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A-LEVEL PSYCHOLOGY REVISION NOTES

Cognition and Development

AQA Psychology 7182 (A-level only)

2025 specification · spec section 4.3.4 · A-level Paper 3

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Contents

How to use these notes. Cognition and Development is an **A-level only** topic (Paper 3 option, AQA 7182). Each section ends with PEEL evaluation that can be deployed as ready-made paragraphs in 8-, 12- and 16-mark questions.

Note on the 2025 specification: "Theory of mind as an explanation of autism" has been **removed** from the 2025 spec. Theory of mind itself, the Sally-Anne study, Selman's perspective-taking and the mirror neuron system remain. Past-paper questions framed around theory of mind and autism are now obsolete.

AQA 2025 SPECIFICATION — COGNITION AND DEVELOPMENT CONTENT (A-LEVEL ONLY, PAPER 3)

- **Piaget's theory of cognitive development**: schemas, assimilation, accommodation, equilibration, stages of intellectual development. Characteristics of these stages, including **object permanence, conservation, egocentrism** and **class inclusion**.
- **Vygotsky's theory** of cognitive development, including the **zone of proximal development** and **scaffolding**.
- **Baillargeon's explanation of early infant abilities**, including knowledge of the physical world; **violation of expectation research**.
- **The development of social cognition**: **Selman's levels of perspective-taking**; **theory of mind**; the **Sally-Anne study**. The role of the **mirror neuron system** in social cognition.

1 Piaget — Basic Concepts: Schemas, Assimilation, Accommodation, Equilibration

Jean Piaget (1896–1980) proposed that children are **active constructors** of their understanding of the world. Cognitive development is the gradual building and reorganisation of mental structures (schemas) as the child interacts with the environment. Four core mechanisms drive this process.

1. Schemas

> **SCHEMA**
> A **schema** is a mental framework or "package" of organised knowledge about an object, situation or action. Infants are born with a small number of innate schemas (e.g. grasping, sucking) and gradually develop new ones throughout life.

Schemas allow the child to make sense of the world. As the child encounters new experiences, schemas are constantly being created, refined and reorganised.

2. Assimilation

Assimilation is the process of incorporating new information into an *existing* schema. The new experience fits comfortably with what the child already knows.

Example: a child has a schema for "dog" (four legs, fur, tail). When they see a sheep for the first time, they call it a "dog" — they have assimilated the new experience into their existing schema.

3. Accommodation

Accommodation happens when an existing schema cannot account for the new experience — so the schema must be *changed* or a new schema created.

Example: when a parent corrects the child by saying "that's a sheep, not a dog", and the child learns to distinguish dogs from sheep, the child has accommodated — creating a new "sheep" schema and refining the "dog" schema.

4. Equilibration

> **EQUILIBRATION**
>
> **Equilibration** is the drive to maintain mental balance. When new information cannot be assimilated, the child experiences **disequilibrium** — a state of cognitive discomfort. The drive to restore equilibrium motivates accommodation. Equilibration is the engine of cognitive development.

The cycle: **equilibrium** → **new information** → **disequilibrium** → **accommodation** → **equilibrium**. Each cycle refines the child's understanding.

Evaluation

Strength — schemas are well-evidenced across psychology. The concept of schemas extends well beyond Piaget — Bartlett's (1932) "War of the Ghosts" study showed adults distort unfamiliar stories to fit Western cultural schemas, and modern cognitive neuroscience confirms schema-based memory and attention. This is important because the convergence of evidence across cognitive psychology, social psychology and neuroscience strengthens the schema concept that Piaget pioneered.

Strength — applied value in education. Piaget's concepts have shaped modern teaching practice. Teachers explicitly use "discovery learning" — providing experiences that produce disequilibrium and force accommodation. UK and US primary curricula were substantially reformed in the 1960s–70s based on Piagetian principles. This is important because applied success in education demonstrates the practical reality of these mechanisms.

Limitation — Piaget underestimated children's abilities. A significant limitation is that subsequent research has shown Piaget systematically *underestimated* what young children can do. Baillargeon (Section 5) showed object permanence appears far earlier than Piaget's sensorimotor stage predicts; Hughes (1975) showed egocentrism declines earlier than Piaget claimed. This is important because if the empirical findings are wrong, the theoretical mechanisms may need revision.

Limitation — emphasis on individual discovery understates social learning. A further limitation is that Piaget's account underplays the role of **social interaction** in cognitive development. Vygotsky's theory (Section 3) argues children develop through social interaction with more knowledgeable others — not just by individually constructing schemas. This is important because contemporary research strongly supports the social nature of learning. This limits Piaget's account as a complete theory.

Limitation — cultural bias. A further limitation is that Piaget's research was conducted primarily on Swiss middle-class children. **Dasen (1994)** reviewed cross-cultural studies and found Piaget's stages appeared in different cultures but at different ages — Aboriginal Australian children, for example, reached conservation at later ages than Swiss children. This is important because if the timing of stages varies culturally, the universality of the theory is qualified.

Conclusion. Piaget's basic concepts (schemas, assimilation, accommodation, equilibration) remain foundational to cognitive psychology, supported by educational applications and converging evidence from other fields. However, the systematic underestimation of children's abilities and the neglect of social factors mean the theory must be qualified by Vygotsky's social account and by Baillargeon's evidence for earlier cognitive abilities.

2 Piaget's Stages of Cognitive Development

Piaget proposed that cognitive development progresses through **four invariant stages**. Each stage represents a qualitatively different way of thinking. Children must pass through every stage in order — the stages cannot be skipped — though the age at which each is reached can vary.

The Four Stages

Stage	Age	Key features
1. Sensorimotor	0–2 years	Children learn through their senses and physical actions. Key milestone: **object permanence** — understanding that objects continue to exist when out of sight. Develops around 8 months (Piaget) or much earlier (Baillargeon — see Section 5).
2. Pre-operational	2–7 years	Children use language and symbols but their thinking is dominated by what they perceive directly. Key features: **egocentrism** (inability to see things from another's viewpoint), inability to handle **conservation** (e.g. believing a tall thin glass holds more than a short wide glass with the same volume), and difficulty with **class inclusion** (the relationship between a category and its sub-categories).
3. Concrete operational	7–11 years	Children can perform logical operations on concrete (physical) objects. They can handle conservation (the tall and short glasses can hold the same amount); they can decentre (consider multiple viewpoints); they grasp class inclusion. They still struggle with abstract or hypothetical reasoning.
4. Formal operational	11+ years	Children can reason abstractly and hypothetically. They can engage with abstract concepts (justice, freedom), systematic problem-solving and "what if" reasoning. Reached by around age 11, though not all adults reach this stage in all areas.

Key Concepts Tested by Piaget

Object permanence (sensorimotor stage)

Piaget's classic study showed infants under ~8 months would not search for a toy hidden under a cloth — apparently believing it had ceased to exist. He concluded that object permanence develops around 8 months. Baillargeon (Section 5) later showed this is wrong: 5-month-olds show evidence of object permanence using violation-of-expectation methods.

Egocentrism (pre-operational stage)

Piaget's **three-mountains task**: a child sits in front of a model with three mountains, with a doll placed on the opposite side. Asked what the doll can see, pre-operational children describe their own view rather than the doll's. Hughes (1975) used a simpler "policeman and boy" task and found 90% of 4-year-olds could decentre — suggesting Piaget's task underestimated children's ability.

Conservation (pre-operational vs concrete operational)

Piaget's classic conservation task: pour liquid from a tall thin glass into a short wide one in front of a child. Pre-operational children say the short wide glass has *less* liquid; concrete-operational children correctly say the amount is the same. McGarrigle and Donaldson (1974) showed that altering the task subtly — having a "naughty teddy" rather than the experimenter rearrange the items — allowed pre-operational children to succeed earlier.

Class inclusion (pre-operational vs concrete operational)

Class inclusion involves understanding that a sub-category is part of a larger category. Piaget showed children pictures of 7 dogs and 3 cats and asked "are there more dogs or more animals?" Pre-operational children typically answered "more dogs". By the concrete operational stage, children correctly grasp that "more animals" includes both the dogs and the cats.

Evaluation

Strength — supporting research evidence. A key strength of Piaget's stages is the wealth of supporting research. Piaget himself, and many subsequent researchers, have replicated the developmental patterns — children consistently progress through similar stages in similar order, even if at different ages. This is important because the developmental sequence is robust even where ages and details have been challenged.

Strength — major educational applications. A further strength is the applied value of the theory. Piaget's stages directly informed primary-school curricula — the use of concrete materials (counters, blocks) for younger children matches the concrete operational stage. UK and many other national curricula were reformed along Piagetian lines. This is important because educational success demonstrates the practical applicability of the stage framework.

Limitation — children's abilities underestimated (Hughes 1975; McGarrigle and Donaldson 1974). A significant limitation is that Piaget's tasks were too complex and unfamiliar, leading him to underestimate children's abilities. Hughes's policeman-and-boy task showed 4-year-olds could take another's perspective (overcoming egocentrism) — Piaget's three-mountains task was confusing. McGarrigle and Donaldson's naughty-teddy variation showed conservation can be demonstrated earlier. This is important because if the empirical findings about WHEN stages occur are wrong, the strict age boundaries in Piaget's theory need revision.

Limitation — stages may not be discrete. A further limitation is that the boundaries between stages may be fuzzier than Piaget claimed. Children often show abilities from "later" stages in some contexts (where they are familiar) and "earlier" stages in others. This is important because if cognitive development is more gradual and domain-specific than Piaget's stage model implies, the discrete-stage framework may not be the best description.

Limitation — neglects social and cultural factors. A further limitation is the relative neglect of social interaction and culture. Vygotsky (Section 3) and Bruner argued that children develop cognitively through interaction with more knowledgeable others. Cross-cultural research (Dasen 1994) shows the timing of stages varies with cultural emphasis. This is important because purely individual developmental accounts cannot explain cross-cultural and within-culture variation in development.

Conclusion. Piaget's stages remain a powerful framework for understanding cognitive development, with deep educational impact and continuing relevance. However, his methods underestimated children's abilities, stage boundaries are less discrete than he claimed, and social/cultural factors deserve more weight than the original

theory gave them. Contemporary cognitive-developmental psychology accepts Piaget's broad sequence while qualifying the ages and the discreteness of the stages.

3 Vygotsky's Theory: The Zone of Proximal Development and Scaffolding

Lev Vygotsky (1896–1934) proposed a fundamentally **social** theory of cognitive development. Whereas Piaget saw the child as an independent constructor of knowledge, Vygotsky argued that **cognitive development is driven by social interaction** — particularly with **more knowledgeable others (MKOs)** such as parents, teachers and older peers. Language and culture are central to development.

Key Concepts

The Zone of Proximal Development (ZPD)

> **THE ZONE OF PROXIMAL DEVELOPMENT**
>
> The **ZPD** is the gap between (i) what a child can do *independently* and (ii) what they can do *with help* from a more knowledgeable other (MKO). Learning happens best when the task is in the child's ZPD — challenging enough to require support but not so hard as to be impossible.

Below the ZPD: the child can already do the task alone — no learning happens. Above the ZPD: the task is too hard even with help — frustration. Inside the ZPD: with the right support, the child can stretch beyond what they could do alone.

Scaffolding (Wood, Bruner and Ross 1976)

> **SCAFFOLDING**
>
> **Scaffolding** is the temporary, adjustable support provided by a more knowledgeable other within the child's ZPD. As the child becomes more competent, the scaffolding is gradually **removed** — exactly like scaffolding around a building. The MKO must adjust their support to match the child's evolving level of competence.

Wood, Bruner and Ross identified six scaffolding techniques: **recruitment** (engaging the child's attention), **reducing degrees of freedom** (simplifying the task), **maintaining direction** (keeping the child on task), **marking critical features** (drawing attention to important points), **frustration control** (reducing anxiety) and **demonstration** (modelling the solution).

Cultural Tools and Language

Vygotsky argued that cognitive development is shaped by **cultural tools** — the practices, technologies and especially the **language** of a child's culture. Language is internalised to become **inner speech** — the basis of all higher cognition. Children's first interactions are inter-mental (between people); these become intra-mental (within the child) through internalisation.

Evaluation

Strength — research support for scaffolding (Wood et al. 1976). A key strength is direct experimental support. Wood et al. (1976) observed mothers helping their 3- to 5-year-old children solve puzzles. The mothers who provided the most appropriate scaffolding — adjusting support as the child improved — produced the most learning. This is important because it experimentally demonstrates the value of MKO-led adjusted support, as Vygotsky predicted. This strengthens the validity of the scaffolding concept.

Strength — applied value in education. A further strength is the major educational applications. Modern teaching practice draws heavily on Vygotskian principles: differentiation, peer tutoring, "I do, we do, you do" lesson structures, and the deliberate design of tasks at the student's ZPD. **Bond and Castagnera (2006)** reviewed peer tutoring and found large positive effects on learning, supporting Vygotsky's theory. This is important because applied success demonstrates the real-world value of the theory.

Strength — cross-cultural validity. A further strength is cross-cultural support. **Rogoff et al. (1993)** studied mother-child pairs across four cultures (USA, Turkey, India, Guatemala). They found that scaffolding was universal — but the style varied. Western parents used explicit verbal instruction; in many non-Western cultures, scaffolding was provided through guided participation and observation. This is important because it shows the underlying mechanism is universal while its expression varies — consistent with Vygotsky's emphasis on cultural shaping.

Limitation — does not fully explain individual differences. A significant limitation is that Vygotsky's theory does not adequately account for **individual differences** in cognitive development. Two children given the same scaffolding can show very different learning outcomes. This is important because the theory predicts roughly similar outcomes from similar instruction — but individual variation is substantial. This suggests additional factors (e.g. innate ability, motivation, prior knowledge) need to be incorporated.

Limitation — vague on developmental mechanisms. A further limitation is that Vygotsky's account is more descriptive than mechanistic — he describes the role of social interaction but does not specify exactly how scaffolding produces internalisation. Piaget's account is more mechanistic (equilibration). This is important because a mature theory should specify the cognitive processes underlying the social learning.

Limitation — practical difficulties in classroom application. A further limitation is the difficulty of providing properly differentiated scaffolding in real classrooms. Effective ZPD-based teaching requires the teacher to know each child's current level — challenging in classes of 30+. This is important because if the theory's applications are hard to deliver consistently, its real-world impact is limited.

Conclusion. Vygotsky's emphasis on social interaction and cultural tools is now central to developmental psychology and educational practice. The ZPD and scaffolding concepts have been validated by experimental and cross-cultural research and applied with significant success in education. The main limitations are theoretical vagueness about mechanisms and the practical challenges of differentiation.

4 Comparing Piaget and Vygotsky

Piaget and Vygotsky are the two foundational theorists of cognitive development. They agree on some things (children actively make sense of the world; development is gradual) but differ sharply on others. Understanding the contrast is essential for top-band exam answers — particularly in 16-mark essay questions that ask candidates to discuss BOTH.

Comparison Table

Dimension	Piaget	Vygotsky
Role of the child	"Little scientist" — actively constructs knowledge through individual exploration of the environment.	Active social participant — develops through interaction with more knowledgeable others.
Role of social interaction	Peripheral — useful, but not the engine of development. Disequilibrium drives change.	Central — social interaction is the *cause* of cognitive development. Cultural tools and language drive higher mental functions.
Role of language	Language is a *result* of cognitive development — children develop the cognitive structures first, then the language to describe them.	Language is a *driver* of cognitive development. Inner speech (internalised social speech) underlies higher cognition.
Stages	Four discrete, universal, invariant stages with characteristic features (object permanence, conservation, etc.).	No fixed stages. Development is continuous and culturally shaped.
Role of culture	Cognitive structures are universal — culture provides the content but not the sequence.	Culture is fundamental — different cultures develop different cognitive tools, leading to different patterns of cognition.
Implications for teaching	"Discovery learning" — provide experiences that produce disequilibrium; the child constructs understanding.	"Assisted learning" — the teacher provides scaffolding within the ZPD; gradually withdraws support.

Where They Agree

- Both treat children as **active** learners, not passive recipients (vs behaviourism).
- Both emphasise the importance of **action and experience** (vs purely verbal instruction).
- Both reject simple maturation as the explanation — development is shaped by interaction with the environment.
- Both have had major impact on educational practice.

Evaluation

Strength — they are complementary rather than opposed. A genuine strength of comparing the two theorists is that they offer complementary accounts. Piaget's stages describe what cognitive abilities emerge when; Vygotsky's account explains how social interaction makes that development happen. This is important because contemporary cognitive psychology typically integrates both — using Piaget's stage framework with Vygotsky's social-mechanism account.

Strength — combined educational impact. A further strength is that modern teaching draws on both. Lessons are organised around developmental readiness (Piaget) but delivered through scaffolded social interaction (Vygotsky). The "I do, we do, you do" structure exemplifies this combination. This is important because applied success of the combined approach supports both theories.

Limitation — both theories have empirical problems. Piaget's underestimation of children's abilities (Hughes; McGarrigle and Donaldson) and Vygotsky's vagueness about mechanisms have both been criticised. Neither theory is complete on its own. This is important because acknowledging these limitations supports a balanced view that draws on both selectively.

Limitation — neither addresses individual differences fully. Both theories struggle to explain why two children with similar experiences develop differently. Genetic and temperamental differences contribute substantially to cognitive outcomes. This is important because mature accounts of cognitive development must integrate biological, cognitive AND social factors.

Conclusion. Piaget's and Vygotsky's theories are best understood as complementary rather than rivals. Their combined influence on developmental psychology and education is profound. Each addresses what the other neglects — Piaget on stages and discovery, Vygotsky on social interaction and culture.

5 Baillargeon's Explanation of Early Infant Abilities

Renée Baillargeon challenged Piaget's account of the sensorimotor stage by developing the **violation-of-expectation (VOE)** method to test infant cognition. Her research shows that infants understand far more about the physical world than Piaget's tasks revealed — including **object permanence** at much younger ages.

Violation-of-Expectation Research

The VOE method exploits the well-established finding that infants **look longer at events that surprise them**. The logic:

1. Show the infant a **familiarisation** event (e.g. a screen rotating up and back down).
2. Then show two test events: an **expected event** (consistent with physical laws) and an **unexpected event** (violates physical laws).
3. Measure looking time. If infants look *longer* at the unexpected event, they "knew" what to expect — meaning they had the relevant physical knowledge.

Key study — Baillargeon and Graber (1987) "drawbridge" study

5-month-olds were familiarised with a drawbridge (screen) rotating up through 180°. Then a block was placed in the path of the drawbridge. In the **possible event**, the drawbridge rotated up and stopped when it hit the block. In the **impossible event**, the drawbridge appeared to rotate through the block, all the way to 180° (achieved using a hidden mechanism).

Findings: infants looked *significantly longer* at the impossible event — indicating they "knew" the block should have stopped the drawbridge. This means 5-month-olds have **object permanence** (they knew the block continued to exist behind the screen) — much earlier than Piaget's 8-month estimate.

Baillargeon's Theoretical Position

Baillargeon proposed that infants are born with an **innate physical reasoning system** — a set of core principles about how objects behave. As they encounter physical events, they develop more detailed expectations. Examples of early physical knowledge demonstrated by VOE research:

- **Object permanence** — objects continue to exist when out of sight (from 3.5 months).
- **Solidity** — two solid objects cannot occupy the same space.
- **Continuity** — objects move on continuous paths through space; they don't teleport.
- **Containment** — small objects can fit inside larger ones; large objects cannot fit inside smaller ones.
- **Support** — objects need support to avoid falling.

Evaluation

Strength — challenges Piaget's underestimation of infants. A major strength of Baillargeon's work is its clear refutation of Piaget's claim that object permanence develops around 8 months. By demonstrating object permanence in 3- and 5-month-olds, VOE research shows Piaget's manual-search tasks underestimated infant cognition. This is important because it forces revision of Piaget's account of the sensorimotor stage and supports the existence of innate cognitive structures.

Strength — robust methodology. A further strength is the rigour of the VOE method. Looking-time is a well-validated, objective measure; the comparison between expected and unexpected events controls for stimulus differences; the design eliminates the motor demands that confound manual-search tasks. This is important because methodological rigour gives the findings high internal validity.

Strength — converging evidence across physical domains. A further strength is that VOE research has converged across many physical domains (solidity, support, containment, occlusion, collision). The pattern of findings is consistent — infants understand the relevant physical principles by 3–6 months. This is important because converging evidence across phenomena strengthens the theoretical claim of an innate physical reasoning system.

Limitation — alternative interpretations of looking time. A significant limitation, raised by Bremner (2014), is that **looking longer at an "impossible" event** does not necessarily mean the infant "understands" physical principles. Infants may simply be attracted to novelty or visual oddness. This is important because the inferential leap from looking time to "knowledge" can be questioned.

Limitation — nativist account vs constructivist alternatives. A further limitation is that Baillargeon's nativist interpretation (innate physical reasoning) is not the only one available. Bremner argues that very young infants may learn rapidly from observation rather than starting with innate knowledge. This is important because the nature-versus-nurture interpretation of the findings remains contested.

Limitation — small samples and replication concerns. A further limitation is that VOE studies use small samples (often 8–16 infants per condition) and not all findings replicate cleanly. Reproducibility in developmental psychology has been a concern in recent years. This is important because the strength of conclusions depends on the reliability of the underlying evidence.

Conclusion. Baillargeon's VOE research has fundamentally changed our understanding of early cognition, demonstrating that infants know far more about the physical world than Piaget realised. The methodology is widely used and respected. Theoretical debates remain — particularly about whether the findings support a strong nativist position or a fast-learning constructivist alternative.

6 Selman's Levels of Perspective-Taking

Robert Selman (1980) proposed a stage theory of **perspective-taking** — the developing ability to see things from another person's point of view. Where Piaget treated egocentrism as a single feature of the pre-operational stage, Selman showed perspective-taking develops gradually across five distinct levels.

Selman's Method

Selman read children short social dilemmas and asked them to reason about the perspectives of the characters involved. The most famous was the **Holly dilemma**:

> **THE HOLLY DILEMMA**
>
> "Holly is an 8-year-old girl who loves climbing trees. She is the best tree climber in her neighbourhood. One day, while climbing down from a tall tree, she falls — but isn't hurt. Her father sees her fall and is upset. He makes her promise not to climb trees any more. Holly promises.
>
> Later that day, Holly and her friends meet Sean. Sean's kitten is stuck in a tree and is afraid to come down. Something needs to be done quickly or the kitten may fall. Holly is the only one who climbs well enough to reach the kitten — but she remembers her promise to her father."

Selman then asked questions like: "How does Sean feel about his kitten? How might Holly's father feel if he found out she climbed the tree? What would *you* do in Holly's place?" Children's responses revealed which perspective-taking level they were at.

The Five Levels (Selman 1980)

Level	Age	What the child can do
0. Undifferentiated (egocentric)	3–6	Cannot distinguish their own perspective from others'. Assumes everyone feels and thinks as they do.
1. Social-informational (subjective)	6–8	Recognises others may have different views — but believes this is because they have different information.
2. Self-reflective (reciprocal)	8–10	Can step "outside" themselves and see their own perspective as others might. Begins to understand reciprocity.
3. Mutual (third-person)	10–12	Can adopt a third-person perspective on their own and others' interactions — seeing the whole relationship.
4. Societal (in-depth)	12+	Recognises that perspectives are shaped by broader social, cultural and societal factors.

Evaluation

Strength — supporting research (Selman 1971; Schultz et al. 2003). A key strength of Selman's theory is supporting evidence. Selman's original (1971) study with 60 children aged 4–6 showed that older children consistently scored higher on perspective-taking than younger children — and that performance correlated with social maturity. Schultz et al. (2003) found Selman's levels predicted social skills and the ability to interpret social situations. This is important because the converging evidence supports the validity of the developmental sequence.

Strength — refines Piaget's account of egocentrism. A further strength is that Selman provides a more nuanced account than Piaget's simple "egocentric vs not". Selman shows that perspective-taking develops in stages — children may overcome egocentrism in some domains while retaining it in others. This is important because the finer-grained framework better matches real developmental patterns. This strengthens Selman as an improvement on Piaget's account.

Strength — applied value in education and therapy. A further strength is the applied value of Selman's work. Educational interventions to develop social cognition use Selman's levels as a guide. Therapy with children showing social difficulties (e.g. anxiety, conduct issues) often involves explicit perspective-taking exercises. This is important because applied success supports the underlying theoretical framework.

Limitation — cultural bias. A significant limitation is that Selman's research used American children and Western dilemmas. **Wu and Keysar (2007)** found Chinese participants outperformed Americans on perspective-taking tasks — possibly because of collectivist cultural values emphasising other people's viewpoints. This is important because if the developmental sequence varies cross-culturally, the universality of Selman's stages is qualified.

Limitation — does not explain the mechanism of development. A further limitation is that Selman describes WHEN perspective-taking develops but not HOW. Why do children move from one level to the next? What role do interactions with parents, peers and siblings play? This is important because a complete theory should specify mechanisms, not just sequence.

Limitation — methodological — relies on language and abstract reasoning. A further limitation is that the dilemma method requires children to understand and reason about complex social scenarios — relying heavily on language ability. This is important because younger children's reasoning may be limited by the task demands rather than by their underlying perspective-taking ability. Simpler tasks (like the Sally-Anne false-belief task, Section 7) may reveal earlier perspective-taking.

Conclusion. Selman's perspective-taking levels provide a more detailed account of social cognition than Piaget's broad-brush egocentrism concept, with applied value in education and therapy. The main limitations are cultural bias, the absence of a mechanism for development, and methodological reliance on language. The theory works best as a description of the developmental sequence rather than an explanation of it.

7 Theory of Mind and the Sally-Anne Study

THEORY OF MIND (TOM)

Theory of mind is the ability to attribute mental states — beliefs, desires, intentions — to oneself and to others, and to understand that others may have mental states different from one's own. ToM is essential for predicting and explaining others' behaviour.

2025 spec note: "Theory of mind as an explanation of autism" has been **removed** from the 2025 spec. Theory of mind itself, false-belief tasks, the Sally-Anne study and related research remain valid topics.

False-Belief Tasks

The classic measure of theory of mind is the **false-belief task** — testing whether a child can recognise that another person can hold a belief that the child knows to be false.

The Sally-Anne Study (Baron-Cohen, Leslie and Frith 1985)

Feature	Detail
Aim	To investigate whether children with autism lack a theory of mind, compared to typically developing children and children with Down syndrome.
Procedure	Children were shown two dolls, Sally and Anne. Sally had a basket; Anne had a box. Sally put a marble in her basket and then "left the room". While Sally was away, Anne moved the marble from Sally's basket into her own box. Sally then "returned". The children were asked: **"Where will Sally look for her marble?"**
The correct answer	"In her basket" — because Sally believes the marble is still there. Saying "in the box" indicates the child has not separated Sally's belief from their own knowledge.
Findings	85% of typically developing children (mean age 4½) and 86% of children with Down syndrome (mean age 11) correctly said Sally would look in her basket. Only **20%** of children with autism (mean age 11) gave the correct answer — most said "in the box".
Original conclusion	Baron-Cohen et al. concluded that autism involves a specific deficit in theory of mind — a "mindblindness" hypothesis. *(Note: this autism-explanation interpretation is removed from the 2025 spec. Treat the Sally-Anne study itself as a general demonstration of theory of mind.)*

Wimmer and Perner (1983) — Maxi and the Chocolate

Wimmer and Perner developed the original false-belief paradigm. Maxi puts chocolate in a green cupboard and goes out to play. His mother moves the chocolate to a blue cupboard. The child is asked where Maxi will look. 3-year-olds typically say "blue cupboard" (their own knowledge); 4–5-year-olds correctly say "green cupboard" (Maxi's belief). This established the typical age at which false-belief understanding emerges.

Onlooker-and-Reality (Onishi and Baillargeon 2005)

Onishi and Baillargeon (2005) used violation-of-expectation methodology (like Baillargeon's drawbridge studies in Section 5) to test theory of mind in 15-month-olds. Infants looked longer when a person searched for an object in the location where it actually was (but the person didn't know about) — suggesting infants already track another's false belief at this age. This challenges the standard 4–5-year-old age for ToM.

Evaluation

Strength — robust developmental finding. A key strength is the robustness of the standard false-belief finding. The shift from failing to passing the Sally-Anne task around age 4 has been replicated in many countries and cultures. **Wellman et al. (2001)** meta-analysed false-belief studies across cultures and confirmed the consistent developmental shift around age 4. This is important because cross-cultural consistency suggests the underlying cognitive development is universal.

Strength — applied value in social-cognitive interventions. A further strength is applied value. Interventions that teach perspective-taking and mental-state vocabulary have shown improvements in children's social cognition, especially in children with social-communication difficulties. This is important because the success of interventions confirms the underlying construct is real and modifiable.

Limitation — task demands may underestimate younger children. A significant limitation is that the classic Sally-Anne task requires language comprehension, memory and inhibition of one's own knowledge. **Onishi and Baillargeon (2005)**, using violation-of-expectation, showed 15-month-olds already track false belief — much earlier than the Sally-Anne result. This is important because task demands may make children appear to lack ToM when they actually have an implicit form of it. This challenges the standard "age 4" conclusion.

Limitation — autism explanation no longer in the 2025 spec. Although the Sally-Anne study itself remains valid, the autism interpretation is now removed from the spec. This reflects the broader scientific recognition that autism is not adequately characterised by a single "ToM deficit" — Senju et al. (2009) and others have shown some autistic adults pass false-belief tasks; some non-autistic children fail; and many other cognitive features distinguish autism. This is important because Baron-Cohen et al.'s original interpretation has been refined by 40 years of subsequent research.

Limitation — culture and social experience matter. A further limitation is that ToM development is influenced by language exposure, family conversation styles and number of siblings. **Hughes and Devine (2015)** reviewed evidence showing children from families with rich mental-state conversations develop ToM earlier. This is important because development is not purely maturational — social experience matters.

Conclusion. Theory of mind and false-belief tasks like Sally-Anne are robust and central to the study of social cognition. The classic age-4 finding remains, although VOE research suggests earlier implicit understanding. The original autism interpretation is no longer in the spec, reflecting more nuanced contemporary understanding.

8 The Mirror Neuron System in Social Cognition

MIRROR NEURONS

Mirror neurons are neurons that fire both when an individual *performs* an action AND when they *observe* someone else performing the same action. The neuron "mirrors" the action it observes — supporting understanding of others' intentions and emotions through internal simulation.

Discovery (Rizzolatti et al. 1996)

Mirror neurons were discovered accidentally by **Giacomo Rizzolatti and colleagues** at the University of Parma. Recording from neurons in the ventral premotor cortex of a macaque monkey, they found that some neurons fired not only when the monkey grasped an object but also when the monkey *watched the experimenter grasp it*. Subsequent research has identified similar mirror-system activity in humans, particularly in the inferior frontal gyrus and inferior parietal lobule.

The Role of Mirror Neurons in Social Cognition

Several proposed roles for the mirror neuron system in social development:

- **Imitation** — mirror neurons may underlie the human capacity to imitate observed actions, fundamental to social learning (Bandura).
- **Understanding intentions** — by simulating others' actions internally, we may infer the goals behind their behaviour.
- **Empathy** — observing others' emotional expressions may activate the same neural circuits as experiencing those emotions ourselves, supporting empathic understanding.
- **Language acquisition** — Rizzolatti and Arbib (1998) proposed that human language evolved from the mirror neuron system, with imitation of mouth movements being a key precursor to speech.
- **Theory of mind** — some researchers (Gallese and Goldman 1998) proposed mirror neurons underlie ToM by allowing us to simulate others' mental states.

Key Research

Iacoboni et al. (2005) used fMRI to compare brain activity when participants watched (a) someone grasping a cup and (b) the same grasping action in different contexts (cup on table after a meal vs cup before a meal). The mirror-system activation was significantly greater when the action had a clear intention (drinking before a meal) than when it was ambiguous (after a meal). This supports the role of mirror neurons in understanding intentions.

Dapretto et al. (2006) reported reduced mirror-neuron activity in children with autism when they imitated and observed emotional expressions — suggesting a possible link between mirror-neuron functioning and the social-cognitive features of autism. (Note: this is correlational and the autism interpretation should be treated cautiously.)

Evaluation

Strength — neurobiological evidence for the system. A key strength is the direct neurobiological evidence — both single-neuron recordings in monkeys and fMRI evidence in humans converge on the existence of a mirror system. This is important because the empirical basis is unusually firm for a developmental concept — most claims rest on behavioural evidence, but mirror neurons have direct neural support.

Strength — integrative explanatory power. A further strength is the system's potential to integrate diverse phenomena — imitation, empathy, theory of mind, language acquisition. A single biological mechanism may underlie much of social cognition. This is important because integrative theoretical accounts are valuable. If mirror neurons really do connect these phenomena, the framework provides a coherent foundation for social-cognitive psychology.

Limitation — over-stated claims. A significant limitation is that early claims about mirror neurons were over-stated. **Hickok (2009)** argued that the leap from "mirror neurons fire when you observe actions" to "mirror neurons explain ToM, empathy and language" is much greater than the evidence supports. This is important because exciting initial findings have been replicated less reliably for the higher cognitive claims.

Limitation — direct human evidence is limited. A further limitation is that direct single-neuron recording is ethically restricted in humans. Most human evidence is fMRI, which measures large neural populations — not individual mirror neurons. **Mukamel et al. (2010)** did record mirror-system activity in human single neurons during epilepsy surgery, but such studies are rare. This is important because the strongest evidence remains correlational fMRI rather than direct single-neuron recording.

Limitation — alternative accounts (associative learning). A further limitation, raised by Heyes (2010), is that mirror neuron activity may itself be a *product* of social learning rather than its biological foundation. Through repeated associations between observing and performing actions, neurons may come to fire to both — a Hebbian learning mechanism. This is important because if mirror neurons are themselves learned, they cannot be the innate biological foundation of social cognition.

Conclusion. The mirror neuron system is one of the most exciting discoveries in developmental neuroscience and has plausible (if contested) connections to imitation, empathy, theory of mind and language. The main limitations are the gap between the strong neural evidence and the more speculative cognitive claims, the dependence on indirect human methodology, and competing learning-based accounts. The system likely plays SOME role in social cognition, though the precise role remains under active investigation.