Cognition and Development
Paper 3

The AQA specification

- 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 including theory of mine as an explanation for ='autism; the Sally-Anne study. The role of the mirror neuron system in social cognition.

Topic 1 - Piaget's theory of schema development

Jean Piaget suggested that children reason (think) differently from adults and see the world in different ways. He believed that cognitive development was a result of <u>maturation</u> (the effects of the biological process of ageing) and interaction with the <u>environment</u>.

Below are some important concepts from Piaget's theory.

<u>Schemas</u>

Schemas are mental structures which contain knowledge about the world. Some schemas may represent a group of related concepts, such as your schema for a dog (fur, four legs, wet nose). Schemas can be **behavioural** (such as grasping an object) or **cognitive** (such as classifying objects) or **Social** schema's (for example schemas for a events or a person).

Rather like individual computer programs, schemas are 'programs' that people construct for dealing with the world. Children are born with a small number of schemas and in infancy they develop new schemas as a result of interactions with the environment. New experiences lead to new and more complex schemas being developed.

Piaget suggested schemas develop through the process of **adaptation** and identified two main processes:

<u>Assimilation</u> – applying an existing schema to a new situation or object.

This means that when you are faced with new information, you make sense of this information by referring to information you already have and try to fit the new information into the information you already have.

<u>Accommodation</u> – involves forming a new schema distinct from the existing schema.

This happens because the existing schema has to change because incoming information conflicts with what is already known (i.e disequilibrium)

<u>Equilibration and Disequilibrium</u>

According to Piaget, the driving force behind adaptation is the principle of equilibration. This is where there is a mental balance between what is already known and incoming information.

Equilibrium occurs when a child's schemas can deal with most new information through assimilation. However, an unpleasant state of disequilibrium occurs when new information
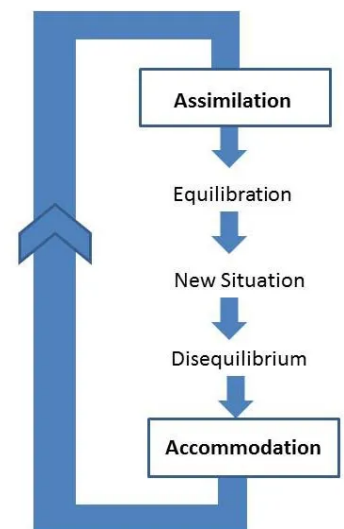
cannot be fitted into existing schemas (assimilation). Equilibration is the force which drives the learning process as we do not like to be frustrated and will seek to restore balance by mastering the new challenge (accommodation).

Evaluation of Piaget's schema theory/cognitive theory

Research Supporting evidence- innate schemas	There is evidence to support Piaget's belief that some schemas are innate. Fantz (1961) studied 2-month-old babies by putting a display board above them with two pictures attached- a sketch of a human face and a bullseye. He found that the babies spent twice as long looking at the human face, he claimed showing that human babies had innate schemas for facial recognition further supported by Hunt (1993) that found at 3 months babies can tell the difference between members of their family.
Debate Nature/Nurture	Piaget's theory explains cognitive development through the combined interaction of nature and nurture. Piaget believed that cognitive development was a result of nature - as a child becomes older (biological maturation), certain mental processes become possible and through nurture; as children interact with the environment their understanding of the world becomes more complex.
Application Educational	Many features from Piaget's theory have been applied to education and have been very influential in developing educational policies and teaching practices. A review of primary education by the UK government in 1966 was based strongly on Piaget's theory. This led to a radical transformation in teaching whereby discovery learning, the idea that children learn best through doing and actively exploring, replaced old-fashioned practices such as sitting silently in rows copying from the board. In addition, the idea of 'readiness' was applied as according to Piaget children should not be taught certain concepts until they have reached the appropriate stage of cognitive development and the idea that children should be given opportunities for disequilibrium in a safe way that maximises learning.
Alternative: Comparisons with Vygotsky's theory Mini-scientists vs mini-apprentices	Piaget's theory can be compared and contrasted against Vygotsky's theory of cognitive development. Both psychologists place cognition at the centre of the theory and see the learner as being active as opposed to passive. Both Piaget and Vygotsky highlight the role of experience (nurture) in cognitive development. However, Piaget's saw learners as **mini-scientists**, learning in terms of what happens in the mind of the individual though **trial and error** whereas Vygotsky proposed that learning is essentially a social process (learners are mini-apprentices) , and that children are capable of much more advanced learning if this is supported by peers or an expert adult. Vygotsky provides a useful counterpoint to Piaget theory, suggesting the development can be explained in terms of social rather than individual factors.

Topic 2 - Piaget's Stages of intellectual (cognitive) development

Piaget identified **four** universal stages of intellectual development. Each stage represents the development of new ways of reasoning.

Piaget believed that the stages are determined by biological maturation (the natural process of getting older). Although, the exact ages vary from child to child, all children go through the stages in the same order.

Summary of the stages of intellectual development		
Name	*Ages*	*Main characteristics and developmental changes*
Sensori-motor stage	0-2	Gain knowledge through senses and movement. Develop object permanence (around 8mths old)
Pre-operational stage	2-7	Thinks at symbolic level & unable to use logic. Egocentric Lacks conservation Difficulty with class inclusion
Concrete operational stage	7-11	Begin to think logically about concrete events Tend to make mistakes or be overwhelmed when asked to reason about abstract or hypothetical problems Less egocentric Able to conserve
Formal operational stage	11+	Abstract thought and reasoning.

Want a silly mnemonic to remember the stages…

Stupid (**s**ensori-motor)

Pigeons (**P**re-operational)

Can't (**c**oncrete operational)

Fly (**F**ormal operational)

Sensori-motor stage 0-2 years

In this stage, infants develop an understanding of the world through coordinating sensory experiences (seeing, hearing) with motor actions (reaching, touching). Children learn by trial and error that they can deliberately move their body in particular ways, and eventually than they can move other objects. During this stage babies also develop an understanding that other people are separate objects and acquire some basic language.

By around 8 months old, children develop **object permanence**, an understanding objects and people still exist when they are out of sight.

Piaget's research investigating object permanence

Piaget (1963)

Piaget hid a toy under a blanket, while the child was watching, and observed whether or not the child searched for the hidden toy. Searching for the hidden toy was evidence of object permanence. Piaget assumed that the child could only search for a hidden toy if s/he had a mental representation of it. Piaget found that infants searched for the hidden toy when they were around 8-months-old. He concluded that children around 8 months have object permanence because they are able to form a mental representation of the object in their minds.

Evaluation of the sensori-motor stage

Research Challenging evidence for object permanence	Counter evidence conducted by ***Bower and Wishart (1972):*** shows that children do continue to search if object is made to disappear in more subtle ways. They demonstrated that even children as young as 3 months may have object permanence. They turned out the lights and then observed the child with infrared camera. They found that infants continued reaching for objects in the dark, suggesting that they realise they're there. This means that Piaget may have underestimated the age of object permanence.
Issue Methodology	Piaget may have underestimated children's cognitive ability in relation to object permanence. Children might not have looked for the toy because they lacked the necessary motor skills to look for it, they were not interested in the toy or the deliberate covering of the toy by the researcher led them to believe that it was forbidden. Therefore, Piaget could be criticised as confusing a childs lack of performance in a task with a lack of understanding, a childs failure to search for the toy does not necessarily mean the child did not understand that the toy still existed. This means that Piaget could have underestimated the age at which children develop object permanence.

Pre-operational stage 2-7 years

Piaget used the term 'operations' to describe logical mental rules.

The child's thinking during this stage is pre-operational meaning they cannot use logic or transform, combine or separate ideas. This lack of logical thought means children rely on what they see so their understanding is governed by outward appearances.

Children in the pre-operational stage have difficulty with conservation and class inclusion and are egocentric.

Class inclusion:

The ability to understand that any object can at the same time be an example of a subordinate group and also an example of a superordinate group. For example, the ability to recognise that large categories such as 'fruit' includes smaller sub-categories such as 'apples' or 'oranges'.

Piaget's research investigating class inclusion

Piaget and Szeminska (1941)

Piaget showed children 20 wooden beads, 18 were brown and 2 were white. When asked 'Are there more brown beads or more wooden beads?', children in the pre-operational stage would answer incorrectly, with most children saying brown. The findings suggest that pre-operational children do not have class inclusion as they presume if brown beads belong to one class, and they are the majority, then they must have more than any other class.

Conservation:

The ability to understand that when shape or appearance of an object changes, the overall quantity / properties remains the same if nothing is added or taken away.

Tests of Various Types of Conservation

Type of Conservation	Initial Presentation	Transformation
Volume	Two equal glasses of liquid.	Pour one into a taller, narrower glass.
Number	Two equal lines of checkers.	Increase spacing of checkers in one line.
Matter	Two equal balls of clay.	Squeeze one ball into a long, thin shape.
Length	Two sticks of equal length.	Move one stick.

Piaget's research investigating conservation

Piaget and Szeminska (1952)

Piaget did several conservation tasks on mass, volume, number and length (see diagram on the left)

He would present children with two objects of equal quantities (e.g. two beakers of liquid or rows of counters). He would then ask them if the objects were the same or different. He would then change the appearance or shape of the object (e.g. by spreading out the counters or pouring the liquid into a taller beaker) and ask them again if the objects were the same or different.

He found that children in the preoperational stage incorrectly answered the second (post-transformation) question.

Egocentrism:

Children only see the world from their own perspective and so are unable to see things from other people's viewpoint.

Piaget's research investigating egocentrism

Piaget and Inhelder (1956)

Piaget used a model of three mountains placed on a table. The three mountains were different colours and topped by different features: a cross, a house and snow. Children, aged between 3 and 8 years old, were encouraged to explore the model and walk around it to see it from all sides. A doll was then placed at different points on the table and the children were asked to carry out several tasks to test their ability to 'see' from the doll's viewpoint.
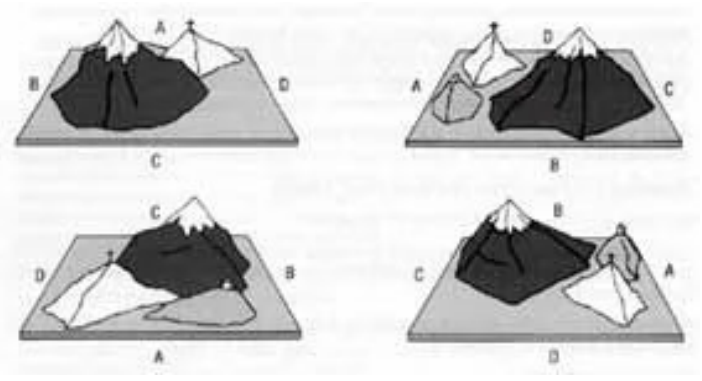
- *The child was given three cardboard shapes of the mountains and asked to arrange them to show what the doll could 'see'.*
- *The child was given ten pictures and asked to select which one the doll could see.*
- *The child was asked to choose any picture and then say where the doll needed to stand in order to see that view.*

Four-year-olds almost always chose a picture that represented what they could see and showed no awareness that the doll's view would be different from this. Six-year-olds frequently chose a picture different from their own view but rarely chose the correct picture for the doll's point of view. Only seven- and eight-year-olds consistently chose the correct picture.

Piaget concluded that at age 7, thinking is no longer egocentric as the child can see more than their own point of view.

Evaluation of the pre-operational stage

Research Challenging evidence for egocentrism	There is evidence challenging Piaget's conclusions on egocentrism. For example, **Hughes (1975)** found 90% of children aged between 3.5 and 5 years old could 'hide' a doll in a 3D model of intersecting walls so that two policeman dolls could not see it, but they could. This suggests Piaget underestimated younger children's ability to decentre (i.e. not egocentric).	
Research Challenging evidence	**Siegler and Svetina (2006)** tested 5-year-old children who undertook a number of class inclusion tasks and found those who were given a logical explanation for why their answers were incorrect improved on subsequent	

for class inclusion	class inclusion tasks. This suggests that children are capable of understanding class inclusion earlier than Piaget believed.
Issue Methodology used in conservation tasks	A criticism of Piaget's conservation tasks is that asking the same question twice may have confused the children. The children were asked whether the quantity was the same before the transformation and after which could have led the child to think that the experimenter asked the question a second time because they wanted another answer. This was investigated by **Rose and Blank (1974) and Samuel and Bryant (1984)** who both found that children made less errors on conservation tasks when they were asked only one question, after the transformation. This suggests that the errors made by the children on Piaget's conservation tasks could be the result of a misinterpretation of what the experimenter wanted to hear rather than an indication that children lack the ability to conserve.

Concrete operational stage 7-11 years

In this stage, Piaget believed children to be mature enough to use logical thought or operations but could only apply this logic to physical ('concrete') objects or events. They still struggle to reason about abstract ideas and to imagine objects or hypothetical situations. However, they have now developed conservation and class inclusion abilities and are less egocentric.

Formal operational stage 11+ years

In this stage, Piaget believed that children develop logical reasoning and abstract thought. Adolescents can deal with abstract ideas (e.g. no longer needing to think about slicing up cakes or sharing sweets to understand division and fractions) and can solve problems logically rather than through trial and error. They can also deal with hypothetical problems with many possible solutions.

Evaluation of the formal operational stage

Research	One limitation of Piaget's theory is the criticism that the formal- operational stage has received. Few adults demonstrate the thinking required for scientific reasoning even in industrialised societies. **Martorano** tested 12- 18 females on ten Piaget tests to do with formal operational science problems, including the pendulum problem. Only 2 of the 20 women succeeded on all the problems and the success rate for 18 year olds varied from 15% to 95%. **Keating (1979)** reported that 40-60% of college students fail at formal operation tasks, and **Dasen (1994**) states that only one-third of adults ever reach the formal operational stage.

Topic 3 - Vygotsky's theory of cognitive development

Vygotsky agreed with Piaget that a child's thinking is qualitatively different to an adult. HOWEVER, he placed much greater emphasis on the important of the **social context** of children's learning. He believed that **culture** is the prime determinant of individual development. Cognitive maturation is driven by a child's biological maturation **BUT it is most importantly a product of a child's interactions with others.**
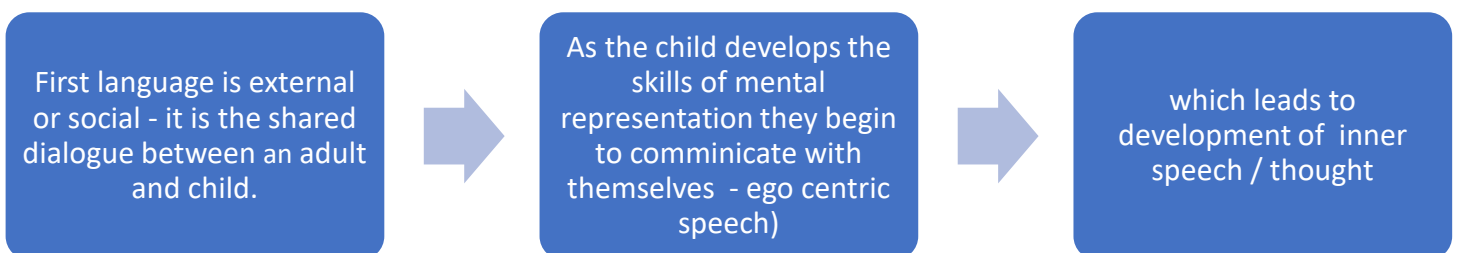
Elementary and higher mental functions

Vygotsky claimed that we are born with four "elementary mental functions": Attention, Sensation, Perception, and Memory. It is our social and cultural environment that allows us to use these elementary skills to develop and finally gain "higher mental functions". Elementary mental functions are biological and share with other mammals whereas higher mental function are exclusively human. The role of culture is to transform elementary to higher mental functions. But how?....

The role of others: experts or More knowledgeable others (MKOs)

A child learns through problem-solving experiences share with someone else, usually a parent or teacher but also more competent peers. All people with greater knowledge than the child are called **experts or More knowledgeable others (MKO).** Initially, the person interacting with the child assumes most of the responsibility for guiding the problem- solving acidity, but gradually this responsibility transfers to the child.

The role of Language

Vygotsky emphasised the role of language that experts use. Semiotics if you want to be fancy because language can be spoken word or signs or symbols. He said that Culture is transmitted through language from expert to child. This is the process..

First language is external or social - it is the shared dialogue between an adult and child. ➔ As the child develops the skills of mental representation they begin to comminicate with themselves - ego centric speech) ➔ which leads to development of inner speech / thought

Therefore, if reasoning abilities are acquired from others via the **language** they use, it follows that the child will acquire the reasoning abilities of those particular people. This means that there may be **cultural different in cognitive development**, with children picking up the mental 'tools' that are most important for life within their physical, social and work environment. (This is in direct contrast to Piaget)

The zone of Proximal development (ZPD)

A child's Zone of proximal development is the region where cognitive development takes place, it is the gap between a child's current development i.e what they can understand and do alone, and what they can potentially understand after interaction with more expert others.

Thus, the term "proximal" refers to those skills that the learner is "close" to mastering.
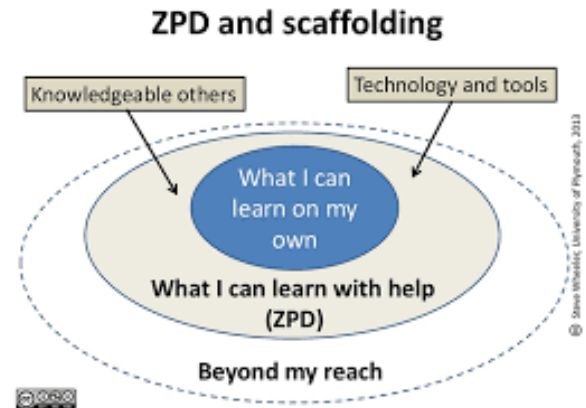
Expert assistance allows a child to cross the ZPD and understand as much of a subject or situation as they are capable- children are still to some extent limited by their development stage. Vygotsky believed that children develop a more advanced understanding of a situation and hence the more advanced reasoning abilities needed to deal with it by learning from others. As opposed to Piaget's view which is through individual exploration of the world.

Critically, Vygotsky was not just saying that children can learn more facts during social interaction, but also that they acquire more advanced reasoning abilities. In fact he believed that higher mental functions, such as formal reasoning, could **only** be acquired through interaction with more advanced others.

Scaffolding

Scaffolding is the next logical step in understanding the ZPD. The term scaffolding refers to all the kind of help **experts** give a child to help them to cross the ZPD. Scaffolding was first introduced by Jerome **Bruner** and his colleagues.

Wood, Bruner and Ross (1976) identified 5 aspects to scaffolding which are general ways in which an adult can help a child better understand and perform a task:

- **Recruitment**: engaging the child's interest in the task
- **Reduction of degrees of freedom**: focusing the child on the task and where to start with solving it.

- **Direction maintenance:** encouraging the child in order to help them to stay motivated and continue trying to complete the task
- **Marking critical features**: highlight the most important parts of the task
- **Demonstration:** showing the child how to do aspects of the task

Wood et al. Also noted the particular strategies that experts use when scaffolding (see table below). In general as a learner crossed the ZPD, the level of help given in scaffolding declines from level 5 most help to level 1 least help.

An example of scaffolding helping a child draw

Level of help	Nature of prompt	example
5	Demonstration	Mother draws an object with crayons
4	Preparation for child	Mother helps child grasp a crayon
3	Indication of materials	Mother points to crayons
2	Specific verbal instructions	Mother says 'how about the green crayon'
1	General Prompts	Mother say 'now draw something else'

Evaluation of Vygotsky's theory of cognitive development.

Research	There is clear evidence to show that there is a indeed a gap between the level of reasoning a child can achieve on their own and what they can achieve wit help from a more expert other. Roazzi and Bryan (1998) gave 4-5 year old children the task of estimating the number of sweets in a box. In one condition the children worked along and in another they working the help of an older child. Most children working alone failed to give a good estimate. In the expert help condition the older (expert) children were observed to offer prompts, pointing the younger children in the right direction to work out hoe to arrive at their estimate. Most 4-5 year olds receiving this kind of help successfully mastered the task. Studies like this support Vygotsky's idea that children can develop additional reasoning abilities when working with a more expert individual. This in turn suggests that the ZPD is a valid concept.
Can explain cultural differences in development	Vygotsky's claims about the role of culture in cognitive development have been supported in cross-cultural research. **Matang and Owens** 2014 - 272 school children from 22 schools in Papa New Guinea. Each child was assessed on their mathematical knowledge. Results showed on average children using their traditional counting systems in their own language spent 'shorter time and made fewer mistakes' solving tasks, compared to children using English and non-counting systems. Suggesting how **culture and language** can enhance cognitive development. Research with non-human animals has provided further evidence of the role of culture in cognitive development. Some psychologists believe that non-human animals possess elementary mental functions which may be

	transformed into higher mental functions by immersing an animal in human culture. For example, Savage-Rumbaugh (1991) has exposed Bonobo apes (such as Kanzi) to a language- rich culture - the apes are 'spoken to all the time through the use of a lexigram. It is debatable as to whether Kanzi could be said to have acquired human language but he is able to communicate using a symbol system. This suggests that higher mental functions (a symbol system) can be transmitted through culture.
Application	Vygotsky's theory has been applied successfully to education. Scaffolding has shown to be an effective way of teaching and based on this theory teachers are trained to guide children in their learning through careful scaffolding. Collaborative work is also used in the classroom, mixing children of different level of ability to make use of reciprocal / peer teaching. Van Hilde Keer and Jean Pierre Verhaeghe found that 7 year old's tutored by 10 year old, in addition to their whole class teaching, progressed further in reading than a control group who only had class teaching. This supports Vygotsky belief that more able people, even if they are essentially peers, can enhance the development and learning and therefore increases the validity and useful of Vygotsky theory.
Alternative Theory	Or simply point out that Vygotsky and Piaget differ in regards to a number of concepts. By contrasting one theory against the other you can easily create a good evaluative paragraph. Interesting extra detail…. The differences between Piaget's and Vygotsky's approaches reflect differences between the two men. Vygotsky was a Communist who believed in the power of community, and thus valued the role of society in the development of the individual; Piaget was a product of individualist European society. Apart from their different cultural backgrounds, the two men may also represent rather different kinds of learner; Piaget's child is an introvert, whereas Vygotsky's child is an extrovert, and this may be a reflection of the men themselves (Miller, 1994). Thus the two views can be reconciled because they are talking about different styles of learning and different kinds of learner. It is also possible to reconcile the theories by taking the view that they are not that different at their central core (Glassman, 1999). If one contrasts these theories with others in psychology, such as those by Freud, Pavlov or Skinner, we can see that there are similarities. They both place cognition at the centre of the theory; both emphasise the complex interactionist nature of development; both see abstract, scientific thought as the final stage of development; and both see the learner as active rather than passive.

	Piaget	Vygotsky
Sociocultural context	Little emphasis	Strong emphasis
Constructivism	Cognitive constructivist	Social constructivist
Stages	Strong emphasis on stages of development	No general stages of development proposed
Key processes in development & learning	Equilibration; schema; adaptation; assimilation; accommodation	Zone of proximal development; scaffolding; language/dialogue; tools of the culture
Role of language	Minimal — Language provides labels for children's experiences (egocentric speech)	Major — Language plays a powerful role in shaping thought
Teaching implications	Support children to explore their world and discover knowledge	Establish opportunities for children to learn with the teacher and more skilled peers

Topic 4 - Baillargeon's explanation of early infant abilities

Baillargeon's research focuses on understanding how developed cognitive abilities are in **INFANCY.** Baillargeon's work directly challenges some of Piaget's ideas about the **sensorimotor stage**, proposing that even very young babies have a fairly well-developed understanding of the physical world, including object permanence.

Her argument is that rather than lacking mental abilities, infants can't plan and execute necessary motor actions.

Renee Baillargeon
(pronounced Bay-ar-geon

Baillargeon's Violation of expectation (VOE) research

This technique is based on the idea that an infant will show surprise when witnesses an impossible event. There are many different VOE examples. Here is an early one.

The best way to appreciate the procedure is to watch clips of this experiment. It can sound confusing but It's not really! Go to psych205.com to see the links.

Baillargeon and Graber (1987).

Procedure: 24 infants aged 5-6 months were shown a tall and a short rabbit moving along a track behind a screen with a window.
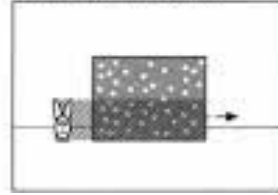
Habituation/ familiarisation stage. This stage involves the infant simply watching the different sized rabbits moving along the track behind the screen.
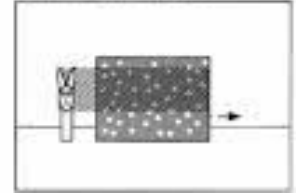
Test event Stage

- **Possible (non-magical) events -** infants are shown the possible events. When the small rabbit passes the window in the screen it is not visible as it is too small. Whereas the Tall rabbit is visible as it passes the window in the screen

- **Impossible (magical) events -** infants are shown the rabbits passing behind the screen however this time the small rabbit is shown in the window whereas the tall rabbit is not visible.
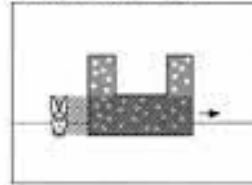
Familiarization Events
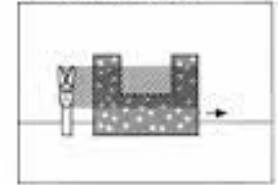Short-rabbit Event   Tall-rabbit Event

Test Events
Short-rabbit Event   Tall-rabbit Event

: region of attention
after Bogartz *et al.* (1997)

Findings The infants looked for an average of 33.07 seconds at the impossible event as compared to 25.11 seconds in the possible condition. The researchers interpreted this as meaning that the infants were surprised by the impossible condition. For them to be surprised it follows that they must have known that the tall rabbit should have re-appeared at the window. This demonstrates an understanding or object permanence.

Baillargeon's theory of infant physical reasoning

Baillargeons et al. (2009) suggest that infants are primarily equipped with mechanisms to interpret and learn from experience, calling this a **physical reasoning system (PRS)**. In other words we are born hard-wired with both basic understanding of the Physical world and the ability to learn more details easily. This differs from Piaget's view because it suggests that infants are born with innate mechanisms that give infants a head start. In contrast Piaget suggested that everything is learned though interaction- there are no innate mechanisms to assist with this.

Baillargeon proposed that, when infants learn to reason about novel (new) physical phenomenon, they first form an all-or-none concept. Later they add to this in terms of the other variables that may affect the concept.

Consider an example from Baillargeon's research related to the **unveiling phenomenon** (the covering principle) – infants are shown a cover with a bulge, suggesting there is an object hidden under the cover. Infants aged 9.5 months show surprise when a cover is removed with nothing under it, However, they don't show surprise if the object revealed is smaller than the bulge suggested. However by 12.5 months they do show surprise at the size mismatch.

So what does this tell us? – Baillargeon says this suggests the following developmental sequence for the PRS:

1) infants first form the concept that a bulge indicates and object.
2) Later they identify a variable that affects this concept (e.g. size)

The same process occurs for all other physical relations – first the concept is understood and then the variations are incorporated. Baillargeon argues that this demonstrates the application of innate learning mechanisms to available data.

Evaluation of Baillargeon's research

Carefully controlled **research**	Baillargeon's research was carefully controlled in **a number of** ways. Firstly, unlike Piaget who used all middle-class children, Baillargeon used a less biased sample by using birth announcement in the local paper, thus higher population validity. Secondly there is a potential issue of the child sitting on their parents lap, the parent could unconsciously communicate cues about how the baby should react. To avoid this, parents were asked to keep their eyes shut and were asked not to interact with the infant. Finally they used multiple observers in each trial. The two observers recording the infant did not know whether the event was possible or impossible (double blind), which otherwise might have biased their observations. Such careful control measures serve to increase the overall validity of the findings.
Methodology Internal validity of the VOE method may be low.	A number of researchers have asked whether the VOE method is actually measuring what is intends to measure (internal validity) the issue is with respect to relying on the dependent variable of 'looking'. • Problem 1 we are inferring and can never know what a baby actually understands nor can we know how a baby might actually behave in response to a violation of expectations. • Although infants look for different lengths of time at different events, this merely means that they see them as different. There may be any number of reasons why they find once scene more interesting than another. Links to point below…
Alternative explanation Was Piaget right after all? Truly **understanding** a principle vs acting in accordance with it?	Links to point above. In fact children may not really **understand** the principle of object permanence They may simply be reacting to it. For example **Bremner (2013)** argues that demonstrating object permanence (being surprised at the impossible task) does not imply than an infant has a real understanding of it . For Piaget, cognitive development involves **understanding** a principle, not just acting in according with it, as Baillargeon's research shows. This suggests that Baillargeon may only have shown that Piaget underestimated children's abilities, rather than disprove his views.

Debates	Susan Hespos and Kirsty Van marle (2012) point out that without learning and regardless of experience we all have a very good understanding of the basic properties of physical objects. They give the example of dangling keys. We all know that if we let go of a key ring it will fall to the floor. According to Hespos and Van Marle this understanding requires a **physical reasoning system (PRS).** The fact that this understanding is universal strongly suggests that this system is **innate** – otherwise we would expect cultural differences for which there is no evidence. This is a strength of Baillargeons idea of the PRS because its **universal nature** suggests that it is innate. Such basic pre-programming enables rapid learning and so confers a **survival value.**
Link with Nature arguments	

Topic 5 - The development of social Cognition: Selman's theory

Social cognition refers to the role of thinking (cognition) in our behaviour with others of our species (social), i.e. about how our thinking affects our social behaviour. So this subtopic moves away from the more general study of how thinking develops to the more specific area of the relationship between thinking and social behaviour.

Selman's Levels of perspective taking

Robert Selman developed a theory of social development based on perspective-taking. Think back to Piaget's three mountains task to assess **ego-centricism**, this is an example of **physical perspective taking**, Selman is more interested in **psychological perspective taking**. He argues that perspective taking was the central dynamic of social development. When a child takes someone else's perspective, this enables the child to have insight into what other people think and feel, and these insights become progressively deeper. It is the more mature insights that are a pre-requisite to social relations.

Selman's perspective- taking research

Selman (1971) conducted research on children's perspective taking abilities by using a series of dilemmas which explore the child's reasoning when faced with conflicted feelings. The dilemma's require the child to take someone else's perspective.

Here is one example of the sort of dilemma he used:

Holly is an 8-year old girl who likes to climb trees. She is the best tree climber in the neighbourhood. One day while climbing a tree she falls off the bottom branch but does not hurt herself. Her father sees her fall, and is upset. He asks her to promise not to climb trees anymore, and Holly promises.

Later that day, Holly and her friends meet Sean. Sean's kitten is caught up in a tree and cannot get down. Something has to be done right away or the kitten may fall. Holly is the only one who climbs trees well enough to reach the kitten and get it down, but she remembers her promise to her father.

Children are then asked questions such as:

- "If Holly climbs the tree, should she be punished?"
- "Will her father understand if she climbs the tree?"
- "Will Sean understand why Holly has trouble deciding what to do?"

When Selman analysed the results a number of distinct levels of role-taking were identified. Selman found that the level of role-taking correlated with age, suggesting a clear developmental sequence. They are as follows:

Selman's stages of development

Stage 0 Undifferentiated / ego centric perspective-taking Approx age 3-6 years	Children can distinguish between self and others but are largely governed by their own perspective. Holly's father will not be mad because whatever is right for Holly is right for others; her father will feel as she does
Stage 1 Social informational perspective-taking Approx age 6-8 years	Children are aware of perspectives that are different to their own but assume that this is because others have **different information from them.** Their own perspective is the only valid perspective and by exchanging information they will attempt to make others perspectives in line with their own. Holly's father would not be mad **if** Holly shows him the kitten and he would then change his mind
Stage 2 Self-reflective perspective-taking Approx age 8-10 years	Child can now view their own thoughts and feelings from someone else's perspective and recognise that others do the same. This marks the first **empathetic** stage whereby one sees, thinks, feels from another persons perspective. Truly stepping into someone else's shoes. Holly's father will not be mad because he will understand why Holly saved the kitten
Stage 3 Mutual perspective-taking Approx age 10-12 years	Can step outside a two-person situation and imagine how the self and other are viewed from the point of view of a third, impartial party (a neutral bystander) . Child can also consider two viewpoints simultaneously. Holly's father will not be mad because he can understand both their points of view.
Stage 4 Societal perspective-taking Approx age 12-15+ year	A person realizes that the neutral third party perspective is not really neutral but influenced by the **societal and cultural context** in which the bystander lives and is reflective of those values. One realizes that one can have different neutral perspectives on a situation, each of which would be colored by the values that are dear to the social and cultural context in which the situation occurs and which dictate what a neutral perspective is. Holly's father will not be mad because the humane treatment of animals

Evaluation of Selman's research

Research support	Selman provided solid evidence that perspective-taking ability improves with age in line with his theory. Selman's original research (1971) involved a cross-sectional sample of 225 participants of various ages ranging from 4 ½ to 32 years. In the first analysis conducted 2 years later, 48 boys were re-interviewed. It was found that 40 of the boys had made gains in their level of perspective taking and none had regressed. Supporting the notion of the stages identified by Selman as being age related. Further analysis was conducted 3 years later (published in 1982) by **Gurucharri and Selman** involving 41 boys. This again confirmed the progressive developmental sequence in the stages of perspective taking – no boys regressed and non skipped any stages. This shows that his earlier cross-sectional research (Selman 1971) was not simply the result of individual differences in social-cognitive ability in children in different groups. This is a strength because Selman's ideas are both based on solid research and supported by a range of studies.
The importance of perspective taking	Perspective-taking skills are key in all social behavior. For example **Fitzgerald and white (2003)** found that maturity of perspective-taking skills was positively correlated with pro-social behaviour and negatively related to aggression. Also **Selman et al (1977)** found that children with poor perspective taking skills have more difficulty in forming relationships. This suggests that perspective-taking skills lead to important social development, and can be used to explain the lack of social development. *NB* Of course there are always issues of proving causation here. It might be the other way round. For example more popular children interact with more people, and that may lead to advances in the development of perspective-taking skills. If this is the case then perspective-taking skills are simply a marker of how socially developed a child is- it is the social experiences which are the cause.
Real world **Application**: • Schools, • prisons, • therapy.	There are many positive real-world applications of Selman's theory. Selman argues that encouraging perspective taking is one of the fundamental missions of primary schools today, and that it should be woven into much of the daily activities. One way to do this in younger children is through play, as this is the natural way in which perspective-taking skills are learned **(smith and Pellegrini, 2008)** Social Skills Training (SST) programmes are used with older children. SST is also used in therapeutic settings with people with mental disorders or emotional problems. Lastly One explanation offered for anti-social behaviour, criminal behaviour is that some criminals lack empathy and perspective taking skills, and this may explain their willingness to harm others directly or indirectly. Therefore, SST programmes have been developed where prisoners are taught perspective-taking skills to increase their empathetic concern for others and their prosocial behaviour on release.

Topic 6- Social Cognition: Theory of Mind (ToM)

Key terms:

Theory of Mind- An individual's understanding that OTHER people have separate mental states (beliefs, emotions, intentions etc.) and see the world from a different point of view to their own.

Autism-Autistic Spectrum Disorder (ASD). An umbrella term on a spectrum which share impairments in interaction, social communication, social imagination and sensory sensitivity.

Sally-Anne studies - A story about two dolls (Sally and Anne). Sally doesn't know that her marble has been moved, but we (the audience do). Where will

False Belief – The understanding that others may hold and act on mistaken (false) beliefs.

Theory of Mind (ToM)

First It's important to recognize that ToM is NOT an actual psychological Theory, like say Piaget's. It is actually our personal understanding of what OTHER people are thinking and feeling. To have a ToM means we understand what is in 'someone else's Mind' and can 'see' something from someone else's point of view.

We have briefly hinted at ToM in Attachment, so you remember the research by Meltzoff and Moore. They found even newborns less than 72 hours old were able to imitate facial expressions, so suggesting the babies 'understanding' of others.

A key part of this area relates to **autism** (Autistic Spectrum Disorder, See key terms). It has been argued that autistic children **don't** have a ToM, i.e. find it hard to see something from another person's viewpoint.

Let's look at the research that investigates whether children have an awareness of another person's perspective?

Key studies: False Belief Task – (*Can children understand that people believe something untrue?)*

A classic way of testing ToM in children was attempted by **Heinz Wimmer and Josef Perner** (1983) it centers on a boy called Maxi.

Procedure: They tell 3 and 4-year olds this story. Maxi's mother had brought home some chocolate to make a cake. Maxi sees her put the chocolate in the blue cupboard. Then Maxi goes out to play. His mother uses the chocolate for the cake and puts it back in the green cupboard. When Maxi returns from playing, he wants some chocolate. The researchers acted out the story using dolls and matchboxes to make it more understandable.

The final question which was put to the children was; Which cupboard will Maxi look in for the chocolate?

Findings: They found nearly all 3-year olds say the chocolate is in the green cupboard! Yes, it's in the green cupboard, but Maxi should THINK it's in the blue cupboard (a false-belief). However, from 4-year olds onwards, many children give the correct answer.

Conclusion: This suggests that ToM and therefore, social cognition undergoes a shift and becomes more advanced at around 4 years old.

Sally-Anne studies:

Simon Baron-Cohen et al (1985) used a similar false belief task as an explanation of autism.

Children were told the story using two dolls, Sally and Anne.

Procedure: The study involved three groups of participants; 20 autistic children (average age 12 years old); 14 children with Down's syndrome (similar chronological age, but lower mental age) and 27 not autistic children (mean age of 4. The children were then asked some control questions such as "Where is the marble really? just to check they had seen what happened. Finally, they were asked the 'belief' question about where Sally thought the marble was.
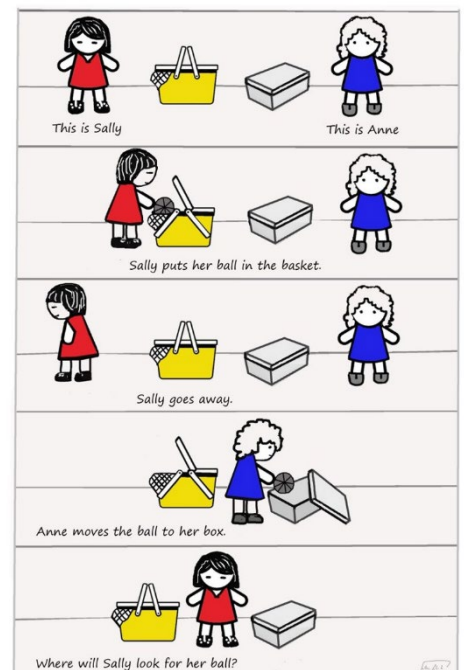

Findings: Most (85%) of the not autistic children answered the false belief question correctly. The same was true for the Downs syndrome children demonstrating the ToM isn't linked to low intelligence. Only 20% of the autistic children answered correctly.

Conclusion: Baron-Cohen and his colleagues suggested that impairments in ToM might be an explanation for ASD.

Later Research on Adults: Baron-Cohen et al (1977) considered the question of whether high-functioning individuals on the autistic spectrum might have ToM. Autistic adults tend to pass the Sally-Anne task. Therefore, to test ToM on adults his team created a new task, called

The Eyes Task. This is where participants are shown pictures of people's eyes and asked to select one of two emotions that might be represented, for example, attraction versus repulsion, or relaxed or worried etc.
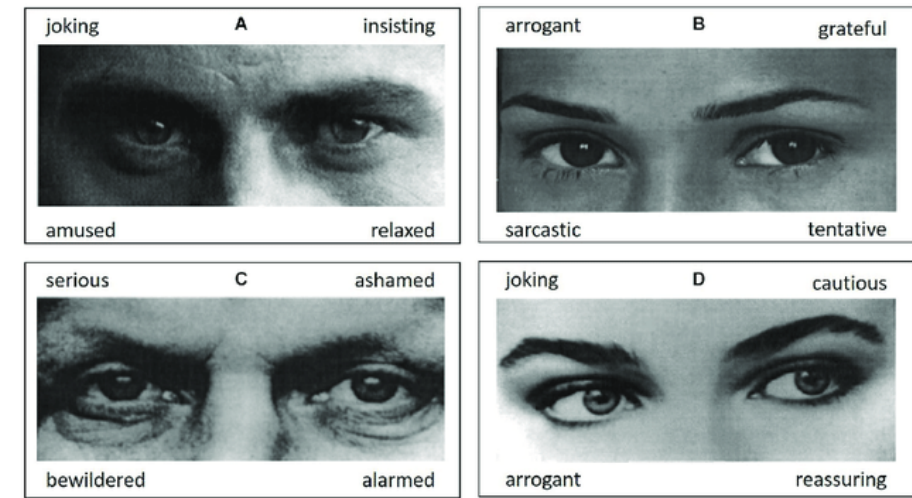
Findings: They found that adults on the autistic spectrum had a mean score of **16.3** compared to not autistic participants with a mean score of **20.3** (out of a maximum of 25). The ranges of scores were fairly similar; autism range 13-23; normal range 16-25, suggesting that autistic individuals demonstrated more challenges with identifying facial emotions in other people's eyes.

Read here for more thorough discussion on theories of Autism
https://www.spectrumnews.org/features/deep-dive/theory-of-mind-in-autism-a-research-field-reborn/

Evaluation of ToM

Weakness - Research issues with Validity.	Some critics argue the false belief tasks lack validity. Success on a false belief task requires other cognitive abilities other than ToM e.g. Memory. Although the sally-Anne task is slightly shorter than the Maxi story, it is still quite a bit for 3 year old to remember. Some alternative studies have given memory aids and have found that younger children are capable of holding false beliefs. These criticisms are a major blow for ToM research because it has been dominated by false belief research.
Strength - Consistent with Biological explanations	A strength of ToM is that is appears to be consistent with Biological findings in relation to Autism. Baron-Cohen suggests that ToM has a **biological** basis because 1. ToM appears to develop at a particular age and 2. the fact that it's likely to be absent in many autistic people. Baron-Cohen (1995) suggests a ToM module (ToMM) which is a specific mechanism in the brain that matures around age 4 and offers an explanation for an individual's ability to understand the mental states of other people.

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	HOWEVER It could be argued that biology may not be the sole reason for ToM. Perner *et al* (1994) found that ToM appears **earlier** in children from large families, with older siblings. In these circumstances a child is challenged to think about the feelings of others when resolving conflicts. This offers a challenge to Baron-Cohen that ToM is biological, it could be a combination of biology and social environment (Nature and Nurture).
Weakness - Issues proving cause and effect	There are many problems in proving that ToM explains autism. First the research only shows that SOME autisitc individuals lack ToM. If a lack of ToM was a central aspect of the condition, we would expect that all of the participants would be impaired. Second is whether ToM is a cause or effect. Autistic children may not acquire a fully developed ToM because often their characteristics prevent them communicating and engaging with others – their abnormal language development, lack of social skills and so on may mean they do not have the appropriate experiences that lead to ToM rather than an inherent lack of ToM causing their poor social interaction. Therefore while is may be true to say that autistic people are likely to have a less developed ToM it is not accurate to claim that this causes autism.
Application Partial strength	One of the major applications of ToM research is in understanding ASD. It is widely agreed that autistic people have more difficulty than others on age appropriate ToM tests. ToM research has been extremely useful in helping us understand the different experiences of those on the autistic spectrum and those who are neurotypical. However as already outlined above it is not clear that ASD is the direct result of ToM deficits, nor does it appear that all people on the autistic spectrum experience the same difficulties. And thus ASD and ToM may therefore not be as closely linked as we once believed. In addition ASD has many other characteristics including cognitive strengths (**islets of ability**) such as superior visual attention and highly systematic reasoning. ToM cannot easily explain these characteristics.

Topic 7 - Social Cognition – The mirror Neuron System

This final topic deals with social cognition, the cognitive processes that underlie human social interaction. In particular we deal with the likely role of particular class of brain cell, the mirror neuron. It seems likely that mirror neurons are involved in the social-cognitive processes of empathy, understanding intention, perspective-taking and theory of mind.

> This 'stuff' is pretty amazing, it can get a little tricky and its very current and constantly being researched. So by all means do you own google search.

The discovery of mirror neurons

Mirror Neurons (MN's) were discovered accidentally by Giacomo Rizzolatti and colleagues (1996). The researchers were recording neural activity in the motor cortex of macaque monkeys when one of the researchers reached for his lunch in view of the monkey. This monkey's motor cortex became activated in exactly the same way as it did when the animal itself reached for food. Further investigation revealed that it was in fact **the same brain cells that fired when the monkey reached itself or watched someone else reach**. The researchers called these cells mirror neurons because they mirror motor activity in another individual.
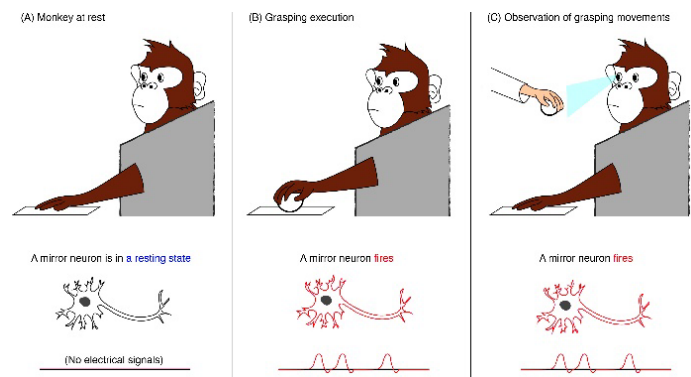
Mirror neurons and imitation

What had been discovered was a system that could explain, at the most basic level, how one individual imitates another. A mirror neuron encodes the activity of another person/animals as if the observer were acting out the same activity. Such imitation is important in the acquisition of skilled behaviours, where an observer watches how someone else performs an action and then copies that behaviour.

Understanding intention
Later research subsequently found that MNs record more than the mere imitation of motor activity. It appears that MNs also represent intentions in humans, **i.e. not just what a person is doing but what they intend to do**.

Lacoboni et al research into mirror neurons and intention

Lacoboni et al (2005) conducted a study to demonstrate the MN's might encode more than the WHAT of an action but also the WHY. i.e. understanding a persons intentions.

Procedure:

Participants were shown 3 different types of a movie clip related to a 'tea party' and fMRI was used to record neuron activity.

  A. **Context clip** – scene 1 was before tea (tea cup full, table clean), Scene 2 was after tea (crumbs on table).
  B. **Action clip –** scene 1 showed a hand grasping the cup as if to drink from it; scene 2 showed the hand grasping the cup as if to clear it away. There was no context in this clip, just a hand.
  C. **Intention clip** – combined context and action.

A) Context — Before Tea / After Tea

B) Action

C) Intention — Drinking / Cleaning Up
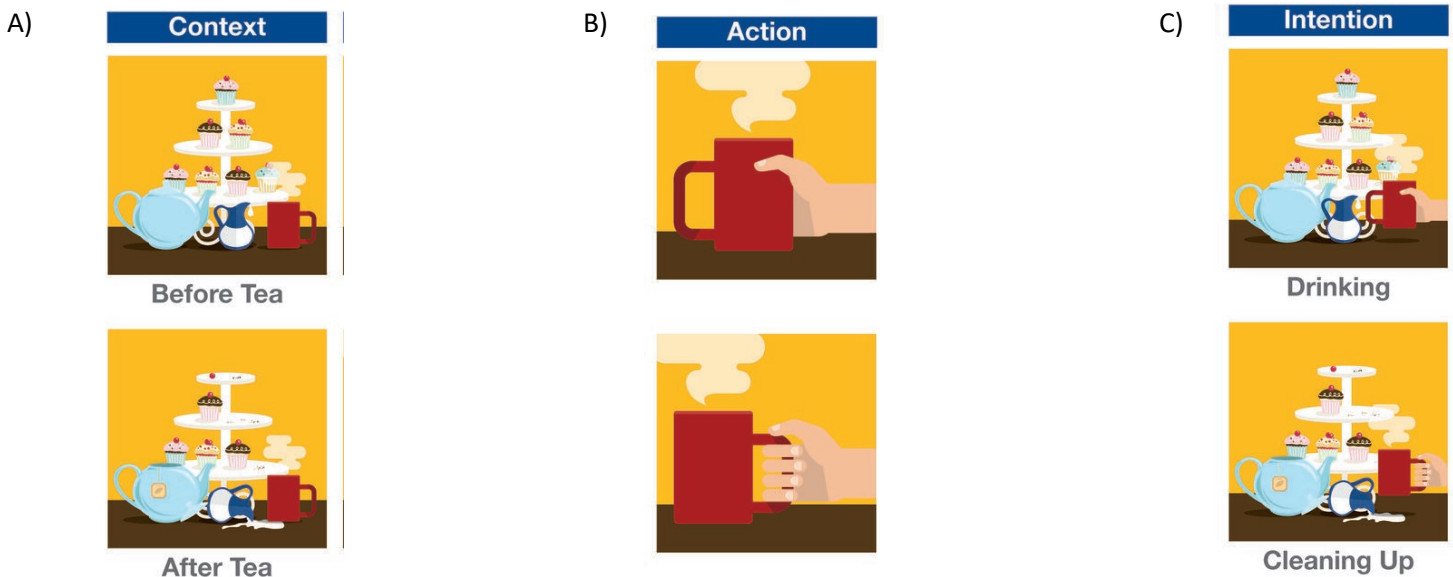
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Findings:

The highest level of MN activity was in the inferior frontal cortex during the intention clip. This shows that this area of the brain is concerned with understanding why a person was behaving in a certain way, because otherwise there would have been similar level of activity from the other clips. This also shows that MNs are more likely to fire when the intention of the person is understood rather than just the motor action.

Perspective-taking and TOM
The next developmental step up from understanding intentions is to understand the thought of others. Vittorio Gallese and Alvin Goldman (1998) claimed that MNs may be seen as a part of or a precursor to a more general mind-reading ability because **they enable us to experience someone else's actions as if they are our own**. This suggests that MNs are the mechanism by which we understand another person's perspective, i.e. when we develop a **theory of mind (TOM).**

This may also lead to empathy-the ability to do more than just understand what someone else is thinking but to also understand how they are feeling Nancy Eisenberg (2000) suggested that empathy is likely to be the basis for prosocial behaviour.

Evaluation of the Mirror Neuron system

Research – support. Haker – contagious yawning	There is evidence to support an important role of mirror neurons in human social cognition. **Helene Haker (2012**) demonstrated that an area of the brain believed to be rich in mirror neurons is involved in contagious yawning, which is widely seen as a simple example of human empathy, the ability to perceive mental states in others. fMRI was used to assess the brain activity in participants while they were stimulated to yawn by showing them film of others yawning. When they yawned in response, participants showed considerable activity in Brodmann's area, an area in the frontal lobe believed to be rich in mirror neurons.
Issue - can explain Gender differences – strength	Research generally shows that females have greater social sensitivity to males, i.e. better at understanding the feeling of another. If MN's underlie such social sensitivity then we would expect to find gender differences. Yawei Cheung has conducted a number of studies using different physiological measures to assess MN activity. For example Cheung 2009 recorded EEG activity while men and women watched either a moving dot or hand actions. Only hand actions should arouse MNs. Male and female performance was the same for the moving dot but females showed a significantly stronger response than males with the hand action. This suggests that gender differences in social sensitivity have a biological basis, perhaps in differences in MN, rather than a social basis.
Application MN research and the link with ASD. Mixed support	There is various evidence that suggests research into MN might help us to understand Autism. For example Dalpretto (2006) used brain scanning techniques to observe what parts of the brain were used by autistic and not autistic children as they watched faces show anger, fear, sadness or no emotion. The only difference was that the autistic participants showed reduced activity in a part of the inferior frontal gyrus, a section of the brain that has been identified as part of the MN system. However not all such findings have been replicated consistently and evidence linking ASD to mirror neurons is mixed. This is a problem for the broken mirror theory of ASD. The theory is credible because of the close link between the signs of ASD and the likely role of mirror neurons in social cognition. However, there is a lack of reliable direct evidence to support the theory.
Can MNs explain human evolution? This is a tricky one – but you might like it!	Vilayanur Ramachandran (2011) has suggested that mirror neurons are so important that they have effectively shaped human evolution. The uniquely complex social interactions we have as humans require a brain system that facilitates an understanding of intention, emotion and perspective. Without these cognitive abilities we could not live in the large groups with the complex social roles and rules that characterise human culture. Ramachandran suggests that mirror neurons are absolutely key to understanding the way humans have developed as a social species.

However

A number of critics including Patricia Churchland (2011) says that a mirror neuron is just a neuron. It is simply reporting information to higher level circuitry which then establishes intentions and thought of another. So the mirror neuron is simply a neuron that fires in response to action. Furthermore Cecilia Hayes suggests that MNs are basically the outcome of associative learning (classical conditioning) rather than the evolutionary adaption proposed by Ramachandran. Neurons become paired because they are both 'excited' at the same time or because one regularly precedes the other. In other words, MNs are the result of experience rather than being innate.