasing **standardisation of research**, together with tighter **managerial control** and **financial monitoring** (such as cost–benefit evaluations of projects), gradually reduced the ability of big corporations to develop truly **cutting-edge projects**.

- Even though most research in the United States is carried out by large companies (in the early 2000s, private firms funded almost 70% of all R&D, and 46% of this spending came from only 167 very large companies with more than 25,000 employees – a figure that rises to 80% if we include the 2,000 firms with over 1,000 employees), most big corporate laboratories focus on **routine work** and **incremental innovation**.

- These data suggest that while large firms perform most R&D, the most radical and original innovations are mainly produced by **medium-sized** and **small firms**.

The Post-Fordism and the rebirth of SMEs and independent entrepreneurs

- With the rise of **post-Fordism** and then the **knowledge economy**, SMEs regained importance: first in traditional industries (mainly through incremental innovation), and later also in high-tech sectors and areas of more radical innovation, such as telecommunications, IT, personal computers, and biotechnology.

- In this context, in recent years, the number of **venture capital** investors willing to finance highly innovative companies has increased.

- As a result, **independent inventors** and the **market for innovation** have attracted renewed academic interest.

- In many sectors, large research laboratories have been reduced in size, while small firms focused on cutting-edge research (especially technological start-ups) have multiplied. These companies often sell the **intellectual property rights** to their discoveries.

- **Patent activity** and the market transactions of new technologies have therefore started to grow again.

- This evolution has shifted the focus of innovation studies toward its **relational aspects**, with growing attention to **how information circulates** and **how innovative firms cluster** in **specific areas**.

- The creation and diffusion of new knowledge are now seen as **collective processes**, based on **interaction** between **firms** and **institutions** within certain **regions** — Silicon Valley is the best-known example but also industrial districts.

- **Theoretically**, researchers now place less emphasis on the idea that research results are difficult to appropriate.

- Instead, they highlight that even public knowledge requires the **ability to use it**.

- There is now more stress on the fact that knowledge, including public knowledge, requires a capability of use that encourages private actors to invest in R&D, to enhance the ‘absorptive capacity’ of knowledge and of the information produced **outside** individual companies (spillover).

- In addition, changes in the knowledge base of some sectors — especially information technology, life sciences, and biotechnology — have led to stronger **integration** between different **types of knowledge** and closer collaboration between **companies** and **universities**.

- As a result, the traditional boundaries between the **scientific community** and the **technological community**, and between “academic inventors” and “company inventors”, have become less rigid.

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- The **locus of innovation** has changed again: first it was the innovative entrepreneur, then large innovative firms, and **later** the focus is on social and territorial innovation systems; **and now?**

- This shift highlights the importance of the relationship between economic actors (firms) and “non-economic” institutions.

- However, the role of **inventors** remains in the shadow. Inventors, who had already become almost invisible during the Fordist era, only partly reappear in post-Fordism, but mainly in studies on the **psychology of creativity**.

2.4 The psychology of creativity

- What do we mean by creativity?

- In social psychology, it is the ability (individually or in groups) to develop original solutions that are useful or at least influential.

1. The Gestalt psychology
2. The psychoanalytic approach
3. The psychology of creativity
4. The cognitive psychology
5. The “socio-cultural approach”

The Gestalt psychology

- In the first half of the 20th century, **Gestalt psychology** (Psychology of Form) studied some key aspects of creativity, especially the role of insight (a sudden moment of intuition or illumination). They saw creativity as an **adaptive response to new and unusual situations**.

- Gestalt psychologists said that people use two different styles of thinking, depending on the type of problem:

1. **Reproductive thinking** – used for routine problems. It relies on solutions that worked in the past.
2. **Productive thinking** – used when we face new problems that have no ready-made answers. This is a creative form of thinking.

- In short, creativity means being able **to look at reality in a new way**, reorganise information, and give a more **suitable response** to a difficult or unusual situation.

The psychoanalytic approach

- In the psychoanalytic approach, creativity comes from **impulses** with a **strong emotional value** for the subject.

- Creative thinking is seen as a way to express **unconscious desires** in a socially acceptable form. This happens through sublimation, a process in which deep instincts are transformed into socially valued activities – for example, art or great scientific inventions.

- **Sigmund Freud** explained this idea in a famous 1910 essay on Leonardo da Vinci, showing how creativity can turn hidden desires into cultural or scientific achievements.

The psychology of creativity

- However, it was only from the **1950s** onward that research on creativity started to develop in a systematic way.

- This happened after a key moment in 1950, when Joy **Paul Guilford** gave an important speech at the American Psychological Association, officially recognising creativity as a field of study.

- The rise of this research took place during the **Cold War**, when the United States linked creativity to economic, technological, and military competition with the Soviet Union (role of the state).

- The belief was that the **long-term victory** in this global rivalry would depend on scientific superiority and on the ability to mobilise as many citizens as possible in creative scientific work.

- In the beginning, psychologists tried to study creativity as a **personal trait**, using the same kinds of tests used to **measure intelligence**.

- But in the early 1960s, researchers showed that **intelligence and creativity** are not the same thing. A person needs a basic level of intelligence to be creative (threshold theory), but intelligence alone does not make someone creative.

- Guilford had already noted that normal IQ tests do not measure creativity. These tests mainly evaluate **convergent thinking** – a logical way of thinking that finds the one correct answer to a problem.

- Creativity, instead, is based on **divergent thinking** – the ability to produce many different potentially viable solutions, not just one.

- Later research identified the main components of **divergent thinking**:

1. **Fluency** – the ability to produce many ideas quickly.
2. **Originality** – the ability to give new and unusual answers that are still acceptable.
3. **Flexibility** – the ability to change perspective and avoid getting stuck in only one way of thinking, by considering different alternatives.

- Guilford designed then specific tests to measure each part of divergent thinking.
- His key innovation was the idea that creativity can be studied in **normal people**, not only in “geniuses”, and that it can be measured with **a psychometric approach**.
- However, despite the success of these studies – and their influence on school programmes that promote creative thinking – this approach was also strongly **criticized**.
- Over the following decades, **other ways** of studying creativity became more popular.

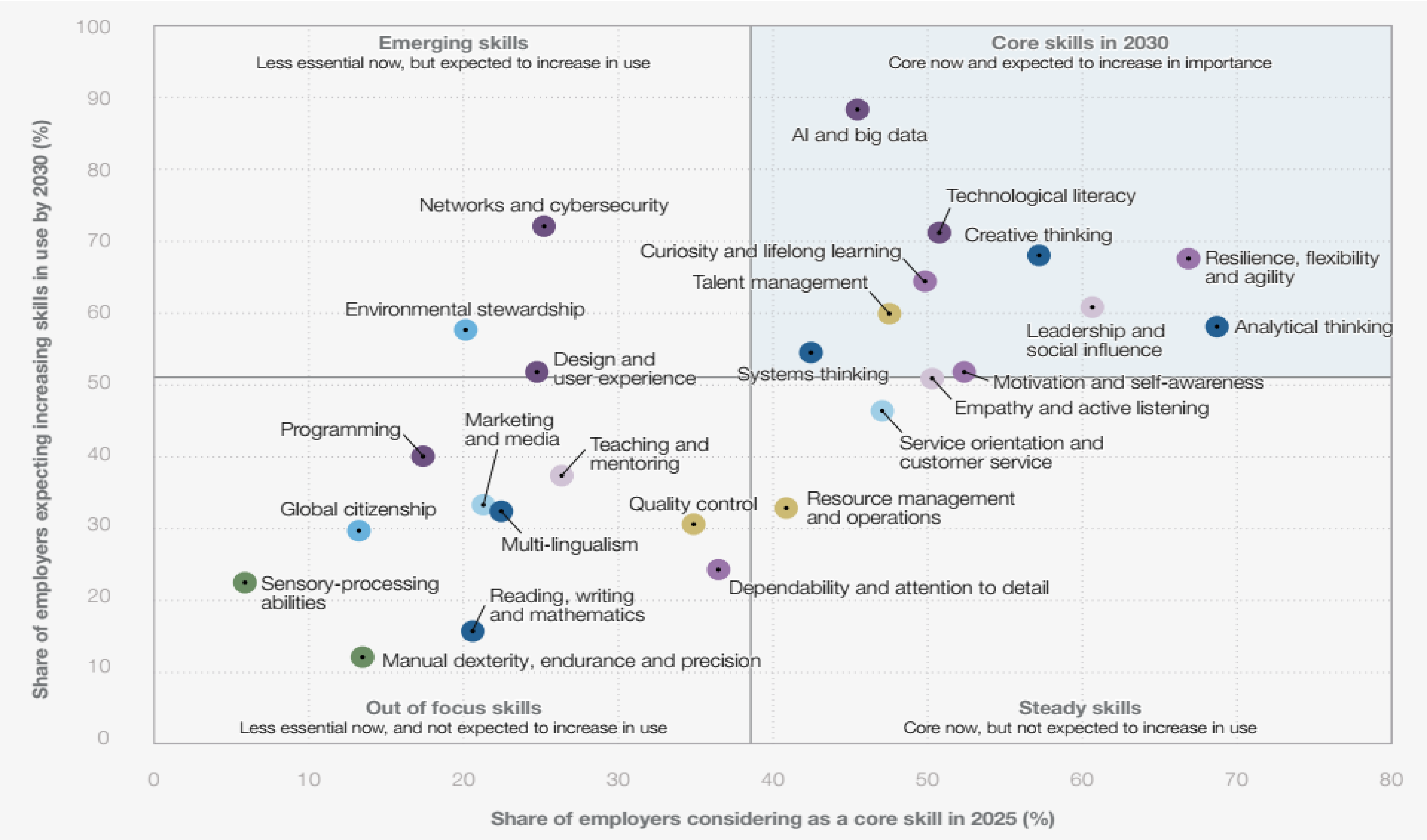
The cognitive psychology

- From the **1970s** onward, **cognitive psychology** opened a new phase in the study of creativity.
- Researchers focused especially on the **mental representations** and **cognitive processes** that support creative thinking.
- One key idea was that creativity does not come from mysterious or exceptional mental abilities, but from the same cognitive processes used in everyday problem-solving. Insight, for example, results from using stored knowledge in new ways.
- In this sense, creativity is based on ordinary mental processes that can produce extraordinary results.

- **Studies on personality** also identified some common traits among creative people: creativity requires sustained effort in a specific domain and, unlike the stereotype of the “wild genius”, it is often associated with individuals who are well-balanced and successful in their field.

- Since the **1980s**, however, both the topics and the methods of investigation have multiplied, and the field has diversified into several specialised sub-areas.

- And in the **1990s**, **soft skills** (learning strategies; problem solving; critical thinking; creativity, originality and initiative; leadership and the ability to influence others) became a crucial element for all workers.



Core skills in 2030: Share of employers considering skills to be a core skill in 2025 and share of employers expecting skills to increase in importance by 2030.

WEF (2025), Future of Jobs Report 2025

The “socio-cultural approach” to creativity

- Psychologists have increasingly analysed the **social and cultural contexts of creativity**, linking them not only to individual and motivational factors, but also to the **processual** and **relational** dimensions of creative activity.

- It gradually became clear that earlier studies tended to **decontextualise and de-socialise creativity**, overlooking the fact that even the most solitary creative individuals are always **embedded** in <u>networks of influence</u>.

- In reality, <u>social dynamics</u> **shape the rules, motivations, knowledge, and skills** that condition creativity, both at the <u>individual</u> and at the <u>group level</u>.

- The “socio-cultural approach” moves in this direction: it studies creative individuals in relation to the different social contexts in which they operate.

- For an idea to be considered innovative, it must be not only **original** but also **appropriate** – meaning that it is recognised as valid by a relevant community of reference.

- The creativity of a new product therefore depends less on its **intrinsic qualities** and more on the **impact** it has on others.

- In other words it requires **public recognition**, based on interaction between producer and audience: ‘*Creativity is not the product of single individuals, but of social systems making judgments about individual’s products* (Csikszentmihalyi 1999, 313).

- To understand creativity, we need to look at the interaction of three elements:

1. The **person** (source of innovation), the individual who generates the innovative idea.

2. The **field**, composed of experts of a creative field (such as teachers, critics, editors of specialised journals, theatre or museum directors, and funding foundations, influencer) who select the ideas that are considered original and appropriate. They then act as the “**gatekeepers**” of a sector.

3. The **domain**, the area into which innovation, once it is recognised as such, enters and is diffused. It includes all the products created in the past and the rules and conventions accepted within a specific sector of activity.

- Innovation is therefore the transformation of **cultural practices** in a way that is considered appropriate according to the criteria of that field.

- Culture is made up of many domains (e.g. music, mathematics, religion, technology), each with its own rules, objects, symbols, and shared systems of notation.

- The level of connection or separation between domains changes across **societies** and **historical periods**.

- Innovation happens inside each domain, through the work of creative individuals who have specific abilities.

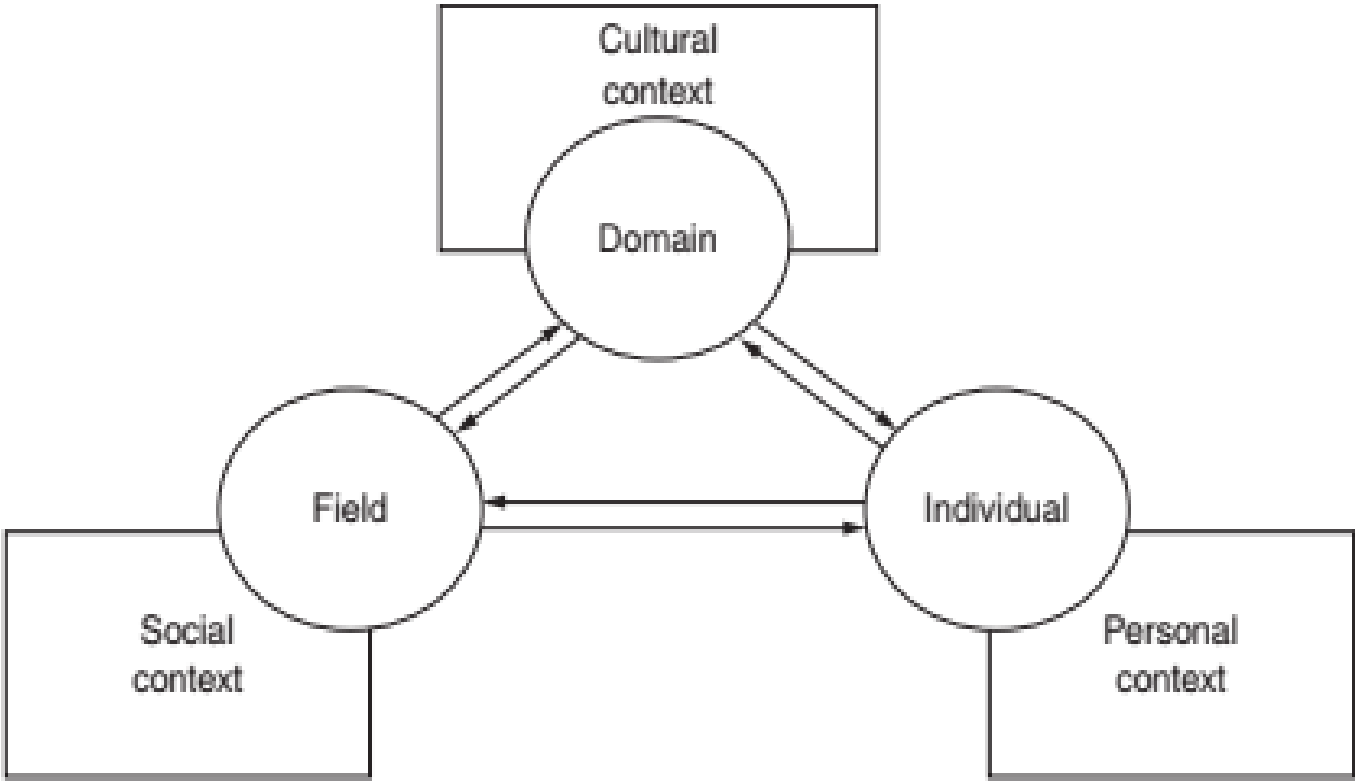


Figure 2.1 Systemic approach to creativity (source: adapted from Csikszentmihalyi (1999, 315)).

Conclusion

- As we saw, the first psychological studies treated creativity as a personal trait of a few special individuals and ignored its social dimension.

- However, the social dimension is always present in creativity: it influences both the moment when new ideas are generated and the later phases of evaluation, development, and communication within a specific field.

- The socio-cultural approach overcomes these limits. It goes beyond the individualistic view and examines the social context in which the creative process takes place.

- The social dimension becomes even more visible in the collective forms of creativity, that are now central in this field.

- Today, the most important creative processes are based on cooperation and take place within **complex networks** of highly skilled experts.

- Studies on “creative groups” and “work teams” now focus on the social interactions and organisational conditions that support or block collective creativity.

- These topics offer rich ground for interdisciplinary work.

Thanks for the attention

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(Fai clic sulla freccia in modalità Presentazione)