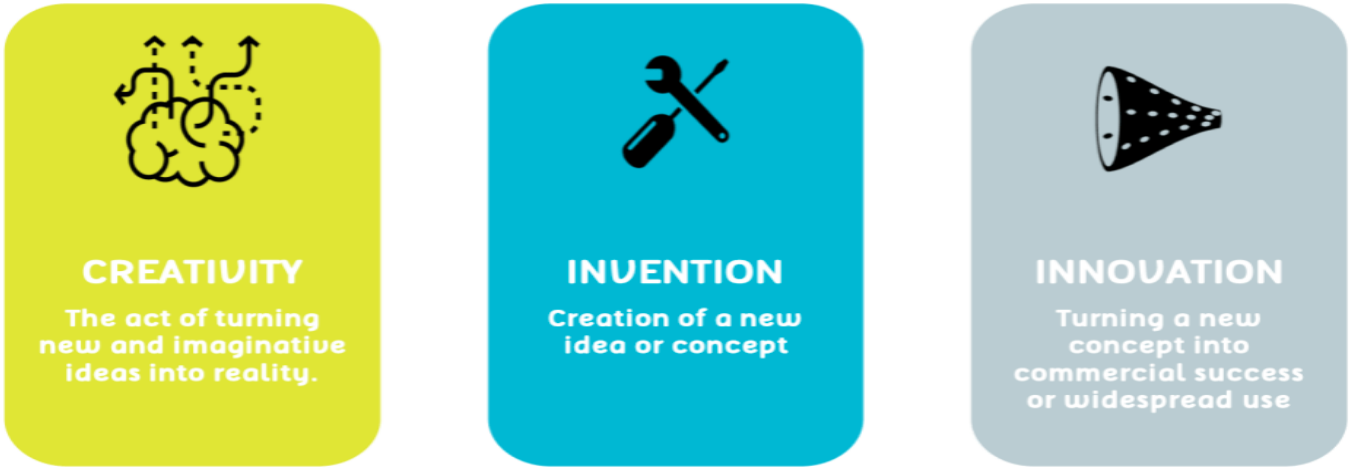
Invention and creativity

Innovation, Invention, and Creativity

https://www.youtube.com/watch?v=FXJUDyqobbM

How does innovation differ from **invention** and **creativity**?

Creativity, **invention**, and **innovation** are all interrelated and necessary for growth to occur. We can follow any successful company and see an investment of time and effort into these three concepts.



Innovation cannot happen without creativity or invention, and neither creativity nor invention is useful in business if not properly executed.

Creativity

Creativity is the act of channeling imagination into something concrete.

It is the very first stage of design, where ideas start to actually take form, and a plan can be developed.

Example of creativity:

- In the case of Uber, creativity was necessary in producing the **concept of ride sharing** and of making driving jobs accessible to any individual.

Invention

Invention is the physical creation of a new concept or idea.

It is defined as ”the creation of an idea to do or make something without verification that it works, or is commercially valuable”. Invention cannot occur without creativity, but just creativity is not enough to properly develop an idea.

Examples of invention:

product designs, business models, or working prototypes.

Uber channeled invention in creating a solid and working business model, based upon the ideas they had formed in the creation stage.

Innovation

Innovation is the successful exploitation of new ideas.

It involves turning an invention into a commercial success and encouraging its widespread use. This is the stage where bold ideas, once properly developed, are brought to the public eye. This is what Uber has achieved, now that its product is in use all over the world and benefits people everywhere.

As can be clearly seen in the example of Uber, **all the three steps are crucial in order to create a profitable business**.

Uber achieved innovation through creative ideas, a profitable business plan, and widespread marketing, all of which allowed the product to completely change the car sharing industry. These three stages are steps that will allow to create and commercialize a product, and make a business grow and succeed.

Invention and creativity

Creativity and invention are not the same as innovation but are essential inputs to the innovative process.

We will review some of the key ideas in the theory of creativity and invention.

ECONOMICS AND INVENTION

The economics literature tends to talk of invention rather than creativity.

That literature on invention lies at the confluence of two different streams of economic thought:

- **the economics of networks:**

Simon (1985) recognised that the process of learning from diverse knowledge bases is a highly important source of invention and innovation. To a first approximation, the larger the network of people from whom we can learn, the greater the prospects for invention.

- **the division of labour:**

Smith (1776) stated that specialised labour builds up enough experience through learning by doing from which to create inventions as a problem-solving exercise. The process of the division of labour creates an incentive for specialised labour to seek to modify their tools and invent new ones.

ECONOMICS AND INVENTION

These two explanations of invention look very different and may seem incompatible.

we will show that they are not incompatible!

For there must be a limit to the extent of the invention derived from the division of labor.

Smith himself knew that the division of labor was not an unambiguously good thing for the economy and society.

ECONOMICS AND INVENTION

Smith described how those who spent all their lives performing a few operations would have very limited knowledge or intelligence, and their intellectual capital is bound to degrade.

- *The man whose whole life is spent in performing a few simple operations, of which the effects are perhaps always the same, or very nearly the same, has no occasion to exert his understanding or to exercise his invention.*

In short, while the division of labour may be a source of inventions and innovations, that source may dry up when the labour becomes too highly divided.

If divided labour does not have within itself the intelligence for invention, then that invention must be put together from different sources.

Smith recognised that some inventions were made by:

- *Those who are called philosophers or inventor, whose trade it is not to do anything, but to observe everything; and who, upon that account, are often capable of combining together the powers of the most distant and dissimilar objects.*

ECONOMICS AND INVENTION

This extraordinarily farsighted passage captures three essential characteristics of the professional '**man of speculation**' (or inventor).

1. His trade is 'not to do anything'. He is a theorist.
2. He observes everything. To do that he must talk to many. Now, surely, invention and innovation become much more of a network activity.
3. He is good at 'combining together' disparate and dissimilar knowledge. This leads us on to the second key perspective on the process of invention and innovation.

That is the essence of what the economics literature has to say about the two streams leading to invention and creativity.

CREATIVITY: A PARADOX

The creativity literature recognises a deep paradox about the creative process.

1. One aspect of this is that creativity requires both **introversion and extroversion**.
2. Another aspect of this paradox is that creativity requires a delicate balance between **obedience and disobedience**.

CREATIVITY: A PARADOX

The psychoanalyst, Otto Rank, recognised the fundamental tension in this question.

Creative work stems from two desires that are in tension with each other:

1. the desire for **individuation**, the ability to develop one's own **autonomous** self,
2. the desire for identification to **share experiences** and **togetherness**.

Rank indeed recognised that the tension between these two is such that the transition towards individuation is painful.

CREATIVITY: A PARADOX

Rank recognised three types or stages of personality:

1. **A conformist or adapted type**: these people have not developed their autonomy, and take their lead from the world around them. They passively obey norms and dare not move out of line.
2. **A conflicted or neurotic type**: these people have moved some way towards developing their autonomy. They have broken free of some norms, but feel uneasy about this. This unease makes them unhappy and confused, and they spend much of their energy in a fight against external domination.
3. **A creative or productive type**: these people have completed their passage through the two previous stages, and have emerged with a powerful autonomous voice. Instead of being engaged in a fight against domination, these people recognise and affirm themselves.

While Rank's categories apply to exceptional creativity – rather than everyday creativity – the creativity literature still seems to recognise such tensions for anyone involved in creativity, at whatever level.

BISOCIATION

The creativity literature sees combination and reorganisation as fundamental to the process of creative thought.

People create new knowledge or ideas by combining and reorganising existing concepts or categories.

This has been recognised for some time in the aphorisms of the great minds.

- Einstein, Feynman and others are all associated with the idea that creativity/invention, '*is seeing what everyone else has seen, and thinking what no one else has thought*'.

Koestler (1964) coined the term bisociation to describe what happens in creative thinking.

- Koestler's aim was to, '*make a distinction between the routine skills of thinking on a single "plane" … and the creative act which … always operates on more than one plane.'*
- **Bisociation is about perceiving an idea or situation, '*in two self-consistent but habitually incompatible frames of reference.*'**

BISOCIATION

Bisociation is a combinatorial activity – meaning that it involves the combination of existing ideas.

It need not be a social activity. However, some have argued that the scope for bisociation is greatest when there can be creative interaction in heterogeneous groups.

Group interaction is important because it brings together individuals with different experience and backgrounds to exchange ideas.

- The more diverse the group, the greater the potential for creative bisociation because the group can in principle combine many different knowledge sets.

This becomes increasingly important with the ongoing division of intellectual labour, and the attendant growing complexity of disciplines.

BISOCIATION

The creativity literature doesn't stop there. It recognises the **friction** we described.

1. First, different disciplines generally **lack a common language** or common concepts, so that exchange between different members may be at a low level.
2. Second, if the group progresses beyond the point of non-communication, it may well transpire that individuals from different backgrounds have quite **different values**, and hence **disagreement** or even **conflict is quite possible**.

In theory such conflict can be **productive, if managed properly**.

But **if not managed** properly, it is liable to inhibit the creative process.

In those exceptional cases where outstanding creativity has come from groups with very poor interpersonal relationships, it seems more likely that the creativity is achieved despite rather than because of the conflict.

BISOCIATION - Groupthink

- For the groups that cannot cope with difficult interpersonal relations, diplomatic silence may be in order.
- But then there is a risk that the group will **fail to achieve the creative fusion that it might**.
- It is recognised that even if careful principles are followed for group brainstorming, these groups may still generate fewer ideas than would emerge if the group members brainstorm in isolation.
- Janis (1972) has coined the term, **Groupthink**, to describe the risks that a group may encounter in some circumstances.
- Groups that are unduly concerned to avoid conflict and achieve unanimity will often fail to explore all alternatives.
- Such groups may not air differences, may suppress dissent, may not seek expert advice and may tend to stereotype experts in an adverse way, may be too selective in the information they gather, and may have an illusion of invulnerability.
- Groups suffering from Groupthink are liable to make poor decisions, which can sometimes be catastrophic.

BISOCIATION - In short

- In short, creative collaboration between diverse parties is liable to encounter friction, in one form or another.
  - Sometimes the benefits of collaboration are enough to overcome the friction.
  - Sometimes the friction is just too great.
- However, bisociation need not be an especially social activity. In principle, one scholar can achieve bisociation on his own. When one scholar masters two of the disciplines that one would combine in a group creativity exercise, then he need not suffer the communication problems or the conflict that could arise in the group, though he may suffer from a degree of cognitive dissonance.
- A hybrid scholar is a researcher who transgresses the accepted boundaries of his home discipline and integrates concepts, theories, methods and results originating from other disciplines (Dogan and Pahre, 1990).
  - Disciplines vary in the reaction to hybrid scholars: some are highly suspicious and often very hostile towards scholars who have travelled to other ‘lands’ and seek to return.

AUTONOMY

Now we turn to another essential characteristic of creative work

➢ the need for the creative person to establish his **own intellectual and creative autonomy.**

Research on creativity has identified several characteristics of personality that are regularly correlated with creativity:

- Introversion
- Self-directedness and self-sufficiency
- Independence of mind and judgement
- Stubbornness and arrogance
- Courage in the face of criticism
- Intrinsic (rather than extrinsic) motivation
- Lack of concern about others' perceptions
- Little need for external approval
- No desire to conform for the sake of it
- Lack of interpersonal skills
- Asociability and even anti-sociability
- Liking for solitude.

AUTONOMY

- Creative people are either autonomous by nature (or have it forced on them), or have to create such autonomy.
- The creativity literature recognises that it is probably impossible to identify a single direction of causation here.
- Naturally autonomous people tend to be creative, but equally, creative work also tends to make people autonomous.
- Sheldon (1999) argues that ‘conformity and creativity don’t mix’. Creativity of its very character involves breaking rules and disobeying norms. Sheldon argues that a large amount of research evidence shows that pressures to conform, broadly defined, have negative effects on creative effort.
- Sheldon makes a distinction between informational and normative social influences.
    - Informational influence should be constructive if people use the information gained to sharpen their perception.
    - In contrast, normative social influence can be destructive to the extent that it deters the creative person from his creative quest, back towards the conventional, flawed view.

AUTONOMY

- Those with a well-developed sense of autonomy are better able to take all external influence as informational – whether the intention was informational or normative.
- Autonomous people are not too concerned about winning the approval of those with whom they converse, they are better able to select what is helpful from the advice and criticism they receive and ignore the rest.
- Those who have not reached that state of autonomy, and are unduly concerned to win approval of their peers, will not find it easy to interpret all external influence in this way. Faced with normative influence that is negative about their present work, their anxiety level rises sharply, and they tend to hurry back to the ‘straight and narrow’ of conventional wisdom.
- Using Rank’s three categories, the conformist type quickly alters his behaviour in the face of negative normative influence, while the productive type takes it in his stride, and just picks out what is useful. The conflicted type reacts unpredictably, even neurotically.

INTRINSIC AND EXTRINSIC MOTIVATION

Amabile (1996) has stressed what she considers a key distinction between intrinsic and extrinsic motivation for creative work.

- Researchers who are *intrinsically* motivated are creative because of their love or fascination for the subject and for what they create.
- Researchers who are *extrinsically* motivated are creative as a means to a rather different end – advancement, promotion, fame, peer recognition, and so on.

INTRINSIC AND EXTRINSIC MOTIVATION

Amabile argues that **extrinsic** motivation is not as good for creativity as **intrinsic** motivation. To the extent that creativity involves breaking rules and rejecting norms and risking the wrath of the academy,

- **the extrinsically motivated** researcher may pull up shy when such creative work risks damaging his reputation, and will instead seek an accommodation with current norms.
- **The intrinsically motivated** researcher, by contrast, is much less worried about incurring the wrath of the academy. As a result, he is more task-oriented and will espouse unpopular and contrary views if he believes they are right.

Subsequent writers have argued that extrinsic motivation is not necessarily opposed to creativity.

- extrinsic motivation may supply a valuable complement to intrinsic motivation, and may even be stronger than intrinsic motivation.

- however there is general agreement that those who are predominantly influenced by extrinsic factors rather than intrinsic factors are unlikely to achieve exceptional creativity.

INCUBATION

- Several writers have shown that creativity usually does not take the form of sudden flashes of inspiration.
- Rather, creativity is the culmination of long periods of sustained thought and effort.

This is not to deny that the final breakthrough may appear suddenly but to emphasize that breakthrough builds on long periods of painstaking thought.

- The literature uses the term incubation to describe how the creative person needs long periods of heavy concentration on a problem followed by periods detached from that problem, in order to allow the creative product or solution to emerge.
- The creative person endures a long and sometimes painful process developing knowledge, emotions and goals, and at the end of this process the creative product emerges.

THE PARADOX RESOLVED

We started this lesson with a paradox.

Creativity requires both introversion and extroversion and yet it is hard to find these in the same person.

The phase model of creativity offers a partial resolution to the paradox.

- creativity requires sociable networking and introverted autonomy – but not at the same time.

THE PARADOX RESOLVED

The phase model recognizes five stages to the process of creativity and recognises that each stage calls for different activities. These are:

Extroverted	Introverted
1) **information:** is a relatively extroverted activity. The creative thinker has to refer to what is known in the literature.	
	2) **incubation:** starting from what is known already, the creative thinker starts a stage of incubation.
	3) **illumination:** with luck and a lot of hard work, the stage of incubation eventually leads to illumination.
	4) **verification:** before that is communicated to any audience, the thinker must carry out some preliminary in-house tests to verify that the creative product works
5) **communication**: only when the three relatively introverted phases are complete, would the creative thinker emerge and start the altogether more extroverted process of communicating creative ideas to an audience.	

CONSISTENCY OF ECONOMICS AND CREATIVITY

Are these ideas from the creativity literature consistent with economists' ideas about invention?

Yes they are, up to a point, but the ideas from creativity are rather more subtle.

Networks

- Creativity is a combinatorial activity and the greater and **more diverse the community who can be joined together in a network, the greater the theoretical benefits for creativity.**
- However, the creativity literature recognises some of the frictions that emerge in **group** creativity, which economics tends to overlook.
- These frictions may well make it impossible to achieve these theoretical benefits.

Networks

- We have also seen that exceptional creativity is correlated with certain **personal characteristics** that fit uneasily in the network, and will indeed be a source of such frictions.
- The **creative person is autonomous, a norm doubter, is not unduly concerned about peer approval, shuns conformity for the sake of it, and is not unduly motivated by extrinsic factors**.
- Such people do not feel an especial wish to form part of a network, and others may with justification feel unease or even irritation at having such people in their community.

Networks

- In short, the idea in the economics of networks that the value of a network increases with the number and diversity of participants seems much too simplistic.
- It is a theoretical possibility but does not reckon with the frictions that can emerge.

Division of Labour

- The fit between the creativity literature and the concept of division of labour is in part a close one and in part not so close.
- To understand this point it is helpful to make a distinction between **containment and autonomy**.
  - When there is division of labour, the activities of any person within that are **contained**. Tasks are well defined and specified in advance.
  - However, those within a division of labour do not enjoy **autonomy**. They are cogs in a greater machine. Their survival depends on their seamless integration into that machine. Autonomous behavior towards the rest of the machine is not sustainable.

Division of Labour

The discussion of personal characteristics correlated with creativity identified some that are consistent with a division of labour:

- introversion,
- lack of interpersonal skills,
- asociability and anti-sociability,
- and perhaps a liking for solitude.

These characteristics require containment but do not require autonomy.

Division of Labour

But some of these characteristics associated with creativity definitely require autonomy:

- self-directedness and self-sufficiency,
- independence of mind and judgement,
- stubbornness and arrogance,
- intrinsic (rather than extrinsic) motivation,
- lack of concern about others' perceptions,
- little need for external approval,
- and no desire to conform for the sake of it.

This is not consistent with a division of labour.

Moving beyond personal characteristics, however, some other factors recognised in the creativity literature are also consistent with the division of labour.

In particular, the idea of incubation recognises that the creative person needs long periods of careful attention to the same problem if he is to produce a creative solution.