



Cognitive Development in Human

Health
Psychology
(CMED2006)
LKS Faculty of
Medicine
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Describe the characteristics of sensorimotor, preoperational, concrete operational, and formal operational stages according to Piaget's theory of cognitive development

Contrast formal operation, relativistic thinking, and pragmatic thoughts

Describe how health-related information can be delivered differently to people in different cognitive developmental stages

Learning Objectives

At the end of the lecture, student should be able to:

- Describe the characteristics of sensorimotor, preoperational, concrete operational, and formal operational stages according to Piaget's theory of cognitive development
- Contrast formal operation, relativistic thinking, and pragmatic thoughts
- Describe how health-related information can be delivered differently to people in different cognitive developmental stages

A black and white photograph of Jean Piaget, a Swiss psychologist. He is shown from the chest up, wearing dark-rimmed glasses and a dark suit jacket over a white shirt and dark tie. He is holding a smoking pipe in his right hand, which is resting against his chin. He has a thoughtful expression, looking slightly to the left of the camera. The background is a plain, light-colored wall.

Cognitive Development

Cognition refers to mental activity and behaviour through which knowledge of the world is attained and processed

As a baby's brain grows, their cognition / mental ability also develops



Piaget's Theory of Cognitive Development

A theory developed by Jean Piaget

Main idea being that “children think differently to adults”

Baby starts from what they can sense and becomes more and more abstract

Stages

Formal operational (12+)
Able to reason with abstract symbols only

Concrete operational stage (7-12)
Able to think logically

Preoperational stage (2-7)
Able to use language & other symbols to represent the world

Sensorimotor stage (0-2)
Explore the world through their senses and actions

Sensorimotor (birth to 2 years)

Explore the world through their senses and actions

Preoperational (2-7)

Able to use language & other symbols to represent the world

Concrete Operational (7-12)

Able to think logically

Formal Operational (12+)

Able to reason with abstract symbols only



Part 1

Sensorimotor Stage



Examples of Sensorimotor Cognition

Newborns explore the world through their senses and actions, and their cognition is highly limited to their senses and actions

Of course, completely newborn is very different from a 1-year-old and 2-year-old

Object Permanence:

<https://www.youtube.com/watch?v=NCdLNuP7OA8>

Object Permanence



The understanding that objects continue to exist when out of sight

According to Piaget, children develop object permanence between 8 and 12 months; however, later research suggests that object permanence is developed at 2.5-3.5 months

Detailed Development From 0 to 2



0-1m: newborn reflexes

1-4m: simple motor habits around the infant's own body

4-8m: action aimed at repeating interesting effects in external objects

8-12m: intentional, or goal-directed behaviour

12-18m: experiments to explore the properties of objects

18-24m: internal representation of objects and events, make-believe play



Schema

According to Piaget, we learn things by developing Schema – which is a specific psychological structure of organized ways of making sense of experience

Category of knowledge that help us to interpret and understand the world (e.g., a schema for dog, a schema for car, etc.)



Schema – Equilibration

As children progress through the stages of cognitive development, it is important to maintain a balance between applying existing schema (assimilation) and changing existing schema to account for new knowledge (accommodation)



Tool 62: Cognitive Development

A person's behaviour might be the consequences of how they understand the world and their ability to understand the world (including the physical world and social world)

There is a universal staging of development – regardless of one's age

Tool 63: Sensorimotor Stage



A newborn's behaviour might be explained by their highly limited cognitive ability – i.e., the fact that their cognition is mostly linked to what they can sense and what they themselves can actually do (e.g. object permanence, schema, goal-oriented behaviour)



Part 2

Pre-operational Stage

A photograph of a young child sitting on a bed of large white teddy bears. The child is wearing a light blue vest over a white shirt. In the background, there are blue balloons and a vase of blue flowers. The scene is soft and colorful.

Pre-Operational Stage

Around 2-7 years of age

Increase in representational or symbolic activity

Operation refers to any mental actions that obey logical rules



Concreteness & Realism

Unable to think about very abstract concepts

Believe that everything is real
– difficult to distinguish between a dream or a fantasy with reality



Limitations in Pre-Operational Stage

Egocentrism (please refer to the lecture on social development) & animistic thinking

Centration, inability to conserve & irreversibility

Lack of hierarchical classification

A photograph of a baby crawling on a green lawn towards a large, brown teddy bear. The baby is wearing a white long-sleeved shirt, grey pants, and white sneakers. The teddy bear is sitting upright on the grass. The background is filled with bright sunlight filtering through dense green foliage.

Animistic Thinking

Attributing life to an inanimate object / thinking inanimate objects are alive

Magical thinking declines between ages 4-8 when familiarity with physical events and principles increases



Limitations in Pre-Operational Stage

Conservation Task:

<https://www.youtube.com/watch?v=OxUxgPwpfgk>

Categorization Task:

<https://www.youtube.com/watch?v=tYtNkoBotRE>



Conservation & Conservation Task

Conservation is the understanding that certain physical characteristics remain the same even when their outer appearance changes

We can test a person's understanding by asking them questions before and after the change of appearance

Number: Is there the same number of coins?



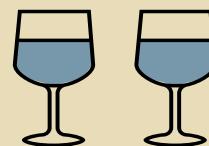
Length: Are these 2 sticks equally long?



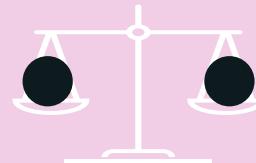
Mass: Does each piece have the same amount of clay?



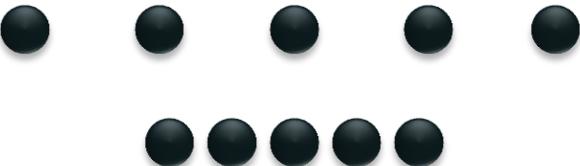
Volume: Is there the same amount of water in each glass?



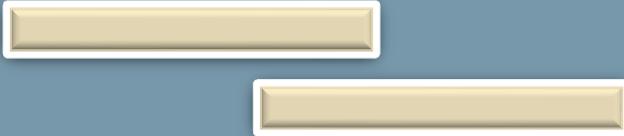
Weight: Do the two pieces of clay weigh the same?



Number: Is there the same number of coins?



Length: Are these 2 sticks equally long?



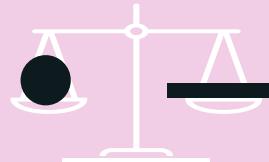
Mass: Does each piece have the same amount of clay?



Volume: Is there the same amount of water in each glass?



Weight: Do the two pieces of clay weigh the same?





Centration & Irreversibility

Centration is to focus on one aspect of situation, neglecting other important features

Irreversibility is the inability to mentally go through a series of steps in a problem and then reverse direction, returning to the start point (undo)

Conservation Tasks & Classification

3yo can complete the number-conservation task if there are only 3 items, and older children can complete more and more different tasks

2 years olds can understand global categories (animals, plants); 3 year olds can understand super-ordinate categories (furniture), basic level (chairs, tables), and subcategories (desk chair, rock chair)



A photograph of a young child sitting on the floor, surrounded by several large, fluffy teddy bears. The child is wearing a light blue vest over a white shirt. In the background, there is a large potted plant with blue flowers and two large balloons, one blue and one silver, reflecting the room's lights.

Tool 64: Preoperational Stage

A small child's behaviour might be explained by their limited logical thinking ability (e.g. centration & irreversibility, egocentrism, and animistic thinking)

Specifically, they are not good at things that are abstract or unreal



Part 3

Concrete Operational Stage

A photograph of a classroom from the perspective of a student. In the foreground, the back of a child's head and shoulders are visible, wearing a dark blue hoodie. In the middle ground, several other children are seated at their desks, facing a teacher who is standing at the front of the room near a chalkboard. The teacher is wearing a maroon vest over a white shirt. The background shows the interior of a classroom with light-colored walls.

Tool 65: Concrete Operational Stage

A child's behaviour might be explained by their limited logical thinking ability –

Specifically, they might be able to think logically using abstract rules, but is not able to deal with logical problem that is hypothetical or based entirely on abstract concepts



Concrete Operational

Able to think logically about concrete or real-world events and experiences

Develop a set of abstract rules for examining & interacting with the world

Reasoning becomes more logical



Compared to Preoperational Stage

Better at hierarchical classification, seriation and transitive inference

Reversibility in thinking is achieved

More able to perform decentration – see Conservation Task

Seriation (1) Physical Ordering



Seriation means ordering items along a quantitative dimension (e.g., please arrange the following sticks from the shortest to longest)

Easiest and does not necessarily require inference

Seriation (2) Transitive Inference

Transitive inference is to perform mental seriation; e.g.

B is longer than A

A is longer than C

Then B is _____ than C

More difficult, but doable by concrete-operational children when A, B & C are all visible to the child



Seriation (3) Hypothetical Problems



For example, “Amy is taller than Angel, Angel is taller than Alice. Who’s the tallest?”

Most difficult, requires more information (and comparison) to be held in one’s brain

Not doable by concrete-operational children



Inductive Reasoning

Able to use one's own experience to form a general principle

Contrast to deductive reasoning, which is based on hypothetical premises and requires predicting a specific outcome from a general principle – which concrete-operational child cannot do



Information Processing

Increases in information-processing speed and capacity

Gains in inhibition and attention

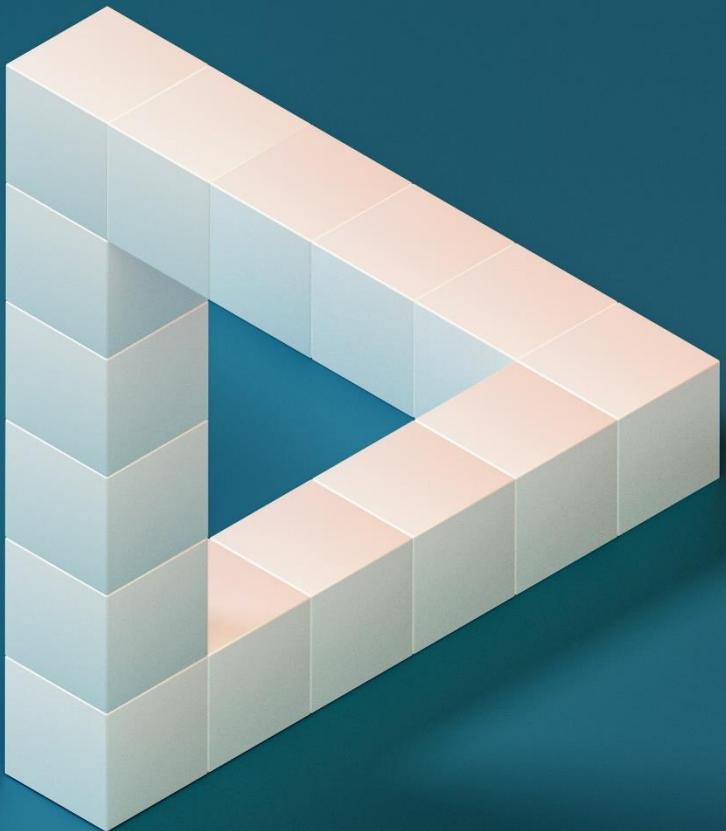
Development of Memory Strategies (rehearsal, organization, elaboration, and mnemonic)

A photograph of a classroom from the perspective of a student. In the foreground, the back of a child's head and shoulders are visible, wearing a dark blue hoodie. In the middle ground, several other children are seated at their desks, facing a teacher who is standing at the front of the room near a chalkboard. The teacher is wearing a maroon vest over a white shirt. The background shows the interior of a classroom with light-colored walls.

Tool 65: Concrete Operational Stage

A child's behaviour might be explained by their limited logical thinking ability –

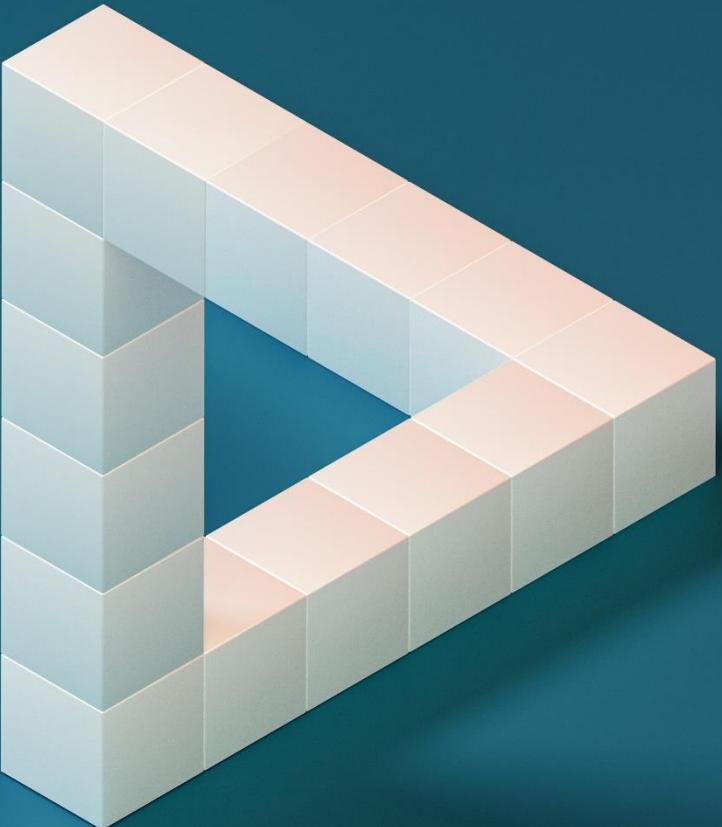
Specifically, they might be able to think logically using abstract rules, but is not able to deal with logical problem that is hypothetical or based entirely on abstract concepts



Part 4

Formal Operational Stage

Logic and Deductive Reasoning

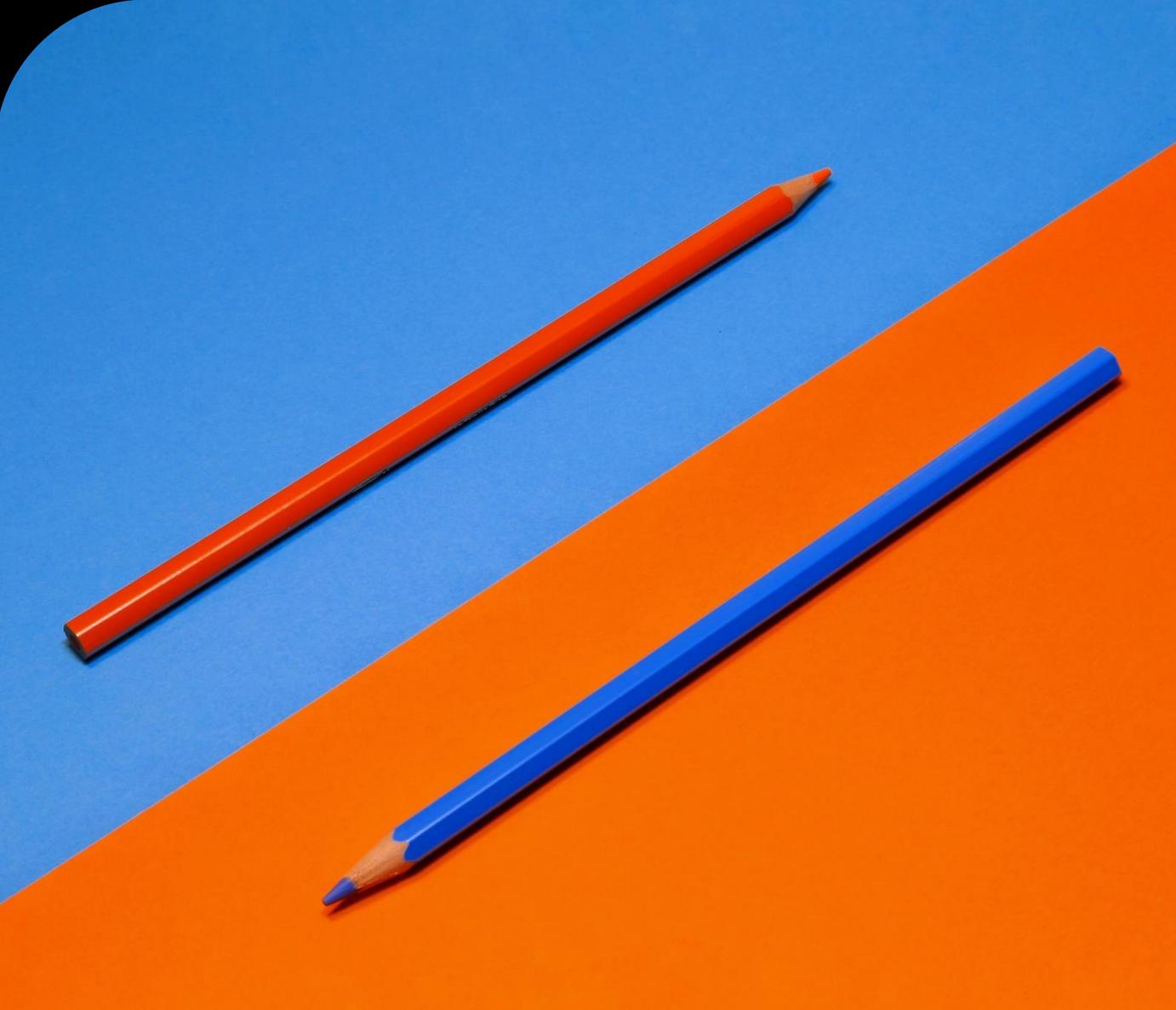


True or False?

"If dogs are bigger than
elephants
And elephants are bigger than
mice

Then dogs are bigger than
mice"

Fourth graders: 0% correct
Seventh graders: 45% correct
College students: 85% correct



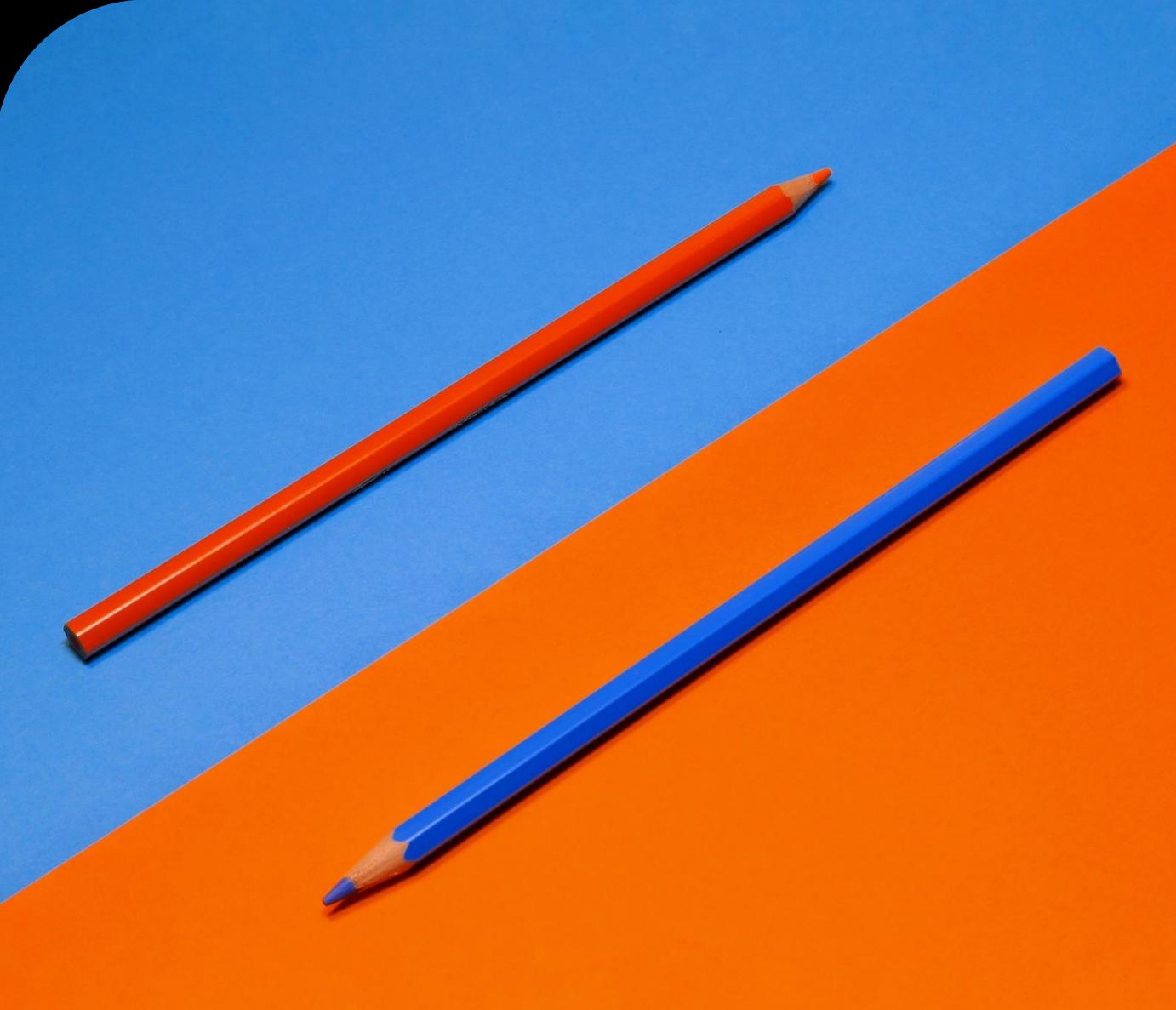
Formal Operational

Starts around age 11

Capable of hypothetico-deductive reasoning

(Problem → Hypothesis → Deduce logical and testable inference)

Able to isolate and combine variables to test

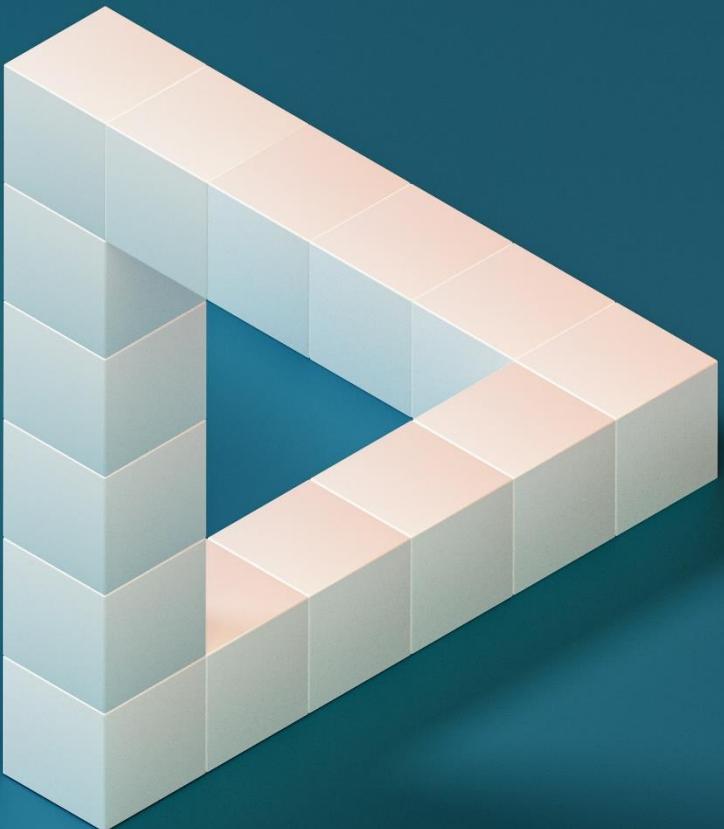


Propositional Thought

Evaluate the logic of propositions without referring to real-world circumstances

However, maybe still dualistic thinking (i.e. dividing information, values, and authority into right and wrong, good and bad)

Tool 64: Formal Operational Stage



A child's behaviour might be explained by their limited logical thinking ability –

Specifically, they might be able to think logically about both concrete and abstract concepts, but is still unable to engage in relativistic thinking

Part 5

Post-Formal Thought





Consider these
Questions...

Is The Super Mario Bros. Movie a good movie?

What about the Barbie movie? Better than Oppenheimer?

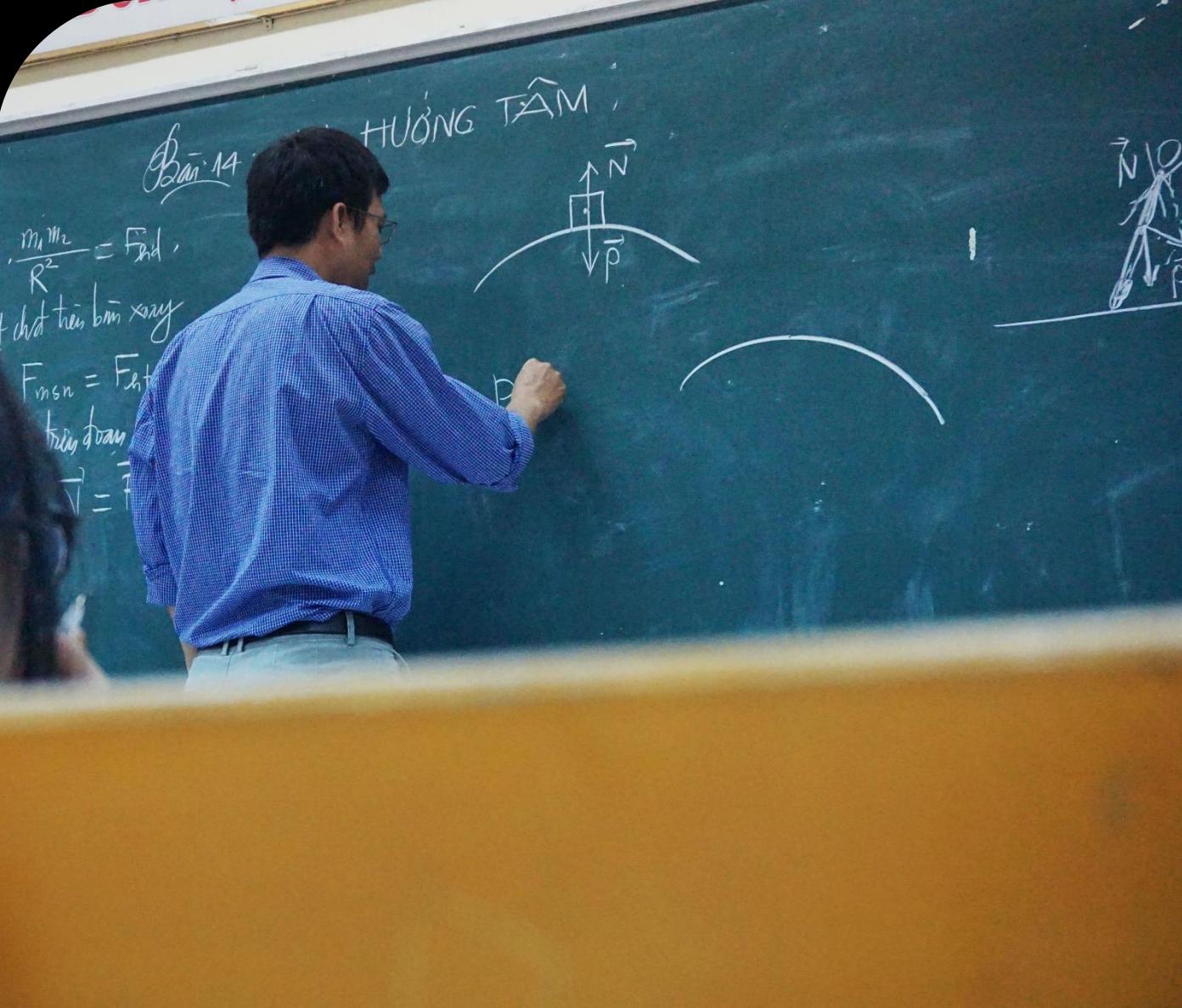
Is Arsenal or Liverpool a better football team?

Is psychology or sociology more useful for a nursing career?

Post-Formal Thought

A type of adult thinking that is suited to solving real-world problems

Less abstract and absolute than formal thought and more adaptive to inconsistencies in life



Epistemic Cognition

Our reflections on how we arrived at facts, beliefs, and ideas

One study asked undergraduates at the end of their four years programmes:

Who's the best teacher?

Who deserves an A in this course?



A photograph showing a group of hands reaching towards the center of a circle. The hands belong to different people and are partially covered in red paint. The background is dark, making the red paint stand out.

From Dualistic to Relativistic Thinking

Relativistic Thinking encompasses the following:

- Knowledge as embedded in a framework of thought
- Aware of a diversity of opinions on many topics
- Believe in multiple truths, each relative to its context



Commitment within Relativistic Thinking

Formulate a perspective that synthesizes contradictions

Generate rational criteria against which options can be evaluated

Seek out differing perspectives to advance one's knowledge and understanding; Reflect & interact with peer



Pragmatic Thought

Logic becomes a tool for solving real world problems

Accept contradictions as part of existence and develop ways of thinking that thrive on imperfection and compromise

More able to integrate cognition with emotion



Cognitive-affective complexity

Awareness of positive and negative feelings and coordination of them into a complex and organized structure

Greater awareness of one's own and others' perspectives and motivation

Important in emotional intelligence and solving pragmatic situations

Tool 67: Pragmatic Thought



A person's behaviour might be explained by whether they are able to accept contradictions as part of existence and develop ways of thinking that thrive on imperfection and compromise (including multiple truths and cognitive-affective complexity) in order to solve real life problems pragmatically

A photograph of two young men sitting at a table in a bright, airy cafe. One man, seen from behind, wears a light-colored t-shirt. The other man, facing the camera, has short dark hair and is wearing a dark t-shirt. They appear to be engaged in a conversation. The background shows large windows looking out onto greenery.

Part 6

Explaining and Suggesting Behaviours

Scenario 1

Susie, 5, is a niece of yours. She is not very fond of eating vegetables, and her parents ask you (a nursing student) to help explain to her why it is important to eat vegetables.

However, you find that Susie does not really understand the concept of vegetables.

She knows that she is usually given Choi-Sum to eat at home, and these are referred to as “*Choi*” (菜, vegetables). On the other hand, her kindergarten teachers once taught her about food pyramid, where “vegetables” also include carrots and tomatoes – which her parents say do not count.

She is also confused about seaweed, as it has the word “*Choi*” in its name.

Peter, 18, is struggling with his university study. He is very good at remembering facts and solving abstract problems, and therefore achieved very good grades in public exams.

However, he finds that in university, most questions are not well-defined. His lecturers would give him scenarios that require him to fill in details from common sense, or to include its investigation as a prerequisite to trying to solve the problem.

Scenario 2

He also finds it frustrating that the lecturers don't provide actual solution to problems – in fact, they claim that there are no model answers. Rather, they prefer to talk about ways to tackle the problem and characteristics of good solutions. He therefore finds it difficult to study, and is always unsure whether his answers are good or not.



Part 7

Behavioural Change

Health Talk

Target:
Primary School Students

Topic:
Healthy living

Sub-topics:
Balanced diet, regular physical exercise,
avoidance of tobacco and alcohol

Case 14

You are organizing a health talk for primary school students on health living. The topics include balanced diet, regular physical exercise, and the avoidance of tobacco and alcohol.

You are wondering the tone that you want to adopt during this talk, as well as the kind of information (and facts) that are most useful to be presented to the students.

Case 14 Focus

Erikson's psychosocial stage
(conflict, task, virtues)

Piaget's cognitive development stage
(cognitive ability, understanding)

Which stage (in both Erikson's and Piaget's theory) are most of your audience most likely to be in? How can your message fit in with their developmental task?

Which stages have your audience passed through already? What virtues do you expect them to have? Given that some of them might not have achieved to virtue, what should you do? What kind of concepts can they understand?



Part 8

Conclusion



Cognition: mental activity & knowledge

Piaget's theory (4 stages)

Sensorimotor stage

Preoperational stage

Concrete operational stage

Formal operational stage

Post-formal thoughts

Pragmatic thought

Relativistic thinking

Conclusion

Cognition refers to mental activity & behaviour through which knowledge of the world is attained & processed

Jean Piaget's theory states that there are four stages of cognitive development, namely sensori-motor, preoperational, concrete operational, and formal operational stage – but we now think that there are also post-formal thoughts that embraces pragmatic and relativistic thinking

A photograph of a library aisle. On both sides, there are tall, dark wooden bookshelves filled with books. The books are arranged in rows, their spines visible. Above the bookshelves, several vintage-style lightbulbs are suspended by black cords from the ceiling, casting a warm, yellow glow. The lighting creates a cozy and scholarly atmosphere. In the background, more bookshelves and a doorway are visible, though slightly out of focus.

Reading / References

Boyd, DR & Bee, H (2019). Lifespan development (8th ed.). Chapter 2.3 Cognitive Theories; chapter 5.1 Cognitive Changes and Intelligence in Infancy; chapter 7.3 Piaget's Preoperational Stage of Cognitive Development; chapter 9.2 Cognitive Changes in Middle Childhood; chapter 11.4 Changes in Thinking and Memory; 13.3 Cognitive Changes in Early Adulthood. Boston, MA: Pearson.



~ End of Lecture ~

