DP IB Psychology: HL

Your notes

Models of Development

Contents

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Brain development: maturation

- In the first few years of human life, more than 1 million new **neural connections** are formed every second
- Humans are born with a huge capacity to **respond** to their **environment**
- The human brain is hard-wired to take in the multitude of environmental stimuli that it encounters daily
- Some **synapses** are strengthened through repeated use and thus expand their network, which is known as **neural branching**
- About half of these connections are eliminated during adolescence to increase efficiency, which is known as **neural pruning**
- Brain development reflects the development of **higher-order cognitive functioning**
  - Evidence shows that the first areas of the brain to mature are those related to the most **basic** of functions e.g. movement and senses
- Functions such as **decision-making**, reflection and planning develop later (along with their associated brain areas)
- This sequence means that it is possible to see the **connection** between the developing brain and increasingly **sophisticated** cognitive functions

Research support for brain development

Chugani et al. (1998)

Aim:

- To investigate **glucose metabolism** in the human brain from birth to late adolescence in order to track the course of brain development and cognitive functioning

Procedure:

- A **review article** of **positron emission technology (PET) scan** studies on human brain development

Results:

- **Newborns** show reduced activity in the **cerebral cortex** (linked to executive functions) but activity in the **amygdala**, suggesting emotional responses are central to early interactions and development
- **6–9 months:** activity increases in the **frontal lobes**, coinciding with improvements in cognitive functioning
- **Windows of opportunity for skill development:**
  - **Motor skills:** pre-birth – 6 months

- **Vision:** 0 – 6 months
- **Emotion regulation:** 0 – 3 years
- **Vocabulary and speech:** 0 – 3 years
- **Logic (including maths):** 0 – 4 years

- Missing these windows can have **long-term, potentially devastating consequences** for development
- There is a **critical period in the first 10 years**, particularly for the development of **language structures** (grammar rather than vocabulary)


Your notes

Evaluation of brain development

Strengths

- PET scan studies are **replicable** if there is access to the equipment and trained staff who can operate the machines and analyse the scans
  - Chugani's findings have been supported by other studies into brain development identifying the **prefrontal cortex** as being the last part of the brain to develop
  - This increases the **reliability** of PET scan research
- Understanding the progression of brain development can help to identify **developmental delays** in babies and children, which in turn can inform **interventions** and **treatments**

Limitations

- Using PET scans may be **biologically reductionist**
  - They cannot account for other important influences on cognitive development
    - E.g., upbringing, peers, environment, which may all play an important role in brain and cognitive development
- Some children may not fall in line exactly with the windows of opportunity set out in Chugani's research, which means that the findings do not account for **individual differences**

Link to concepts

Measurement

- The use of PET brain imaging technology on babies and younger children can give insights into the **correlation** between brain development and learning
- PET scans of babies and children can identify biological stages of brain development that peak at 10 years old, providing a 'window of opportunity' for learning
- This technology has allowed researchers to 'look inside' the brain in ways that were unimaginable just decades ago

Causality

- The use of PET scans is an example of an **objective and clinical** methodology which adheres to the **features of science**
  - A **hypothesis** can be tested under **controlled conditions**
    - However, this means that the method lacks ecological validity due to the **artificial** nature of the technique

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Brain development: neuroplasticity

- **Neuroplasticity** refers to the brain's ability to **adapt to change**, be that from injury, damage done due to illness or changes brought about due to learning and experience

Types of neuroplasticity

- **Structural plasticity** refers to changes within **brain structures**
  - E.g., increased **grey matter** build-up in the **posterior hippocampus** due to learning experienced over time
- **Functional plasticity** (also known as **functional recovery**) refers to the brain's ability to replace lost or damaged functions by using existing brain regions in their place
  - E.g., after a stroke, other areas of the brain may compensate for speech or movement deficits
- These changes are **gradual**, occurring over time as the brain responds to either the extent of **damage** or the degree of **learning/experience**
- The build-up of grey matter is due to the increased **synaptic connectedness** in the brain regions that are repeatedly used
- Neuroplasticity shows the brain is not static or fixed but a **dynamic, flexible organ** that adapts continuously to environmental stressors and stimuli

Research support for brain development: neuroplasticity

Luby et al. (1998)

Aim:

- To investigate whether childhood poverty is associated with delayed brain development (reduced neuroplasticity) and the extent to which **mediating factors** may influence early deprivation

Participants:

- 145 children from the USA who were enrolled on a 10-year **longitudinal** study of Preschool Depression
- The children were categorised as living in poverty

Procedure:

- Annual assessments over 3-6 years measured **cognitive, emotional, and social skills**.

  Researchers also collected data on **caregiver-child relationships** and exposure to **negative/stressful life events**.

Each child underwent two MRI scans:

- Session 1: whole-brain scan.
- Session 2: focused scan of the **hippocampus** and **amygdala**

Results:

- MRI scans showed **reduced white and grey matter** in the hippocampus and amygdala compared to expected developmental levels
- This reduction is evidence of **impaired/delayed neuroplasticity**
- Children who received **positive, nurturing care** had less impairment, especially in the hippocampus (more white/grey matter present)

Conclusion:

- Childhood poverty negatively affects brain development and neuroplasticity, but the quality of caregiving can act as a protective factor

Evaluation of brain development: neuroplasticity

Strengths

- Luby et al. compared behavioural, cognitive, and social data with MRI results, strengthening the **internal validity** of the study
- The study's **longitudinal** design allowed for tracking **real developmental changes** over time rather than relying on snapshots

Limitations

- Variables like 'quality of caregiving' or 'social skills' are complex and may have been measured subjectively, reducing validity
- MRI scans can measure brain volume (white/grey matter) but cannot directly explain *why* these changes occur, so the findings have limited explanatory power

Link to concepts

Causality

- Some children in Luby's study had **pre-existing depression**, which may have independently influenced brain development
- This introduces a **confounding variable**, making it unclear whether impaired neuroplasticity was caused by **poverty** or by **mental health factors**
- As a result, the study cannot establish a **direct causal relationship** between poverty and reduced plasticity
- Further research with **control groups** (children without depression) would strengthen claims that poverty itself is responsible for developmental delays

Bias

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- The study suffers from **sample bias** as it only included **US preschool children living in poverty**, limiting the generalisability of the findings
- Since participants also showed **depressive symptoms**, the results may not apply to:
  - children in poverty **without depression**
  - children in other cultural or national contexts
  - or children outside the **preschool age range**
- This reduces the **population validity** of the study

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Human development: Vygotsky's theory

- Vygotsky argued that **social interaction** is central to cognitive development. Unlike Piaget, he did not believe children learn in isolation
- He placed development within a **social and cultural context**, seeing children as **little apprentices** who need guidance from others

Zone of proximal development (ZPD)

- Represents the gap between what a child can do independently and what they can achieve with help
- With the guidance of a **more knowledgeable other (MKO)**, e.g., parent, teacher, older peer, the child can cross 'ones' and reach higher cognitive potential
- The ZPD is an **aspirational model**: what the child **could** achieve under the right conditions

Scaffolding

- Vygotsky compared children's learning to a **scaffolded structure**: support is provided at first, then gradually removed as the child becomes more competent
- Scaffolding is the process by which an MKO gives **constructive help and guidance** to enable a child to practise or complete a task
- This support is **individualised**, tailored to the child's needs, helping them achieve outcomes that would not be possible alone
- Scaffolding includes **strategies** such as:
  - maintaining the child's **interest** in a task
  - **simplifying** complex ideas or actions
- Over time, scaffolding is **reduced** until the child can complete tasks independently

Research support for human development: Vygotsky's theory

Conner & Cross (2003)

Aim:

- To investigate scaffolding in **mother–child interactions** during problem-solving tasks

Participants:

- 45 mother–child pairs
- Children were observed at ages **16, 26, 44, and 54 months**

Procedure:

- Four observational sessions over **three years**
- Mothers were observed for:
  - types of scaffolding strategies used
  - consistency and effectiveness of these strategies
  - how much direct help was given
  - levels of child independence

Results:

- Mothers gave **more support at earlier ages** when children needed help
- As children grew, **contingent instruction** was used
- With progress, mothers provided **less direct help**, giving children more freedom

Conclusion:

- Scaffolding supports the child's development of **expertise and independence**, consistent with Vygotsky's theory

Evaluation of Vygotsky's theory

Strengths

- Vygotsky's theory has influenced modern teaching, e.g., the use of **teaching assistants** and **personalised learning programmes** that scaffold progress through the ZPD
- Vygotsky placed the child squarely within **social and cultural contexts,** which means that his theory has **good external validity**

Limitations

- Scaffolding is difficult to **operationalise and measure,** as its very nature tends to be **subjective, i.e.,** what will work for one child may not work for another, lowering reliability
- Despite recognising culture, some argue Vygotsky's model assumes a universal approach, overlooking cultural differences in learning
  - Much scaffolding relies on language, which may not be equally relevant in all cultural settings

Link to concepts

Responsibility

- Children with undetected conditions (e.g., **congenital heart disease**) may develop more slowly
- If adults push them to reach ZPD targets without recognising the condition, it could have **harmful effects**, highlighting the need for careful, responsible application of Vygotsky's ideas

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Change

- Education has shifted toward **child-centred learning**, influenced by Vygotsky
- The emphasis is now on **collaborative learning** and the child as an **active agent**, supported by adults through scaffolding, rather than passive recipients of teacher-led instruction

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Piaget's theory of cognitive development

- Piaget's theory of cognitive development **(1920s–1980s)** proposed that **children's thinking is qualitatively different** from that of adults
- He argued that **cognitive development is maturational**, meaning progress is tied to age and follows a biologically driven timetable
- Piaget believed that children actively explore their environment through **discovery learning**, behaving like **'little scientists'**
- As they interact with their surroundings, children construct **schemas** — mental frameworks that help them organise and interpret information
- These schemas develop through two processes:
  - **Assimilation:** fitting new experiences into existing schemas
  - **Accommodation:** altering schemas when new experiences don't fit
- Piaget described this overall framework as **genetic epistemology**, meaning knowledge develops from innate drives to explore and learn, unfolding according to age-related stages

Piaget's stage theory

The sensorimotor stage (0–2 years)

- This stage is marked by the child's **body schema** and the **physical exploration** of their **environment**
- A key **marker** of this stage of cognitive development is when a baby acquires **object permanence**, usually around the age of **8 months**
- Object permanence can be tested using the '**A-not-B'** task: a toy is repeatedly hidden under location A, then under location B. If the child continues to search at A, they have not yet acquired object permanence

The pre-operational stage (2–7 years)

- The pre-operational stage is the **most widely researched** stage, as children show rapid developmental milestones and are receptive to experiments
- This stage is characterised by increasingly **sophisticated** schemas**, pretend play, anthropomorphism,** early concepts of **time** and the beginnings of **decentration**
- Key markers of this stage include:
  - **egocentrism** – inability to see from another's perspective (passing an egocentrism task marks the end of this stage)

- **conservation** – failure to understand that quantity remains the same despite changes in appearance (passing a conservation task signals transition to the next stage)
- **class inclusion** – inability to classify an object as belonging to multiple categories at once


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The concrete operational stage (7–11 years)

- Children begin to understand **conservation of volume, mass, and number**
- They can **de-centre** and **classify/categorise** objects more accurately
- They can perform **logical mental operations** (e.g., mental maths) but often lack systematic problem-solving strategies

The formal operational stage (11 years +)

- This stage is marked by the ability for **abstract reasoning**, **systematic and scientific thinking**, **relativism**, and debating complex ideas

Research support for human development: Piaget's theory

Conservation: Piaget

- **Present equal quantities**
  - Show the child two equal amounts of material side by side (e.g., liquid in identical glasses, equal clay balls, or equal rows of coins)
- **Initial question**
  - Ask, "Does *this one have more, does that one have more, or are they the same?*"
- **Transform one item**
  - While the child watches, alter the appearance of one material (e.g., pour liquid into a taller container, flatten one clay ball, spread out one row of coins)
- **Repeat the question**
  - Ask the same question again: "*Does this one have more, does that one have more, or are they the same?*"
- **Evaluate the response**
  - If the child says one now has more/less: **Fail** – they focus on appearance, not logic
  - If the child says they're still the same: **Pass** – they understand conservation
- The conservation task tests a key developmental milestone in children, as to pass it, the child must be able to perform a **reverse operation**
  - This means that they can 'conserve' the idea that both materials are the same in terms of **volume/number**

Egocentrism: Piaget & Inhelder (1956) – 3 Mountains task

Your notes

- **Present the model**
  - Show the child a 3D model landscape with three mountains and features like animals or trees
- **Introduce the doll**
  - Place a doll on the opposite side of the model, facing the landscape from a different viewpoint than the child
- **Ask the perspective question**
  - Ask the child, "What *does the doll see?*"
  - The child selects a picture from several images showing the model from different angles
- **Observe the response**
  - Young children (around 4 years old) typically choose the image that matches their own view – showing egocentrism
  - By age 7–8, children more consistently select the doll's viewpoint – showing **reduced** egocentrism and improved perspective-taking
- The 3 Mountains Task tests a key developmental milestone because to pass it, the child must be able to decentre and recognise others' viewpoints

Class inclusion: Piaget

- **Present the Set**
  - Show the child a picture or model of a set of items, e.g., a bunch of flowers
- **Identify Subclasses**
  - The set includes two subgroups — for example, **five daffodils** and **three poppies**
- **Ask the Inclusion Question**
  - Ask the child, "Are *there more daffodils or more flowers?*"
- **Evaluate the Response**
  - If the child answers **"more daffodils"**, they **fail** the class inclusion task, showing they do not yet understand that **"flowers"** includes **both** daffodils and poppies
  - If the child answers **"more flowers"**, they **pass**, demonstrating an understanding of hierarchical categorisation
- The task tests a key developmental milestone in children, as to pass it, the child must be able to understand that 'daffodils' are a **subcategory** of the **overarching** category of 'flowers'

Evaluation of Piaget's theory

Strengths

- Piaget's theory can be easily **tested** using **experimental methodology**, which means that it is **reliable**
- Piaget's theory was **groundbreaking;** Piaget's work shifted psychology toward recognising children's cognitive development, sparking decades of valuable research

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Limitations

- Piaget's theory does not consider the role of **language** in a child's cognitive development
  - This means that it is an **incomplete** explanation of the different aspects of developing cognition
- Piaget's theory was not initially supported by **empirical evidence**; his ideas were formed using a small, **biased** sample of Swiss children and anecdotal observation rather than robust empirical methods

Link to concepts

Bias

- Piaget's theory and the tests he devised show **culture bias**
  - The *3 Mountains Task* is based on Swiss landscapes — unfamiliar to children from non-mountainous areas
  - Conservation tasks reflect **Western/individualistic** ideas of volume, mass, and number, excluding collectivist cultural understandings

Responsibility

- Research with children requires strict adherence to **ethical guidelines**:
  - Informed consent from parents/guardians
  - Protection from harm and ensuring tasks are not distressing
  - Extra care in wording instructions, since children may not understand in the same way as adults

Your notes

Human development: theory of mind

- Theory of Mind (ToM) is the ability to recognise that **other people have their own mental states** — thoughts, feelings, beliefs, and knowledge — which may differ from one's own
- A key aspect of ToM is understanding **intentionality**: appreciating that people act on the basis of their own beliefs and attitudes
  - E.g., I can **predict** that James is going to take his dog for a walk because he is wearing his green 'dog-walking' coat'
- ToM is thought to be **fully developed** by the age of **3 or 4 years old**, although some research (e.g., Baron-Cohen) suggests that infants as young as **7–9 months** show early intentionality
- Research has shown that ToM has a biological basis – a **theory of mind module (ToMM)**, which **matures** in the brain at around 4 years of age

Research support for theory of mind

False belief tasks

- A **'false belief' task** is one way to test ToM, particularly in 3–4 year olds
  - These tasks were developed to test whether **children** can **understand** that others can believe something that is **not true**
  - To pass a false belief task, the child must recognise that another person does not share their knowledge
- A classic false belief task is the 'Smarties' test:
  - **Present the box**
    - Show the child a Smarties box and ask, "What *do you think is inside?*"
      – The child typically answers: **"Smarties"**
  - **Reveal the unexpected content**
    - Open the box to show that it actually contains **pencils**
  - **Ask the False Belief Question**
    - Ask the child, "What *will your friend think is inside the box?*" (The friend hasn't seen inside)
  - **Evaluate the response**
    - If the child says **"Smarties"**, they **pass** – showing they understand that others can hold false beliefs
    - If the child says **"pencils"**, they **fail** – assuming others know what they know, indicating **egocentric thinking**

- The **Sally-Anne** task (**Baron-Cohen *et al.***, 1985) is another false belief task assessing ToM:
  - **Introduce the dolls**
    - Show the child two dolls: **Sally** (with a basket) and **Anne** (with a box)
  - **Set up the scenario**
    - Sally places a **marble in her basket** and then **leaves the room**
  - **Create the false belief**
    - While Sally is gone, **Anne moves the marble** from the basket to her own **box**
  - **Ask the key question**
    - Ask the child, "When *Sally returns, where will she look for her marble?*"
  - **Evaluate the response**
    - If the child says **"basket"**, they **pass** – understanding Sally has a false belief
    - If the child says **"box"**, they **fail** – assuming Sally knows what they know, showing **egocentric thinking**
- The Sally-Anne task has been used to explore links between ToM deficits and **autistic spectrum disorder (ASD)** to offer some **insight** as to why children with ASD have difficulty understanding others' perspectives

Your notes

Evaluation of theory of mind

Strengths

- ToM research has had practical applications, as it has informed **anti-bullying strategies**
  - Bullies often exploit ToM skills to manipulate others, so interventions can use this insight positively
- ToM research has improved understanding of ASD and led to **training programmes** that enhance children's social skills.

Limitations

- False belief tasks may **lack validity**, as they require memory and language skills, so a child might fail despite having ToM
  - Pretend play (which requires ToM) shows some children understand others' perspectives even if they fail the task
- There is no formal **consensus** among researchers over how ToM develops
  - It may develop **synchronously** with **cognitive abilities** (Piaget)
  - It may be **internalised** during **interactions** with adults (Vygotsky)
    - This means that ToM is difficult to test

Link to concepts

Bias

- Much ToM research is **culture-biased**, based mainly on Western, individualistic samples
- In collectivist cultures, enculturation may encourage group-orientated thinking rather than individual perspective-taking
- More research on ToM should be conducted within collectivist cultures to ensure cultural relativism

Causality

- With ASD, it is unclear whether ToM deficits are a **cause** or a **consequence**:
  - Children with ASD may avoid social interaction, giving them fewer opportunities to practise ToM skills
  - Alternatively, a lack of ToM may underpin their social difficulties
- The direction of causality remains unresolved

Your notes