Lecture 1 Psychological signs and main types of thinking – 4 hours

Cognitive abilities like thinking, reasoning and problem-solving may be considered to be some of the chief characteristics which distinguish human beings from other species including the higher animals. The challenges and problems faced by the individual or by society, in general are solved through series of efforts involving thinking and reasoning. The powers of thinking and reasoning may thus be considered to be the essential tools for the welfare and meaningful existence of the individual as well as society.

Ross: "Thinking is a mental activity in its cognitive aspect or mental activity with regard to psychological aspects".

Garrett: "Thinking is a behaviour which is often implicit and hidden and in which symbols are ordinarily employed".

Gilmer: "Thinking is a problem-solving process in which we use ideas or symbols in place of overt activity".

Mohsin: "Thinking is an implicit problem-solving behaviour".

Types of Thinking:

Thinking can be classified as follows:

1. Perceptual or Concrete Thinking:

This is the simplest form of thinking the basis of this type is perception, i.e. interpretation of sensation according to one's experience. It is also called concrete thinking as it is carried out on the perception of actual or concrete objects and events.

2. Conceptual or Abstract Thinking:

Here one makes use of concepts, the generalized objects and languages, it is regarded as being superior to perceptual thinking as it economizes efforts in understanding and problem-solving.

3. Reflective Thinking:

This type of thinking aims in solving complex problems, thus it requires reorganization of all the relevant experiences to a situation or removing obstacles instead of relating with that experiences or ideas.

This is an insightful cognitive approach in reflective thinking as the mental activity here does not involve the mechanical trial and error type of efforts.

In this type, thinking processes take all the relevant facts arranged in a logical order into an account in order to arrive at a solution of the problem.

4. Creative Thinking:

This type of thinking is associated with one's ability to create or construct something new, novel or unusual. It looks for new relationships and associations to describe

and interpret the nature of things, events and situations. Here the individual himself usually formulates the evidences and tools for its solution. For example; scientists, artists or inventors.

Skinner, the famous psychologist says creative thinking means that the prediction and inferences for the individual are new, original, ingenious and unusual. The creative thinker is one who expresses new ideas and makes new observations, new predictions and new inferences.

Characteristics of Creative Thinking:

a. Creative thinking, in all its shapes and forms is absolutely an internal mental process and hence should be considered as an important component of one's cognitive behaviour.

b. Every one of us is capable of creative thinking and hence it is a universal phenomenon.

c. Creative thinking results in the production of something new or novel including a new form of arrangement of old elements.

d. Creative thinking in all its dimensions involve divergent thinking instead of the routine and final types of convergent thinking. The mind must have complete freedom to wander around to create a new idea.

e. The field of creative thinking and its out part is quite comprehensive and built wide. It covers all the aspects of human accomplishments belonging to an individual's life.

5. Critical Thinking:

It is a type of thinking that helps a person in stepping aside from his own personal beliefs, prejudices and opinions to sort out the faiths and discover the truth, even at the expense of his basic belief system.

Here one resorts to set higher cognitive abilities and skills for the proper interpretation, analysis, evaluation and inference, as well as explanation of the gathered or communicated information resulting in a purposeful unbiased and self-regulatory judgement.

An ideal thinker is habitually inquisitive, well-informed, open-minded, flexible, fair-minded in evaluation, free from personal bias and prejudices, honest in seeking relevant information, skilled in the proper use of the abilities like interpretation, analysis, synthesis, evaluation and drawing conclusion and inferences, etc.

The critical thinking is of a higher order well-disciplined thought process which involves the use of cognitive skills like conceptualization, interpretation, analysis, synthesis and evaluation for arriving at an unbiased, valid and reliable judgment of

the gathered or communicated information or data as a guide to one's belief and action.

6. Non-directed or Associative Thinking:

There are times when we find ourselves engaged in a unique type of thinking which is non-directed and without goal. It is reflected through dreaming and other free-flowing uncontrolled activities. Psychologically these forms of thought are termed as associative thinking.

Here day-dreaming, fantasy and delusions all fall in the category of withdrawal behaviour that helps an individual to escape from the demands of the real world by making his thinking face non-directed and floating, placing him somewhere, ordering something unconnected with his environment.

We hear there is nothing seriously abnormal in behaviour involving day-dreaming and fantasy but behaviour involving delusions definitely points towards abnormality.

A person under the influence of such delusions may think or believe that he is a millionaire, the ruler of the universe, a great inventor, a noted historian or even God. In contrast, a person in the grip of delusion may be inclined to be the most incapable, unworthy and unwanted person and may develop guilt feelings or complain that he is the victim of some incurable physical or mental diseases.

Lecture 2 Development of thinking – 4 hours

Thinking is one of the most important aspects of learning process. Our ability to learn and solve the problems depends upon our ability to think correctly which helps us in adjustment and is necessary for a successful living.

Only those men who can think distinctly, constructively and carefully can very much contribute something worthwhile to the society.

As no person is born-thinker, one has to acquire knowledge of technique and practise of proper thinking.

There are few methods which help to develop thinking through training.

1. Adequacy of the Knowledge and Experience:

Adequacy of the knowledge and experience is considered to be the background of systematic thinking.

So care should be taken to help the children with adequate knowledge and experiences which can be done by:

(a) Training the children to enhance the process of sensation and perception to gain better knowledge and experience to improve critical thinking.

(b) A person should be provided with opportunities for gaining adequate experiences and should be encouraged for self-study, discussion and participation in healthy and stimulating activities.

2. Adequate Motivation and Definiteness of Aims:

Motivation helps in mobilizing our energy for thinking. It creates genuine interest and voluntary attention in the process of thinking, and thus helps a lot in increasing the adequacy and efficiency of our thinking. Thus one should try to think on definite lines with a definite end or purpose, the problems we solve should have intimate connection with our immediate needs and basic motives, and such thinking should be directed on creative and productive activities.

3. Adequate Freedom and Flexibility:

Thinking should not be obstructed by imposing unnecessary restrictions and narrowing of the field of thought process. If the past experiences or habitual methods do not help in solving the problem we should strive for new association, relationships and possibilities for arriving at satisfactory results.

4. Incubation:

When we set ourselves to solve a problem but fail to solve it in-spite of our strain, putting more efforts to thinking and persistent thinking, it is better to lay aside the problem for some time and relax for a while or engage in some other activity. During

this interval a solution is evolved to that specific problem through the efforts of our unconscious mind. This phenomenon of incubation is helpful.

5. Intelligence and Wisdom:
Intelligence is defined as the ability to think properly, and thus proper development of intelligence is essential for bringing adequate thinking. Proper care should be taken to use intelligence, wisdom and other cognitive abilities for carrying out the process of thinking.
6. Proper Development of Concepts and Language:
Concept is a word or idea with a generalized meaning which represents an entire class of objects, ideas or events; for example, a word "saree" is a concept, when you think this word it represents all kinds of sarees which are six yards or eight yards long sarees made of silk, cotton, nylon or a mixture of the concept formation begins in early childhood which are first hand face-to-face example. It can be +ve or -ve.
Language is a highly developed system of symbols in which words within a grammar can be written or spoken in different combinations. Much of the thinking depends upon language although some imaging are also present.
Concepts, symbols, signs, words and language are the vehicles as well as instruments of thought. Without their proper development one cannot proceed effectively on the path of thinking. Their development stimulates and guides the thought process.
Improper development and faulty formation of concepts and likewise, symbolic behaviour not only hampers a person's progress in thinking but also proves fatal, as they may provoke perverted thinking and wrong conclusions.
7. Adequacy of Reasoning Process:
Thinking is also influenced by the mode of reasons one adopts. Illogical reasoning often leads to incorrect thinking. Logic is the science of correct reasoning which helps to think correctly. Therefore, we should cultivate the habit of logical reasoning among our children.

Tools of Thinking:
There are a few important elements involved in the thinking process:

1. Images:
As mental pictures consist of personal experiences of objects, persons or situations, heard and felt. These mental pictures symbolize actual objects, experiences and activities. In thinking, we usually manipulate the images rather than the actual objects, experiences or activities.

2. Concepts:
A concept is a general idea that stands for a general class and represents the common characteristics of all objects or events of this general class. Concept, as a tool, economize the efforts in thinking, for example, when we hear the word 'elephant' we are at once reminded not only about the nature and qualities of elephant as a class but also our own experiences and understanding of them come to the surface in our consciousness to stimulate our thinking at that time.

3. Symbols and signs:
Symbols and signs represent and stand for substitute of the actual objects, experiences and activities. For example, traffic lights, railway signals, school bells, badges, songs, flags and slogans all are symbolic expressions, they stimulate and motivate resultant thinking because they tell us what to do or how to act.
4. Language:
Is the most efficient and developed vehicle used for carrying out the process of thinking. When a person reads, writes or hears words or sentences or observes gesture in any language one is stimulated to think. Thus reading and writing of documents and literature also help in stimulating and promoting the thinking process.
5. Muscular activities:
Thinking in one way or the other shows the evidence of the involvement of some incipient movements of groups of our muscles. A high positive relation has been found to exist for the thinking and muscular activities of an individual. The more we engage ourselves in thought, the greater is the general muscular tension and conversely as we moved towards muscular relation, our thought processes gradually diminish.
6. Brain functions:
Whatever may be the role of the muscles, thinking is primarily a function of the brain. Our mind is said to be the chief instrument of the thinking process. The experiences registered by our sense organs have no meaning, and thus cannot serve as stimulating agents, or instruments for thinking unless these impressions are received by our brain cells and properly interpreted to derive some meaning.
The mental pictures or images can be stored, reconstructed or put to use only on being processed by the brain. What happens in our thought process is simply the function or product of the activities of our brain.
Errors in Thinking:

Our thinking, reasoning and problem-solving behaviour all are largely influenced by our "sets", which is a kind of habit or a way in which we have accustomed ourselves in perceiving certain situations.

Whatever registered earlier in our perceptions or experiences provide the base for our present and future thinking. We won't change from our preset path of thinking which leads towards a rigid behaviour.

We happen to make mistakes because of our attitude, likes and dislikes, bias or oversimplified thinking, reasoning and problem-solving, etc. These mental sets have been gained from previous experiences surely interfere with our subsequent thinking resulting in ineffective behaviour.

Thus our thinking will be defective and harmful if it is not based on correct data or information. Our biases, prejudices and beliefs sometimes do not enable us to think logically. We make wrong conclusion because of our prejudices, hence we are inclined to ignore and overlook those facts which support right conclusion.

1. Our thinking is defective because we have allowed ourselves to be swayed by our emotions. Many people do not think clearly and accurately during an examination because they have been disturbed by fear and failure.
2. Many times our thinking become fallacious, and cannot view the problem from different angles broadly.
3. Many of our thinking may also be distorted by superstitions or by lack of information that is relevant to the subject.
4. Many of our wishful thinking are also unscientific thinking. Our prejudices and biases cause conflicts, rationalizations and delusions which are defective thinking as well.

Lecture 3 Nature of intellect. Diagnosis of intellect – 4 hours

It sounds easy enough to answer, but when one gets down to the nitty gritty of it, one finds that there are many layers to this question.

Intellect is the capacity of an organism to understand the world around it. It also includes the organism's ability for problem-solving, logical reasoning and creativity.

The brain is where the magic happens. Where neurons fire, strengthening and weakening the connections between them.

Human brains are interesting in that they are bigger than most species in the animal kingdom. It's not just the size of our brain that's different either. The cerebral cortex, which is responsible for higher intellect, is disproportionately larger in humans. It makes up 80% of our brains.

But that alone isn't enough to separate us from the pack. After all, many traits once thought to be unique to humans are found in the animal kingdom. Chimpanzees wage tribal war with each other, rats show altruism, and in a study on animal behavior, Capuchin monkeys demonstrated an understanding of inflation and even took part in gambling. Crows can use twigs and branches to fashion crude tools for different situations. They even use small stones to bring up the level of a water source to get a drink, just like in Aesop's fable.

Perhaps the biggest distinguishing factor between humans and other species is the level of plasticity in our early developing, brains. Plasticity is the molding potential of a brain.

Studies have shown that human brains are less genetically inheritable than those of monkeys. This means that our young brains take a longer time to grow and hence can be shaped for a longer period.

The longer the brain is molded, the more information we can take in from our surroundings. Take a newborn baby as an example. Their limbs are constantly moving when they're awake. This movement helps them understand their place in the space around them, thus molding their brains to understand spatial dimensions. Everything they do from their early life right up until their final breath shapes their brain in different ways. Our brain's plasticity could hold the key to understanding the origins of our intellect.

Intellectual creatures are constantly trying to understand their environment. A large part of early humankind's survival came down to this ability. Being able to perceive threats and opportunities for hunting in their vicinity gave early humans an advantage over other animal species. Other animals possess this sense of awareness, but not to the level of human beings. A rabbit, for example, might only have to worry about a fox within the area of its burrow. Early humans had to worry about a multitude of threats. With the variety of nutrients required to fuel our bodies, humans had to hunt and search for different kinds of food sources. This inevitably led them to confront different types of predators.

All this led to human beings joining forces to form tribes. For the first time, humans were able to see problems from the perspective of other humans. The ability to work together and come up with different solutions for the same problem greatly increased our problem-solving ability and logical reasoning.

Communication also plays a major part in the development of intellect. A human child has an expressive vocabulary of 2600 words, and a receptive vocabulary of 20,000 to 24,000 words. Compare this to that of a dog, which on average is only capable of a mere 165 word receptive vocabulary. It's this difference in language complexity that gave humans a significant advantage over the rest of the animal kingdom.

A World of Artificial Intelligence

In recent years, the main goal of computer scientists has been to develop pure artificial intelligence. Known as seed intelligence or general-purpose intelligence, it is a level of intelligence equal to that of a human being.

As it stands, we have developed machines and programs that beat chess masters and professional Go players at their own game. However, these programs are specialized to do just one task. Deep Blue, the machine created by IBM to play chess, was only good at playing chess. Give it another task, and it would fail miserably.

This is where artificial intelligence can't hold a candle to our intellect so far. It cannot replicate our ability to take different parts of understanding and glue them together.

An Alien Understanding

So far, everything discussed has been with regards to planet Earth. But what about alien intellect? If we entertain the idea that alien life exists, what is their intellectual level, and how would they display such intellect? One would think that any life that evolves sentience will have some level of intellect. How they choose to show such intellect may be something quite incomprehensible. An advanced alien being will understand the concept of the laws of physics, but might not be able to express themselves in a way as humans understand.

To bring it all back to the first couple of questions asked, cats and dogs have never needed to understand quantum mechanics or modern chemistry. Their survival doesn't depend on knowing these subjects.

These areas of study were born from human intellect that is driven by "forward thinking" and curiosity — discovery of the natural world is how humanity ensures its survival.

In other words, everything what we witness and scrutinize in our physical environment is fundamentally driven by an attempt to survive and the intellect allows us to do that.

However, I'm not sure that human intellect is the most optimal tool of observation and analysis. AI may, over time, present us with a completely different way to adapt and problem solve that is out of the realm of our understanding. Even more intriguing is the idea of alien intelligence beyond our universe.

Humanity, AI, and the prospect of alien intelligence might ultimately define what the nature of the intellect truly is. It is the ability of an organism, human or otherwise, to question and understand where it comes from, where it's going, and its place in this world.

"The cosmos is within us. We are made of star-stuff. We are a way for the universe to know itself." ― Carl Sagan

Lecture 4 Thinking and speech (J.Piaget), speech and thinking (L.Vygotsky) – 2 hours

Methods and approaches to teaching have been greatly influenced by the research of Jean Piaget and Lev Vygotsky. Both have contributed to the field of education by offering explanations for children's cognitive learning styles and abilities. While Piaget and Vygotsky may differ on how they view cognitive development in children, both offer educators good suggestions on how teach certain material in a developmentally appropriate manner.

Piaget proposed that cognitive development from infant to young adult occurs in four universal and consecutive stages: sensorimotor, preoperational, concrete operations, and formal operations (Woolfolk, A., 2004). Between the ages of zero and two years of age, the child is in the sensorimotor stage. It is during this stage the child experiences his or her own world through the senses and through movement. During the latter part of the sensorimotor stage, the child develops object permanence, which is an understanding that an object exists even if it is not within the field of vision (Woolfolk, A., 2004). The child also begins to understand that his or her actions could cause another action, for example, kicking a mobile to make the mobile move. This is an example of goal-directed behavior. Children in the sensorimotor stage can reverse actions, but cannot yet reverse thinking (Woolfolk, A., 2004).

During a child's second and seventh year, he or she is considered to be in the preoperational stage. Piaget stated that during this stage, the child has not yet mastered the ability of mental operations. The child in the preoperational stage still does not have the ability to think through actions (Woolfolk, A., 2004). Children in this stage are considered to be egocentric, meaning they assume others share their points of view (Woolfolk, A. 2004). Because of egocentricism, children in this stage engage in collective monologues, in which each child is talking, but not interacting with the other children (Woolfolk, A. 2004). Another important aspect of the preoperational stage is the acquisition of the skill of conservation. Children understand that the amount of something remains the same even if its appearance changes (Woolfolk, A., 2004). A child in the preoperational stage would not be able to perform the famous Piagetian conservation problem of liquid and volume, because he or she has not yet developed reversible thinking – "thinking backward, from the end to the beginning" (Woolfolk, A., 33).

Concrete operations occurs between the ages of seven to eleven years. Students in the later elementary years, according to Piaget, learn best through hands-on discovery learning, while working with tangible objects. Reasoning processes also begin to take shape in this stage. Piaget stated that the three basic reasoning skills acquired during this stage were identity, compensation, and reversibility (Woolfolk, A., 2004). By this time, the child learns that a "person or object remains the same

over time" (identity) and one action can cause changes in another (compensation) (Woolfolk, A., 2004). This child has an understanding of the concept of seriation – ordering objects by certain physical aspects. The child is also able to classify items by focusing on a certain aspect and grouping them accordingly (Woolfolk, A., 2004).
Piaget's final stage of cognitive development is formal operations, occurring from age eleven years to adulthood. People who reach this stage (and not everyone does, according to Piaget) are able to think abstractly. They have achieved skills such as inductive and deductive reasoning abilities. People in the formal operations stage utilize many strategies and resources for problem solving. They have developed complex thinking and hypothetical thinking skills. Through hypothetico-deductive reasoning, one is able to identify the factors of a problem, and deduce solutions (Woolfolk, A., 2004). People in this stage also imagine the best possible solutions or principles, often through the ability to think ideally (Woolfolk, A., 2004). The acquisition of meta-cognition (thinking about thinking) is also a defining factor of those people in formal operations.
Based on Piaget's proposed stages and ability levels at each, certain teaching strategies have been offered for teaching in the Piagetian school of thought. In the preoperational stage, the teacher would have to use actions and verbal instruction. Because the child has not yet mastered mental operations, the teacher must demonstrate his or her instructions, because the child cannot yet think through processes. The use of visual aids, while keeping instructions short would most benefit the child in this stage (Woolfolk, A., 2004). Hands-on activities also aid with learning future complex skills, as the text mentions, reading comprehension (Woolfolk, A., 2004). The teacher must be sensitive to the fact that these children, according to Piaget, are still egocentric and may not realize that not everyone shares the same view (Woolfolk, A., 2004).
Teaching children in the concrete operations stage involves hands-on learning, as well. Students are encouraged to perform experiments and testing of objects. By performing experiments and solving problems, students develop logical and analytical thinking skills (Woolfolk, A., 2004). Teachers should provide short instruction and concrete examples and offer time for practice. With skills such as classification, compensation, and seriation developing during this stage, teachers should provide ample opportunities to organize groups of objects on "increasingly complex levels" (Woolfolk, A., 37).
Teaching those in the formal operations stage involves giving students the opportunity to advance their skills in scientific reasoning and problem solving, as begun in the concrete operations stage. Students should be offered open-ended projects in which they explore many solutions to problems. Opportunities to explore hypothetical possibilities should be granted to these students often. As the text states, teachers need to teach the "broad concepts" of the material while relating it to their

lives. Idealism is assumed to be acquired by a person in the formal operations stage; therefore, understanding broad concepts and their application to one's life aid in the realization of ideal concepts.

Piaget also proposed that a child acts on his own environment for learning. Social interaction takes place mainly to move a young child away from egocentricism. It is also important to note that Piaget stated that a child either held the mental structure for conservation, for example, or he did not. A child in the preoperational stage could not be taught to understand the liquid volume experiment; she does not possess the mental structure of a child in concrete operations.

As part of their cognitive development, children also develop schemes, which are mental representations of people, objects, or principles. These schemes can be changed or altered through what Piaget called assimilation and accommodation. Assimilation is information we already know. Accommodation involves adapting one's existing knowledge to what is perceived. Disequilibrium occurs when new knowledge does not fit with one's accumulated knowledge. When one reaches what Piaget called equilibrium, assimilation and accommodation have occurred to create a new stage of development (Woolfolk, A., 2004). When learning the concept of conservation, a child must first "struggle" with the idea that the liquid amount in the cylinders has not changed (disequilibrium). After accommodating the new knowledge, equilibrium occurs, and the child may advance to a new cognitive stage (concrete operations).

Around this time, another psychologist was offering his views on child cognitive development. Lev Vygotsky offered an alternative to Piaget's stages of cognitive development. Vygotsky's Sociocultural Theory of Development became a major influence in the field of psychology and education (Woolfolk, A., 2004). This theory stated that students learn through social interactions and their culture – much different from Piaget's theory that stated children act on their environment to learn. Through what Vygotsky called "dialogues," we socially interact and communicate with others to learn the cultural values of our society. Vygotsky also believed that "human activities take place in cultural settings and cannot be understood apart from these settings" (Woolfolk, A., 45). Therefore, our culture helps shape our cognition. Through these social interactions, we move toward more individualized thinking. The co-constructed process involves people interacting during shared activities, usually to solve a problem (Woolfolk, A., 2004). When the child receives help through this process, he or she may be able to utilize better strategies in the future, should a similar problem arise. The co-constructed dialogues lead to internalization, which in turn leads one to independent thinking (Woolfolk, A., 2004).

Scaffolding is another Vygotskian principle for the sociocultural perspective. Scaffolding involves providing the learner with hints or clues for problem solving in order to allow the student to better approach the problem in the future (Woolfolk,

A., 2004). While Piaget would assume the student does not yet have the mental structures to solve such a problem, Vygotsky would offer encouragement or strategies, in the form of scaffolding, in order for the student to attempt the problem.
The development of language is considered to be a major principle of Vygotsky's sociocultural theory. The language of a certain group of people indicates their cultural beliefs and value system. For example, a tribe with many words meaning "hunting" indicates that hunting is an important aspect of their lives. The text states that children learn language much the same way that children learn cognitive skills. Vygotsky states that humans may have "built in biases, rules, and constraints about language that restrict the number of possibilities considered" (Woolfolk, A., 2004). A child's thinking regarding these language constraints is very important in language development (Woolfolk, A., 2004).
Another aspect of language development involves private speech. Private speech is self-talk children (and adults) may use to guide actions and aid in thinking. While Piaget may view private speech as egocentric or immature, Vygotsky understood the importance of self-directed speech. Private speech is considered to be self-directed regulation and communication with the self, and becomes internalized after about nine years (Woolfolk, A., 2004).
Vygotsky also emphasized the importance of cultural tools in cognition. Cultural tools can be any technological tool or any symbolic tool which aids in communication (Woolfolk, A., 2004). Language, the media, television, computers, and books are only a handful of all the cultural tools available for problem solving or learning. Higher-level processing is "mediated by psychological tools, such as language, signs, and symbols" (Woolfolk, A., 2004). After receiving co-constructed help, children internalize the use of the cultural tools, and are better able to utilize the tools in the future on their own (Woolfolk, A., 2004).
Another Vygotskian principle for teaching involves the zone of proximal development. Like Piaget, Vygotsky believed that there were some problems out of a child's range of understanding. However, in contrast, Vygotsky believed that given proper help and assistance, children could perform a problem that Piaget would consider to be out of the child's mental capabilities. The zone is the area at which a child can perform a challenging task, given appropriate help (Woolfolk, A., 2004).
Piaget and Vygotsky also differ in how they approach discovery learning. Piaget advocated for discovery learning with little teacher intervention, while Vygotsky promoted guided discovery in the classroom. Guided discovery involves the teacher offering intriguing questions to students and having them discover the answers through testing hypotheses (Woolfolk, A., 2004). The students are engaged in the discovery process; however, they are still receiving assistance from a more knowledgeable source.

A teacher utilizing Vygotskian methods for teaching would be a very active member in her student's education. The teacher would apply the technique of scaffolding by providing assistance and offering feedback when relating new information (Woolfolk, A., 2004). Teachers should also make sure that students are provided adequate tools for learning. Students should be taught how to use tools such as the computer, resource books, and graphs in order to better utilize these tools in the future (Woolfolk, A., 2004). Teaching in the Vygotskian method would also incorporate group or peer learning (Woolfolk, A., 2004). By having students tutor each other through dialogues and scaffolding, the students can begin to internalize the new information and come to a better understanding of the material.

I believe that both Piaget and Vygotsky provided educators with important views on cognitive development in the child. Piaget proposed that children progress through the stages of cognitive development through maturation, discovery methods, and some social transmissions through assimilation and accommodation (Woolfolk, A., 2004). Vygotsky's theory stressed the importance of culture and language on one's cognitive development.

Regarding the two cognitive theories, I would be more apt to apply Vygotskian principles to my classroom. I believe that principles such as scaffolding, co-constructed knowledge, dialogue, and cultural tools are all important components of a student's knowledge acquisition. By helping students within their zone of proximal development, we offer them useful learning strategies which they internalize and utilize later. Piaget proposed many applicable educational strategies, such as discovery learning with an emphasis on activity and play. However, Vygotsky incorporated the importance of social interactions and a co-constructed knowledge base to the theory of cognitive development.

In conclusion, a teacher's focus should be to provide assistance to students in need, and provide cultural tools as educational resources. Teachers should provide for group and peer learning, in order for students to support each other through the discovery process. Especially in today's diverse classroom, the teacher needs to be sensitive to her student's cultural background and language, and be an active participant in his knowledge construction.

Lecture 5 Research methods on thinking – 2 hours

Critical thinking and creative thinking are distinctly different, but highly interconnected. Nowhere is this symbiotic relationship more apparent than in the practices inherent to research design, conduct, and dissemination.

What do these terms mean, and how can we use them to better understand our roles as researchers?

To connect these definitions and situate them in a research context, draw on the (updated) Bloom's Taxonomy (2000). This taxonomy lays out dimensions of thinking involved with acquiring, using, and generating knowledge. We can see that thought processes associated with analysis and evaluation, central to the Oxford definition for critical thinking, build towards the ability to create new ideas or solutions. Critical and creative sides of the thinking process are essential if we are to accomplish the goal central to scholarly research: to make an original contribution.hile presented in a linear manner in this figure, the categories interrelate in various ways, depending on the task at hand. There are times when, in the course of analyzing or evaluating a problem, we realize that we lack some important foundations so we need to read more literature and improve our understanding. We might also see an important path from the new solutions derived at the creative stage, to their application in practice. In short, as researchers we need the ability to move across these dimensions, using both critical and creative thinking at various stages.

Here is one way to consider intersections between critical and creative thinking over the course of a study:

At this Research Stage:	Use Critical Thinking to:	Use Creative Thinking to:
Planning the Study	Evaluate potential research problem(s) from multiple angles.	Look beyond the typical ways research problems are identified.
	• Analyze the scholarly literature. • Evaluate perspectives from other schools or thought or disciplines.	Draw ideas from related contemporary writings, media, social media to learn from viewpoints outside of academia.
Designing the Study		Articulate clear, concise research questions and/or hypotheses.

	Evaluate and select theoretical and methodological options.	• Invent theories or methodologies. • Adapt theories or methodologies from other cultures or disciplines.
•	Evaluate data needs and select population, collection options.	• Develop/adapt interview questions, observation guides, instruments. • Consider visual or creative methods for collecting data.
Conducting the Study	Continue to analyze and evaluate study progress and adjust as necessary.	When collecting data from human participants, use ingenious ways to gain cooperation of gatekeepers, and to develop rapport conducive to questioning/surveying participants.
Making Sense of the Data	Critically analyze the data.	• Interpret the themes and trends emerging from the analysis. • Visualizing the data.
Sharing Results	Analyze and describe results in ways that will help readers understand the significance of the study.	Discover imaginative ways to present findings and reach those who can use them. Use visuals, graphics, media, links to related resources.
Applying the Results for Impact	Understand needs in the field, evaluate ways findings match needs, take steps to apply	Imagine new ways to use what you learned from the study.

Lecture 6 Individual differences in thinking styles – 2 hours

Thinking styles exist at the interface between cognition and personality traits. Thinking styles are preferred ways of applying one's intellectual abilities and knowledge to a problem. Two people may have equal levels of intelligence but differ on how they focus their abilities on a task. Research indicates that some thinking styles promote creativity, whereas others diminish it.

For example, Jung (1923; Myers & Myers, 1980) distinguishes between sensing and intuitive styles. People who show the sensing style like to approach a problem through their five senses. They rely heavily on externally available information, and focus their cognitive abilities on the realities of a situation, working with what is given. Intuitive stylists, in contrast, rely on their hunches, feelings, and internal sources of knowledge. Empirically, creative samples of mathematicians, scientists, writers, students, and others show a strong tendency for the intuitive style (Myers & McCaulley, 1985). In one study by Hall and MacKinnon (1969), all 40 architects whom peers rated as highly creative showed a preference for the intuitive type of thinking. In a matched control group of architects, only 61 percent preferred the intuitive style over the sensing style.

From another perspective, Kirton (1976) has proposed the creativity-relevant adaptor-innovator styles. Adaptors seek problem solutions that involve small adjustments or incremental modifications. They prefer to maintain the initial structure or paradigm and work with established procedures or constraints. Innovators, in contrast, prefer to restructure a problem by approaching it from a new angle. Research studies show moderate correlations between a preference for the innovative style and divergent-thinking tests of creativity (Isaksen & Puccio, 1988; Masten & Caldwell-Colbert, 1987; Mulligan & Martin, 1980; Torrance & Horng, 1980).

Several other thinking styles have been hypothesized as important for creativity. One of these styles is the global–local style dimension (Sternberg & Lubart, 1991b). Local stylists like to work on the narrow, detailed aspects of a problem. Global stylists prefer to work on the broad, general level of a problem. Creative solutions often involve seeing the big picture first, and hence a global style is hypothesized to be important. However, in some of the later phases of creative work, attention to detail becomes necessary for completing a task. Thus, some balance between the global and local styles may be optimal.

Students have different thinking styles, which are characterised by strengths and preferences in the ways they process information and construct new meaning. Some students tend to focus on facts and data, while others are more comfortable with information from pictures and diagrams. Some gain more from written and spoken explanations, while others learn actively through interactive engagements with other individuals (Felder, 1996).

Felder examines three other learning style models that have been used effectively in engineering education (his field of interest): the Myers-Briggs Type Indicator Model, Kolb's Learning Style Model and the Felder-Silverman Learning Style Model.

The Myers-Briggs Type Indicator Model

This model classifies students according to their preferences on scales derived from psychologist Carl Jung's theory of psychological types. The Myers-Briggs Type Indicator Model can combine 16 different learning style preferences. According to Felder (1996), students may be classified as:

■

extraverts (who try things out, focus on the outer world of people) or introverts (who think things through, focus on the inner world of ideas)

■

sensors (who are practical, detail-orientated, focus on facts and procedures) or intuitors (who are imaginative, concept-orientated, focus on meanings and possibilities)

■

thinkers (who are sceptical, tend to make decisions based on logic and rules) or feelers (who are appreciative, tend to make decisions based on personal and humanistic considerations)

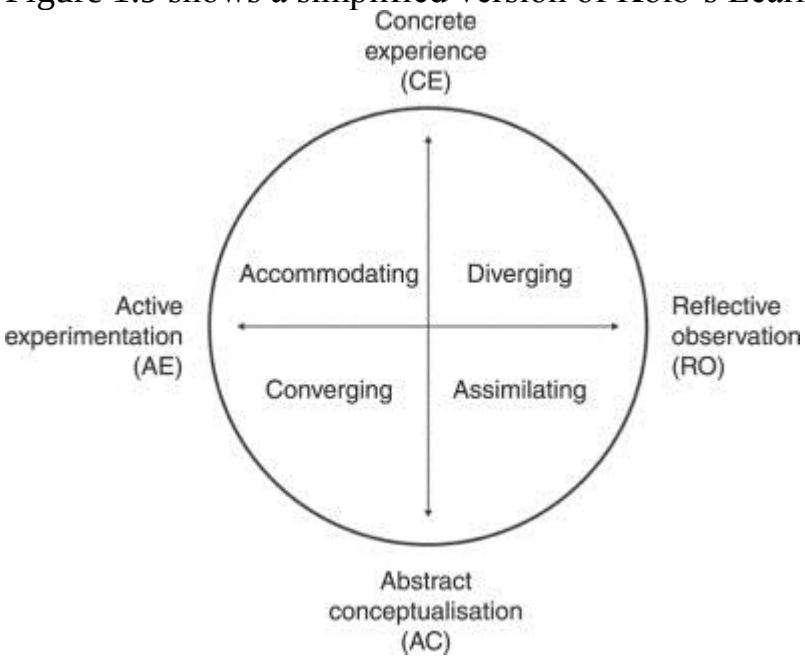
■

judgers (who set and follow agendas, seek closure even with incomplete data) or perceivers (who adapt to changing circumstances, resist closure to obtain more data).

Kolb s Learning Style Model

Kolb is widely credited for launching the modern learning styles movement during 1984 with his scene-setting publication Experimental Learning (Kolb, 1984). It summarises 17 years of research, claiming that an appreciation of different learning styles can benefit teamwork, conflict solution, communication and the choice of a career (Coffield et al., 2004). Kolb postulates that 'learning is the process whereby

knowledge is created through the transformation of experience. Knowledge results from the combination of grasping experience and transforming it' (1984, 41).
Figure 1.9 shows a simplified version of Kolb's Learning Style Model.



Type 1: Converging style

The attributes of this style are abstract and active. Students falling in this category respond well to abstract conceptualisation and active experimentation. They prefer the 'how' question and opportunities to work actively on well-defined tasks, as well as learning by trial and error in an environment that allows them to fail in a safe way. Lecturers should function as mentors to students with a converging style.

Type 2: Diverging style

Students with this style of learning like concrete experience and reflective observation as part of their learning. They view concrete situations from many perspectives and adapt by observation rather than action. They are aware of meanings and values and have an interest in people, which tends to make them feeling-orientated.

Type 3: Assimilating style

This style was initially referred to in the literature as abstract reflective. Students respond well to abstract conceptualisation and reflective observation by focusing on the 'what' explanations. They like to reason inductively and create models and theories. They are more concerned with ideas and abstract concepts than with people. Lecturers should function as experts in order for students to be activated.

Type 4: Accommodating style

This learning style can be described as concrete active. Primarily, students with this style respond well to ‘what-if’ questions and welcome the opportunity to apply learning in new situations in order to solve problems. Lecturers should ‘stay out of their way’ but should create opportunities for them to maximise discovering.

The Felder-Silverman Learning Style Model

This model distinguishes between the following types of students:

- sensing students (who are concrete, practical and orientated toward facts and procedures)
- intuitive students (who are conceptual, innovative and orientated toward theories and meanings)
- visual students (who prefer visual representations of presented material – pictures, diagrams, flow charts)
- verbal students (who prefer written and spoken explanations)
- inductive students (who proceed from the specific to the general)
- deductive students (who go from the general to the specific)
- active students (who learn by trying things out, working with others)
- reflective students (who learn by thinking things through and working alone)
- sequential students (who are linear, orderly and learn in small incremental steps)
- global students (who are holistic, system thinkers; they learn in large leaps).

Summary of learning style models

Numerous learning style models have been used in education and training. Coffield and his research team (2004) contributed to the scientific validation of what we know about current learning style models when they were commissioned by the Learning and Skills Council in England to investigate the wide range of learning style instruments designed to make learning a more successful process for students.

After evaluating the main theories, they concluded that the field of learning styles is extensive and conceptually confusing. In order to make a contribution to the understanding of learning styles, they not only divided the field into three linked areas of activity, but also identified 71 models of learning styles that are available.

After reviewing and assessing the theoretical robustness of each model, they concluded that only 13 major models offer reliable and valid evidence and clear implications for practice based on empirical findings. They emphasised that it matters fundamentally which instrument one uses.

Of the 13 major models, only six were identified that met some of the set criteria. The rest of the models were disregarded as they failed to meet these criteria and could not be considered for use (Coffield et al., 2004).

The Herrmann Brain Dominance Instrument® (HBDI®) was one of the six recommended models for education and training. The measures used in the HBDI® Survey are more closely related to those used in the Myers-Briggs Type Indicator, but less related to those in the learning style inventory of Kolb. Coffield and his team found that the HBDI® as an instrument is especially useful in further education because it throws light on group dynamics, and encourages awareness and understanding of the self and others (Coffield et al., 2004). They concluded that the instrument not only measures preferences of learning for specific quadrants, but actually highlights a low or even an avoidance preference for a specific learning mode. The latter is perhaps the most significant information for lecturer and students in the learning process, because the key to promoting quality learning and facilitating learning by means of appropriate strategies should be to address those low preferences, some of which may be essential to success in a particular subject or career (Coffield et al., 2004).

Lecture 7 Speech: general concepts, types and functions - 4 hours

Speech is human vocal communication using language. Each language uses phonetic combinations of vowel and consonant sounds that form the sound of its words (that is, all English words sound different from all French words, even if they are the same word, e.g., "role" or "hotel"), and using those words in their semantic character as words in the lexicon of a language according to the syntactic constraints that govern lexical words' function in a sentence. In speaking, speakers perform many different intentional speech acts, e.g., informing, declaring, asking, persuading, directing, and can use enunciation, intonation, degrees of loudness, tempo, and other non-representational or paralinguistic aspects of vocalization to convey meaning. In their speech speakers also unintentionally communicate many aspects of their social position such as sex, age, place of origin (through accent), physical states (alertness and sleepiness, vigor or weakness, health or illness), psychic states (emotions or moods), physico-psychic states (sobriety or drunkenness, normal consciousness and trance states), education or experience, and the like.

Although people ordinarily use speech in dealing with other persons (or animals), when people swear they do not always mean to communicate anything to anyone, and sometimes in expressing urgent emotions or desires they use speech as a quasi-magical cause, as when they encourage a player in a game to do or warn them not to do something. There are also many situations in which people engage in solitary speech. People talk to themselves sometimes in acts that are a development of what some psychologists (e.g., Lev Vygotsky) have maintained is the use in thinking of silent speech in an interior monologue to vivify and organize cognition, sometimes in the momentary adoption of a dual persona as self addressing self as though addressing another person. Solo speech can be used to memorize or to test one's memorization of things, and in prayer or in meditation (e.g., the use of a mantra).

Researchers study many different aspects of speech: speech production and speech perception of the sounds used in a language, speech repetition, speech errors, the ability to map heard spoken words onto the vocalizations needed to recreate them, which plays a key role in children's enlargement of their vocabulary, and what different areas of the human brain, such as Broca's area and Wernicke's area, underlie speech. Speech is the subject of study for linguistics, cognitive science, communication studies, psychology, computer science, speech pathology, otolaryngology, and acoustics. Speech compares with written language,[1] which may differ in its vocabulary, syntax, and phonetics from the spoken language, a situation called diglossia.

The evolutionary origins of speech are unknown and subject to much debate and speculation. While animals also communicate using vocalizations, and

trained apes such as Washoe and Kanzi can use simple sign language, no animals' vocalizations are articulated phonemically and syntactically, and do not constitute speech.

Speech production is a multi-step process by which thoughts are generated into spoken utterances. Production involves the selection of appropriate words and the appropriate form of those words from the lexicon and morphology, and the organization of those words through the syntax. Then, the phonetic properties of the words are retrieved and the sentence is uttered through the articulations associated with those phonetic properties.[2]

In linguistics (articulatory phonetics), articulation refers to how the tongue, lips, jaw, vocal cords, and other speech organs used to produce sounds are used to make sounds. Speech sounds are categorized by manner of articulation and place of articulation. Place of articulation refers to where the airstream in the mouth is constricted. Manner of articulation refers to the manner in which the speech organs interact, such as how closely the air is restricted, what form of airstream is used (e.g. pulmonic, implosive, ejectives, and clicks), whether or not the vocal cords are vibrating, and whether the nasal cavity is opened to the airstream. The concept is primarily used for the production of consonants, but can be used for vowels in qualities such as voicing and nasalization. For any place of articulation, there may be several manners of articulation, and therefore several homorganic consonants.

Normal human speech is pulmonic, produced with pressure from the lungs, which creates phonation in the glottis in the larynx, which is then modified by the vocal tract and mouth into different vowels and consonants. However humans can pronounce words without the use of the lungs and glottis in alaryngeal speech, of which there are three types: esophageal speech, pharyngeal speech and buccal speech (better known as Donald Duck talk).

Speech production is a complex activity, and as a consequence errors are common, especially in children. Speech errors come in many forms and are often used to provide evidence to support hypotheses about the nature of speech. As result speech errors are often used in the construction of models for language production and child language acquisition. For example, the fact that children often make the error of over-regularizing the -ed past tense suffix in English (e.g. saying 'singed' instead of 'sang') shows that the regular forms are acquired earlier. Speech errors associated with certain kinds of aphasia have been used to map certain components of speech onto the brain and see the relation between different aspects of production: for example, the difficulty of expressive aphasia patients in producing regular past-tense verbs, but not irregulars like 'sing-sang' has been used to demonstrate that regular inflected forms of a word are not individually stored in the lexicon, but produced from affixation of the base form.

Speech perception refers to the processes by which humans can interpret and understand the sounds used in language. The study of speech perception is closely linked to the fields of phonetics and phonology in linguistics and cognitive psychology and perception in psychology. Research in speech perception seeks to understand how listeners recognize speech sounds and use this information to understand spoken language. Research into speech perception also has applications in building computer systems that can recognize speech, as well as improving speech recognition for hearing- and language-impaired listeners

Speech perception is categorical, in that people put the sounds they hear into categories rather than perceiving them as a spectrum. People are more likely to be able to hear differences in sounds across categorical boundaries than within them. A good example of this is voice onset time (VOT). For example, Hebrew speakers, who distinguish voiced /b/ from voiceless /p/, will more easily detect a change in VOT from -10 (perceived as /b/) to 0 (perceived as /p/) than a change in VOT from +10 to +20, or -10 to -20, despite this being an equally large change on the VOT spectrum.

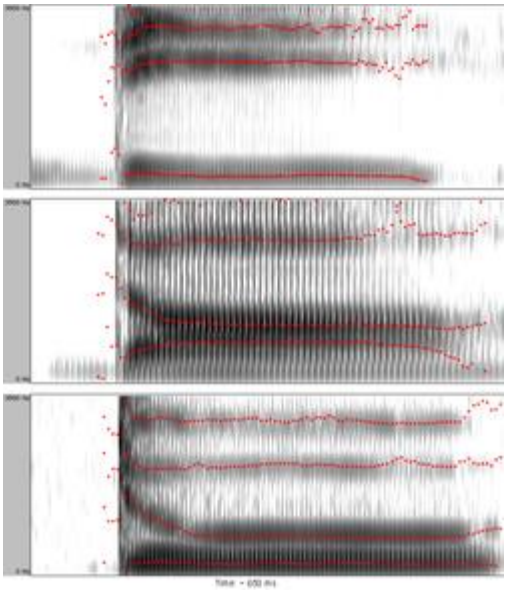
In speech repetition, speech being heard is quickly turned from sensory input into motor instructions needed for its immediate or delayed vocal imitation (in phonological memory). This type of mapping plays a key role in enabling children to expand their spoken vocabulary. Masur (1995) found that how often children repeat novel words versus those they already have in their lexicon is related to the size of their lexicon later on, with young children who repeat more novel words having a larger lexicon later in development. Speech repetition could help facilitate the acquisition of this larger lexicejec

Lecture 8 Speech perception – 2 hours

Speech perception is the process by which the sounds of language are heard, interpreted and understood. The study of speech perception is closely linked to the fields of phonology and phonetics in linguistics and cognitive psychology and perception in psychology. Research in speech perception seeks to understand how human listeners recognize speech sounds and use this information to understand spoken language. Speech perception research has applications in building computer systems that can recognize speech, in improving speech recognition for hearing- and language-impaired listeners, and in foreign-language teaching.

The process of perceiving speech begins at the level of the sound signal and the process of audition. (For a complete description of the process of audition see Hearing.) After processing the initial auditory signal, speech sounds are further processed to extract acoustic cues and phonetic information. This speech information can then be used for higher-level language processes, such as word recognition.

Acoustic cues



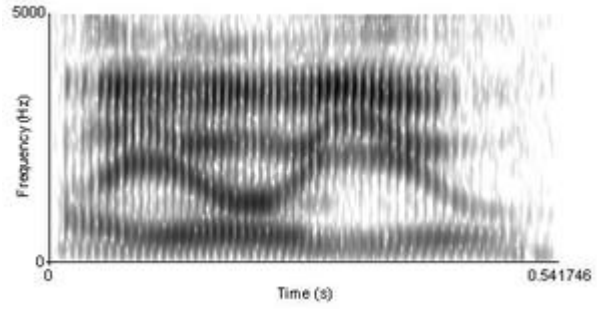
The speech sound signal contains a number of acoustic cues that are used in speech perception. The cues differentiate speech sounds belonging to different phonetic categories. For example, one of the most studied cues in speech is voice onset time or VOT. VOT is a primary cue signaling the difference between voiced and voiceless plosives, such as "b" and "p". Other cues differentiate sounds

that are produced at different places of articulation or manners of articulation. The speech system must also combine these cues to determine the category of a specific speech sound. This is often thought of in terms of abstract representations of phonemes. These representations can then be combined for use in word recognition and other language processes.
It is not easy to identify what acoustic cues listeners are sensitive to when perceiving a particular speech sound:

At first glance, the solution to the problem of how we perceive speech seems deceptively simple. If one could identify stretches of the acoustic waveform that correspond to units of perception, then the path from sound to meaning would be clear. However, this correspondence or mapping has proven extremely difficult to find, even after some forty-five years of research on the problem.

If a specific aspect of the acoustic waveform indicated one linguistic unit, a series of tests using speech synthesizers would be sufficient to determine such a cue or cues. However, there are two significant obstacles:
1. One acoustic aspect of the speech signal may cue different linguistically relevant dimensions. For example, the duration of a vowel in English can indicate whether or not the vowel is stressed, or whether it is in a syllable closed by a voiced or a voiceless consonant, and in some cases (like American English /ɛ/ and /æ/) it can distinguish the identity of vowels. Some experts even argue that duration can help in distinguishing of what is traditionally called short and long vowels in English.
2. One linguistic unit can be cued by several acoustic properties. For example, in a classic experiment, Alvin Liberman (1957) showed that the onset formant transitions of /d/ differ depending on the following vowel but they are all interpreted as the phoneme /d/ by listeners.

Linearity and the segmentation problem



Although listeners perceive speech as a stream of discrete units[citation needed] (phonemes, syllables, and words), this linearity is difficult to see in the physical speech signal (see Figure 2 for an example). Speech sounds do not strictly follow one another, rather, they overlap A speech sound is influenced by the ones that precede and the ones that follow. This influence can even be exerted at a distance of two or more segments (and across syllable- and word-boundaries).

Because the speech signal is not linear, there is a problem of segmentation. It is difficult to delimit a stretch of speech signal as belonging to a single perceptual unit. As an example, the acoustic properties of the phoneme /d/ will depend on the production of the following vowel (because of coarticulation).

Lack of invariance

The research and application of speech perception must deal with several problems which result from what has been termed the lack of invariance. Reliable constant relations between a phoneme of a language and its acoustic manifestation in speech are difficult to find. There are several reasons for this:

Context-induced variation

Phonetic environment affects the acoustic properties of speech sounds. For example, /u/ in English is fronted when surrounded by coronal consonants, Or the voice onset time marking the boundary between voiced and voiceless plosives are different for labial, alveolar and velar plosives and they shift under stress or depending on the position within a syllable.

Variation due to differing speech conditions

One important factor that causes variation is differing speech rate. Many phonemic contrasts are constituted by temporal characteristics (short vs. long vowels or consonants, affricates vs. fricatives, plosives vs. glides, voiced vs. voiceless plosives, etc.) and they are certainly affected by changes in speaking tempo.[1] Another major source of variation is articulatory carefulness vs. sloppiness which is typical for connected speech (articulatory "undershoot" is obviously reflected in the acoustic properties of the sounds produced).

Variation due to different speaker identity

The resulting acoustic structure of concrete speech productions depends on the physical and psychological properties of individual speakers. Men, women, and children generally produce voices having different pitch. Because speakers have vocal tracts of different sizes (due to sex and age especially) the resonant frequencies (formants), which are important for recognition of speech sounds, will vary in their absolute values across iindividualsResearch shoes that infants at the age of 7.5 months cannot recognize information presented by speakers of different genders; however by the age of 10.5 months, they can detect the similarities. Dialect and

foreign accent can also cause variation, as can the social characteristics of the speaker.

Lecture 9 Creative thinking and imagination - 2 hours

Creativity and imagination are not the same thing. Everything I've learned about imagination over the last very many posts is based on this simple observation. Though they frequently call on each other, they are different. And in probing that difference lies a much clearer understanding of what imagination is all about.

Here's an explication of that difference from a book by Ann Pendleton-Julian and John Seely Brown called Pragmatic Imagination: Single from Design Unbound.

Creative activity aims to do something purposeful. The imagination is something that emerges. While creativity works towards products that exist in the real world and have real-world purpose, the product of the imagination is the "imagined object"; it is the image itself. That image comes with meaning, but any purpose it contains is that which one to rise from it as it intersects with other cognitive processes.

... It is precisely because the imagination is given permission to play without pragmatic intent that it finds connections between things that are not obvious or easy. It finds correspondences that the reasoning mind might never see, might find unlikely. It plays with boundaries. It lets thoughts and partial thoughts jump fences. While not purposeful by intent, or pragmatic by nature, it is precisely this kind of activity that has a pragmatic possibility in a world that is rapidly changing and radically contingent.

Later on in the book, the authors make a useful distinction between "experimental imagination" (like Einstein's Gedanken experiments) and "free play imagination."

The free play imagination does not subscribe to the boundaries of what one knows, or knows how to do. It is serendipitous, intuitive, and completely at home not knowing why it sees what it sees. This is the imagination that we most often associate with the realm of the unconscious mind, which "runs in the background" during waking hours and dominates our dreaming... What distinguishes the imagination of free play on the experimental imagination is its motivation. The experimental imagination starts with the question and/or an individual's creative practice and history. These serve as its center of gravity. Whether to make music, experiment with gestures and color on canvas, wrestle with string theory, the experimental imagination honors this search it is focused play.

Lecture 10 Development and pathology of speech and thinking – 4 hours

What is formal thought disorder?
Thought disorder is a disorganized way of thinking that leads to abnormal ways of expressing language when speaking and writing. It's one of the primary symptoms of schizophrenia, but it may be present in other mental disorders such as mania and depression.

Thought disorder is one of the most difficult mental disorders to diagnose and treat, as many people exhibit symptoms of thought disorder occasionally. Some people may demonstrate thought disorder only when they're tired.

There are more than 20 subtypes of thought disorder. In this article, we'll break down the symptoms of some of the most common types. We'll also examine potential treatment options to help you or someone you know manage this disorder.

Types and symptoms of thought process disorder
Thought disorder first appeared in scientific literature in the 1980sTrusted Source, when it was first described as a symptom of schizophrenia. Its loose definition is any disturbance in the organization and processing of ideas.

Each type of thought disorder has unique symptoms. However, a disruption in the interconnectivity of ideas is present in all types.

Even though it's common for most people to display some of the symptoms of thought disorder occasionally, thought disorder isn't classified until it negatively affects the ability to communicate.

These are some of the most common types of thought disorder:

Alogia
People with alogia, also known as poverty of speech, give brief and unelaborated responses to questions. People with this form of thought disorder rarely speak unless prompted. Alogia is often seen in people with dementia or schizophrenia.

Blocking
People with thought blocking often interrupt themselves abruptly mid-sentence. They might pause for several seconds or minutes. When they start talking again, they often change the topic of conversation. Thought blocking is common in people with schizophrenia.

Circumstantiality

People with circumstantiality, also known as circumstantial thinking, or circumstantial speech, often include excessive irrelevant details in their speaking or writing. They maintain their original train of thought but provide a lot of unnecessary details before circling back to their main point.

Clanging or clang association

A person with clanging thought process makes word choices based on the sound of the word rather than the meaning of the word. They may rely on using rhymes, alliterations, or puns and create sentences that don't make sense. Clanging thought process is a common symptom of mania.

Derailment

A person with derailment talks in chains of only semi-related ideas. Their ideas often fall further and further from the topic of conversation. For example, a person with derailment thought disorder might jump from talking about rabbits to the hair on their head to your sweater.

Distractible speech

A person with distractible speech thought disorder has trouble maintaining a topic. They shift quickly between topics and get distracted by internal and external stimuli. It's commonly seen in people with mania.

For example, somebody exhibiting distractible speech might abruptly ask where you got your hat mid-sentence while telling you about a recent vacation.

Echolalia

People with echolalia struggle to communicate. They often repeat noises and words they hear instead of expressing their thoughts. For example, instead of answering a question, they may repeat the question.

Other types of thought disorder

The Johns Hopkins Psychiatry Guide lists 20 types of thought disorder. These include:

Paraphasic error: constant word mispronunciation or slips of the tongue
Stilted speech: using unusual language that's overly formal or outdated
Perseveration: leads to a repetition of ideas and words
Loss of goal: trouble maintaining a topic and an inability to come to a point

Neologism: creating new words
Incoherence: speaking in seemingly random collections of words, known as “word salad”
Do we know what causes thought disorder?
The cause of thought disorder isn’t well known. Thought disorder isn’t a symptom of any particular disorderTrusted Source, but it’s commonly seen in people with schizophrenia and other mental health conditions.
The cause of schizophrenia also isn’t known, but it’s thought that biological, genetic, and environmental factors can all contribute.
Thought disorder is loosely defined and the symptoms vary widely, so it’s difficult to find a single underlying cause. Researchers are still debatingTrusted Source about what might lead to the symptoms of thought disorder.
Some believe it might be caused by changes in language-related parts of the brain, while others think it could be caused by problems in more general parts of the brain.

Risk factors of thought process disorder
Thought disorder is one of the defining symptoms of schizophrenia and psychosis. People have a heightened risk of developing thought disorder if they also have:

mood disorders
bipolar disorder
depression
traumatic brain injury
anxiety
According to research from 2005, people with epilepsy have an increased risk of developing schizophrenia and psychosis compared to the general population.
A traumatic brain injury increases your riskTrusted Source of developing schizophrenia and other mental disorders, such as depression, bipolar disorder, and anxiety disorders.
The following risk factors might also be risk factors for schizophrenia, and by extension, thought disorder:

stress
use of mind-altering drugs
inflammatory and autoimmune disease
exposure to toxic chemicals before birth
When to see a doctor

It’s not uncommon for people to demonstrate symptoms of thought disorder occasionally. However, if these symptoms are frequent or severe enough to cause problems communicating, it’s a good idea to speak with a doctor.

Thought disorder may be a symptom of a mental disorder. Many mental disorders such as schizophrenia are progressive and don’t improve without treatment. However, people with mental disorders are often unaware of their symptoms and need help from a family member or friend.

If you notice any other symptoms of schizophrenia in somebody you know, you may want to encourage them to see a doctor:
delusions
hallucinations
disorganized thinking or speech
neglecting personal hygiene
lack of emotion
lack of facial expression
withdrawing from social life
Thought disorder test and diagnosis
When diagnosing thought disorder, a medical professional will consider a person’s intelligence, culture, and education to see if they’re acting inconsistently.

Rorschach inkblot test
The Rorschach inkblot testTrusted Source was first invented by Hermann Rorschach in 1921. The test uses a series of 10 inkblots to identify a potential thought disorder.

The inkblots are ambiguous and the patient gives their interpretation of each. The administrating psychologist then interprets the patient’s responses to search for potentially disordered thinking.

Thought Disorder Index
After engaging a patient in an open-ended conversation, a medical professional will transcribe the conversation and score it using the thought disorder index.

The Thought Disorder Index, also called Delta Index, is the first standardized test to identify thought disorder. It measures 23 areasTrusted Source of potential thought disturbance and weighs the severity of each on a scale from zero to one.

Thought disorder treatment

Treatment for thought disorder targets the underlying medical condition. The two primary types of treatment are medication and psychotherapy.

Medication
Antipsychotic medication may be prescribed depending on the cause of thought disorder. These medications can balance out the brain chemical dopamine and serotonin.

Psychotherapy
Psychotherapy helps people replace their thoughts with more realistic ones and teach them ways to manage an illness.

Cognitive behavior therapy, a form of psychotherapy, and cognitive enhancement therapy may both be beneficial for people with schizophrenia.

If you suspect that a loved one has a thought disorder, encourage them to seek medical attention. Treatments that can effectively manage thought disorder symptoms are available, and a doctor can help determine the right treatment method based on the underlying condition.
Speech Disorders
Causes
Symptoms
Diagnosis
Treatment
Complications
Outlook
What are speech disorders?
Speech disorders can affect the way a person creates sounds to form words. Certain voice disorders may also be considered speech disorders.

One of the most commonly experienced speech disorders is stuttering. Other speech disorders include apraxia and dysarthria.

Apraxia is a motor speech disorder caused by damage to the parts of the brain related to speaking.
Dysarthria is a motor speech disorder in which the muscles of the mouth, face, or respiratory system may become weak or have difficulty moving.
Some people with speech disorders are aware of what they would like to say but unable to articulate their thoughts. This may lead to self-esteem issues and the development of depression.

Speech disorders can affect adults and children. Early treatment can correct these conditions.

What causes speech disorders?
Speech disorders affect the vocal cords, muscles, nerves, and other structures within the throat.

Causes may include:
vocal cord damage
brain damage
muscle weakness
respiratory weakness
strokes
polyps or nodules on the vocal cords
vocal cord paralysis
People who have certain medical or developmental conditions may also have speech disorders. Common conditions that can lead to speech disorders are:
autism
attention deficit hyperactivity disorder (ADHD)
strokes
oral cancer
laryngeal cancer
Huntington's disease
dementia
amyotrophic lateral sclerosis (ALS), also known as Lou Gehrig's disease
Speech disorders may be hereditary, and they can develop over time.

What are the symptoms of a speech disorder?
Depending on the cause of the speech disorder, several symptoms may be present. Common symptoms experienced by people with speech disorders are:

repeating sounds, which is most often seen in people who stutter
adding extra sounds and words
elongating words
making jerky movements while talking, usually involving the head
blinking several times while talking
visible frustration when trying to communicate
taking frequent pauses when talking
distorting sounds when talking

hoarseness, or speaking with a raspy or gravelly sounding voice

How are speech disorders diagnosed?
Many tests are available to diagnose speech disorders.

Denver articulation screening exam
The Denver articulation screening examination (DASE) is a commonly used testing system to diagnose articulation disorders. This test evaluates the clarity in pronunciation in children between the ages of 2 and 7. This five-minute test uses various exercises to assess the child's speech.

Early language milestones scale 2
This test, created by neurodevelopmental pediatrician James Coplan, determines a child's language development. This test can quickly identify delayed speech or language disorders.

Peabody picture vocabulary test, revised
This test measures a person's vocabulary and ability to speak. The person will listen to various words and choose pictures that describe the words. People who have severe intellectual disabilities and those who are blind won't able to take this assessment. The Peabody picture vocabulary test has been revised many times since its first version was administered in 1959.

How are speech disorders treated?
Mild speech disorders may not require any treatment. Some speech disorders may simply go away. Others can improve with speech therapy.

Treatment varies and depends on the type of disorder. In speech therapy, a professional therapist will guide you through exercises that work to strengthen the muscles in your face and throat. You'll learn to control your breathing while speaking. Muscle-strengthening exercises and controlled breathing help improve the way your words sound. You'll also learn ways to practice smoother, more fluent speech.

Some people with speech disorders experience nervousness, embarrassment, or depression. Talk therapy may be helpful in these situations. A therapist will discuss ways to cope with the condition and ways to improve the outlook of your condition. If your depression is severe, antidepressant medications can help.

What are the potential complications of speech disorders?
Untreated speech disorders may cause a person to experience a great deal of anxiety. Over time, this anxiety can trigger anxiety disorders or a phobia of speaking in public. Early treatment for anxiety can help prevent the development of anxiety disorders or phobias. Treatment options include talk therapy and antianxiety medications.

What is the long-term outlook?
The outlook improves for people who seek early treatment. Early treatment helps prevent a speech disorder from worsening. The outlook for those with permanent disabilities depends upon the severity of the disability.