

UPDATES AND IDEAS
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No.4 - 10 Articles on
Developmental Psychology:
Cognitive and Language
Development

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1. STUDYING COMPONENTS OF THE THEORY OF MIND IN CHILDREN

INTRODUCTION

Jean Piaget, in his theory of cognitive development, proposed that children were egocentric until age six or seven years. Egocentrism is the idea that children are dominated by their own perceptions and viewpoints on the world. Subsequent research has challenged and expanded on this idea, including the work on the "theory of mind" (ToM).

ToM (or "mindreading") is the ability to know that other people have "mental states" that influence their behaviour, and that what motivates our behaviour also motivates other people's. More formally, ToM is "the understanding of others as psychological beings having mental states such as beliefs, desires, emotions, and intentions" (Meltzoff 1995 p838). Children are not born with these abilities (as it is a number of abilities or components; table 1.1) which can be called a theory that aids in making predictions about other's behaviour (Premack and Woodruff 1978).

It involves understanding another's purpose and thus the contents of their mind. For example, if you see a person struggling to reach an object that is too far above them, you know that their intention and desire relate to reaching that object. Given a choice of a key or a stick, you would give them the stick to aid their quest. It is obvious because we understand intention.

COMPONENTS OF ToM	AGE OF DEVELOPMENT
* Use of "mental state" terms	18-24 months
* Know that other people have different desires to yourself	18-24 months
* Understanding intentions underlie behaviour	18-24 months
* False beliefs of others	4-5 years
* Own false beliefs	4-5 years
* Second-order ToM	6-8 years

Table 1.1 - Main components of ToM and age of development.

ToM is not easy to study: "Since no-one is able to look directly into another's mind, we have to be careful to ensure that what we observe is not simply an individual reading another's behaviour but reading another's mind" (Smith and Stevens 2002 p126).

ToM develops in phases and manifests itself in the following ways, according to Baron-Cohen (1999):

- Intentionally communicating with others
- Repairing failed communication with others
- Teaching others
- Intentionally persuading others
- Intentionally deceiving others
- Building shared plans and goals
- Intentionally sharing a topic of interest
- Pretending

All these abilities require an aspect of ToM to work. For example, communication requires the understanding that another will know what your signals mean.

The use of stories to test children's ToM has advantages and disadvantages (table 1.2).

ADVANTAGES

1. Uses stories that children can relate to; more relevant to children today than Piaget's tasks to study egocentrism.
2. Not too abstract for young children.
3. Standardised tasks that can be used with different children in different research projects.

DISADVANTAGES

1. Children may be confused by elements in the story; eg: dolls having beliefs.
2. The language used can be difficult for younger children to understand.
3. The validity of the responses; ie: does answering correctly mean that a child has ToM?

Table 1.2 - Advantages and disadvantages of using stories to test ToM.

There are a selection of different tasks developed to test the different components of ToM (table 1.3).

RESEARCH ON DIFFERENT COMPONENTS OF THEORY OF MIND

Understanding "Mental State" Terms

One of the first stage in the development of a ToM is the child's use of "mental state" terms accurately. This seems to happen by two years old. Wellman and Bartsch (1994) recorded 12 000 utterances of ten children from under two to five years old. From the analysis of

TASK	USED TO STUDY
* "Seeing-leads-to-knowing"	Understand that others have knowledge that you do not
* Standard Belief Test	Understand link between belief and behaviour
* Behaviour re-enactment procedure	Understanding of intention
* Unexpected transfer task (eg: Maxi; Sally/Anne)	False beliefs of others
* Deceptive box test (eg: Smarties task)	False beliefs of others and own
* "Burglar Bill" story	Second-order ToM

Table 1.3 - Examples of tasks used to study different components of ToM.

the speech, there was evidence of a true understanding of "mental states" beginning after 18 months old.

Understanding Different People Have Different Desires

From around 18 months old, children are aware that other people's desires may be different to their own.

Repacholi and Gopnik (1997) compared eighty-one 14 month-olds and seventy-eight 18 month-olds for the appreciation of different desires. The children were given a choice of a biscuit ("Pepperidge Farm Goldfish cracker") or (raw) broccoli, and most (93%) preferred the former. An adult appeared who emphasised their liking for broccoli and disliking of biscuits. The children were asked individually to give the adult something to eat. The younger children tended to offer biscuits (their preference)(54%) while the older children were more likely to offer broccoli (73%).

"The older children not only inferred that the other person held a desire, but also recognised how desires are related to emotions and their expression" (Flynn 2004 p248). This is the beginning of children reading below the surface of behaviour.

Understanding Intentions

It seems that children by 18 months old are able to understand other people's intentions. This is going beyond the observed to what the person is trying to achieve in the future (mentalism - psychological states that underlie behaviour; Meltzoff 1995).

Meltzoff (1995) showed this ability in an ingenious

experiment using the behaviour re-enactment procedure. Forty 18 month-olds watched an adult with five objects (eg: dumbbell-shaped toy) before being allowed to play with the objects themselves. There were four independent conditions:

- i) Adult pulls two parts of toy apart (imitation - "demonstration target" condition);
- ii) Adult tries to pull apart but fails (intention - "demonstration intention" condition);
- iii) Adult puts two halves of toy together (unrelated task control - "adult manipulation" condition);
- iv) No demonstration (control - "baseline" condition).

The second condition is the important one. Will children try to pull the toy apart themselves and thus show they understood the adult's intention? 80% did so compared to 20% in the control groups. Table 1.4 summarises the results.

CONDITION	0	1	2	3	4	5	MODE
Baseline	4	3	0	3	0	0	0
Adult manipulation	3	4	3	0	0	0	1
Demonstration target	0	0	1	2	5	2	4
Demonstration intention	0	0	2	0	4	4	4-5

(After Meltzoff 1995)

Table 1.4 - Number of objects completed by children in each condition.

Studying False Beliefs of Others

One method used to study ToM is the unexpected transfer task. Wimmer and Perner (1983) first used this method with 3-9 year-olds. The children were told a story about Maxi who parts his chocolate in the blue cupboard, and then goes out to play. Meanwhile his mother moves the chocolate to the green cupboard. When Maxi returns, where does he look, the children are asked.

All of the 3 year olds said in the green cupboard because they did not have a ToM. They only understood the world from their viewpoint, and assumed what they know is known by others. This aspect of ToM develops at 4 and 5 years old because 57% of children said the blue cupboard.

While 92% of 6-9 year-olds said the same. This specific ability of ToM is known as false beliefs. This is a representational model of mind (ie: "mental states as active interpretations of the world"; Meltzoff 1995).

The type of scenario used by Wimmer and Perner was criticised as too complex for younger children, particularly in terms of language (Flynn 2004). The standard version of the unexpected transfer task is the "Sally/Anne task".

In this story, Sally puts a ball in a basket and leaves the room. Anne then moves the ball to a box. When Sally returns, where does she look? Sally holds a false belief, and children with a ToM know this because they can distinguish between what is true (their own belief) and that of another person who holds a different belief.

"Young children are realists and believe that everyone in world behaves according to how the world truly is, rather than how each individual represents the world to be" (Flynn 2004 p238).

Avis and Harris (1991) adapted the "Sally/Anne task" to be culturally relevant to the Baka people of the rainforests of Cameroon. Adults acted out a story involving mangoes move between two cooking pots. The children showed similar age differences in their answers as in the studies in the West.

Using the "Sally/Anne task", Baron-Cohen et al (1985) found that 80% of children with autism even as old as 16 years old failed. Maybe this was a problem with understanding that dolls could have beliefs because Meltzoff (1995) found that young children, who could understand the intentions of adults, could not do so for machines. But Leslie and Frith (1988) replicated the "Sally/Anne task" using real people and the children with autism still failed.

Other Tasks Used

Baron-Cohen and Goodhart (1994) developed the "seeing-leads-to-knowing" task using children with autism. In the task, one doll touches a box and one doll looks inside it. Then the children are asked, "Which one knows what's inside the box?". The children themselves do not know what is inside, and those without a ToM answer neither doll. The children with a ToM realise that the doll who looked inside the box knows.

Wellman and Bartsch (1988) created the Standard Belief Test. The basic story is about Sam who wants to find his lost puppy (desire) that could be on the porch or in the garage. Sam thinks the puppy is on the porch

(belief), where will he look? Most of the three year olds tested correctly saying that Sam would look on the porch.

The researchers added a "Not-Belief2 version where the children are told that Sam does not think the dog is in the garage. Most of the children gave the correct answer. Then in the "Not-Own Belief" version, the children were asked where they think the dog was hiding and told that Sam thinks the opposite. Three-quarters of the children still gave the correct answer. But less than one-fifth of three year olds got the "Explicit False Belief" version correct (Wellman 1991). The children are told that the puppy is in the garage, but Sam thinks it is on the porch.

Studying Own False Beliefs

At what age do children understand their own inaccurate beliefs? This has been tested with the deception box test (or appearance-reality task). The child is shown a tube of sweets (Smarties) and asked what is inside. The usual reply is sweets. The experimenter opens the tube to reveal pencils. The tube is closed and a "Sooty" puppet is introduced. The child is asked what the puppet will think is inside the Smarties tube.

Children older than four years old appreciated the puppet's false belief. Gopnik and Astington (1988), who first performed this experiment, then asked the children what they believed was in the tube originally. Young children said pencils. So children younger than four years cannot reflect on their own previous false beliefs.

But problems were raised about the task:

a) The language used was too complex for younger children; eg: "When you first saw this tube and it was all shut up like this, what did you think was inside?". Variations in question wording have found similar results to Gopnik and Astington; eg: "What did you think was in the box before I took the lid off?" (Lewis and Osborne 1990).

b) The children were embarrassed to admit to their original ignorance. Wimmer and Hartl (1991) introduced a variation of a silly puppet who always made mistakes. It was expected that children embarrassed about their ignorance would say pencils for their original belief, but Smarties for the puppet's belief. Young children did not and got both false belief questions wrong.

Second-Order Theory of Mind

Second-order TOM is "the ability to attribute beliefs about beliefs, or beliefs about intentions" (Flynn 2004)(eg: Paul knows that Peter knows where the object is hidden). This develops at between 6-8 years old.

Second-order ToM can be seen in the use of sarcasm. For example, two people sitting at the dinner table, and one says, with their plate full, "I was so hungry I ate all my dinner". The speaker knows that the listener knows the food was not eaten. Thus it is sarcasm (and based on the tone of the voice) rather than an inaccurate understanding of the world. This type of ToM also allows for sophisticated lying.

Another example would be the case of "Burglar Bill" who is hiding in the zoo. His brother knows this, but the police do not trust the brother. What should the brother tell the police? Second-order ToM allows understanding of double-bluff and the brother says the zoo (Happe 1995).

Furthermore, second-order ToM has also been found among bullies. The stereotype that bullies lack social skills and understanding has been challenged by one recent study. "Ringleader" bullies scored higher on second-order ToM skills than other children including "follower" bullies and victims (Sutton et al 1999).

CONCLUSIONS

The development of the ToM is aided by the number of siblings, particularly older, that the child has, the number of adults the child interacts with, and the use of reflection during punishment (eg: "Imagine how he felt when you hit him")(Flynn 2004).

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2. AN EXAMPLE OF CROSS-CULTURAL RESEARCH ON THE THEORY OF MIND

INTRODUCTION

The vast majority of research in psychology has taken place in the West (North America and Western Europe, and to a lesser degree, Australia and New Zealand). For example, Lonner (1989) found that the vast majority of references in thirty-three US textbooks of psychology were from North America. Assuming that the findings of such research is automatically applicable to all people around the world without testing them can be seen as arrogant.

There is ample evidence that different groups around the world behave and perceive the world in varying ways. For example, Geoffrey Lienhardt, studying the Dinka people of Sudan, felt that they had no corresponding concept of "mind" as used in the West: "What we should call the 'memories' of experiences, and regard therefore as in some way intrinsic to the remembering person.. appear to the Dinka as exteriorly acting upon him" (Lienhardt 1961 quoted in Avis and Harris 1991 p461).

When studying behaviour around the world, there are three possibilities:

- i) There are clear cross-cultural differences in a behaviour. It is different in different societies or cultures;
- ii) The cross-cultural differences are superficial and the behaviour is universal. There are cultural differences in presentation, but the underlying behaviour is the same throughout the world;
- iii) A behaviour is universal: it is the same throughout the world.

AVIS AND HARRIS (1991)

This research involved participants from the Baka people (traditional hunter-gatherers) who live in the rainforests of Cameroon. The experimenters employed two French-educated Baka adults to carry out the research because two Western visitors proved to be too disruptive.

Thirty-four children were recruited and divided into two age groups: younger and older. However, the ages of the children were estimates as the Baka do not use Western calendars, and the estimates may have errors of 1-2 months. This could be important because there was not gap in ages between the two groups.

The experiment was testing the understanding of others' false beliefs, which is a key part of the theory of mind. Western experiments have used the unexpected transfer task, like the "Sally/Anne task" (Frith 1989). Children aged 4-5 years realised that individuals act upon their beliefs even if the observer knows them to be false. For example, an adult puts a book in the red cupboard and leaves the room. Another adult, in front of the observing child, moves the book to the blue cupboard. Children with a theory of mind will understand that the first adult will look for the book in the red cupboard when they return.

The basic principle of unexpected transfer task used in Western experiments was adapted to fit Baka society. Most important, it was acted out rather than read to the children as the Baka live in a non-literate society. The child watches as Mopfana (one of the experimenters) cooks wild mango kernels (a delicacy) and then places them in a bowl. He leaves the hut for a while. The other experimenter, Mobissa, encourages the observing child to move the kernels to a cooking pot with a lid. The child is then asked: "When Mopfana comes back, where will he look for the kernels, in the bowl or in the pot?".

Significantly more children in the older group gave the correct answer that Mopfana would look in the bowl on his return to the hut (table 2.1). The results were consistent with findings from experiments with Western children.

	YOUNGER GROUP	OLDER GROUP
Number	17	17
Age range	2 yrs 11 mths - 4 yrs 3 mths	4 yrs 4 mths - 6 yrs 1 mth
Gender: M/F	9/8	8/9
Correct answer (%)		
Total	11* (69)	16 (94)
Males	5 (56)	7 (88)
Female	6 (75)	9 (100)

(* 2 children gave no response which treated as wrong answer)

Table 2.1 - Results from Avis and Harris (1991).

CONCLUSION

The Avis and Harris study is a good example showing both the strengths and weaknesses of using the cross-cultural method in developmental psychology (table 2.2).

STRENGTHS

1. Discover if certain behaviour is universal. Avis and Harris found that the Baka children showed the same age differences in understanding of others' false beliefs as Western children.
2. Gives insight into other cultures. Avis and Harris studied a society that is little known about, and it is important for that reason as well as a comparison with Western results.
3. Helps in reducing the Western bias in psychology. "It is no exaggeration to say that we know more about young, well schooled Euro/Americans.. and Albino rats, than we do about the model citizen of the world - young, adult or elderly, with low incomes, little or no formal schooling.." (Martin 1998 p22).

WEAKNESSES

1. Relies on the observer's interpretation of the behaviour. The answers of the Baka children were recorded on audiotape, and analysed partly at the Baka camp (with the help of the two Baka experimenters) and partly back at home (University of Oxford). The children were also asked how Mopfana would feel to find the kernels gone. The correct answer for researchers was, obviously, sad. But one five year-old said that Mopfana "would remain happy even after discovering the empty bowl because he would be given the kernels to eat eventually. Despite its plausibility, this reply was scored as incorrect" (p463).
2. Difficult to standardise test between cultures. The drama acted out for the Baka children was different to the "Sally/Anne task". This is usually presented as a story, a cartoon strip, or acted out with dolls. The Baka study used humans which can make more sense to children than dolls having beliefs.
3. Communication problems. Initially, Avis and Harris attempted the testing using "enough Baka to administer the test questions", but the children were overawed. Thus the recruitment of the two Baka experimenters. But they spoke French as well as the Baka language. So the questions were translated between French, Baka, and English.

Table 2.2 - Strengths and weaknesses of cross-cultural research and the Avis and Harris (1991) study.

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3. SYMBOLIC UNDERSTANDING IN YOUNG CHILDREN

Symbolic thinking or understanding is the "ability to understand that one object can stand for another" (DeLoache 2005). In other words, the relationship between symbols and actual objects.

It can be tested using "model room experiment". Children are shown a model of the room they are in, and a model dog ("Little Snoopy") is placed in the model room in front of the children. They are then asked to find "Big Snoopy" who was "hiding in the same place in his big room". Three-year-olds were able to take the information from the model room and apply it to the normal sized room, but not two and a half year-olds (DeLoache 1989). It is not due to memory problems because the children can remember where "Little Snoopy" is hidden.

The first type of symbolic object that children encounter are pictures or photographs. Young children can find them difficult to understand. "The problem stems from the duality inherent in all symbolic objects: they are real in and of themselves and, at the same time, representations of something else. To understand them, the viewer must achieve dual representation: he or she must mentally represent the object as well as the relation between it and what it stands for" (DeLoache 2005 p62).

Uttal et al (quoted in DeLoache 2005) presented very young children with highly realistic colour photographs of objects. Nine-month-olds acted as if the picture was the real object and tried to grasp it, for example (eg: putting their lips to the nipple of a photograph of a bottle). This also happens with video images, but only if the pictures or video images are realistic.

By eighteen months old children know the difference. However, some confusions still exist, and even four year olds think that tipping upside down a picture of a drink will cause the liquid to fall out (DeLoache 2005).

Another problem for young children relates to "scale errors". This is the tendency to treat miniature objects as real: "earnest attempts to perform actions that are clearly impossible because of extreme differences in the relative size of the child's body and the target object" (DeLoache 2005)(eg: trying to sit on a doll's chair).

DeLoache et al (2004) allowed 18-30 month-olds to play in a room with an indoor slide, a child-size chair, and a toy car that they could sit inside. After a while, the children were taken out of the room, and when they returned, miniature versions of the toys were there. About half of the children tried to do the same actions with the miniatures as they had with the full-size versions. It was almost as if the presence of a

particular object triggered an automatic response in the young children, irrelevant of the size (eg: see chair and sit down on it).

A practical application of young children's lack of symbolic understanding relates to the use of anatomical dolls when interviewing young children about sexual abuse. The aim is to get the children to point on the doll to where they were touched. But the above research suggests that young children are not able to understand that the doll represented their body (DeLoache and Marzolf 1995).

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4. TWO TECHNIQUES FOR STUDYING PRE-LINGUAL COGNITIVE BEHAVIOUR

Cognitive behaviour in the first year of life involves the recognition and categorisation of things in the world. The problem for researchers is how to test this process before the child has language. In other words, it is not possible to ask them what they see and get a verbal reply.

This has led to the development of specialist experimental methods like familiarization/novelty preference, and touch-based techniques.

Familiarization/Novelty-Preference (F/NP) Method

Infants look at novel things and, after a while, habituation sets in and they lose interest and look away. This is the principle behind the F/NP method, first used by Fantz (1963). There are two stages involved:

i) Familiarization - Infants are shown a stimulus until they lose interest. In the case of testing concept formation, three different pictures of one category (eg: dogs);

ii) Novelty-Preference - The child is now presented simultaneously with (a) a different picture of the category seen above, and (b) a picture of a new category (eg: birds). Which does the child look at most? If the child looks more at (b), it is assumed that they have recognised (a) as another example of the category already seen (ie: not novelty). But if (a) is looked at as much as (b), then the child has not formed a concept or category.

Research has found that 3-4 month-olds do look longer at the picture of a new category (ie: b above). In other words, these young children have formed basic categories of things in the world (Quinn and Oates 2004).

This method has both strengths and weaknesses (table 4.1).

Touch-Based Techniques

These techniques are similar to the F/NP method but concentrate upon the objects the children are touching rather than just looking at. The sequential touching procedure (Mandler et al 1991) is generally used with children over one year old, and object examination (Oakes et al 1991) with over six months-olds.

STRENGTHS

1. Well controlled laboratory experiments including control groups.
2. Computer screens control the images shown and children's looking time and preference can be measured accurately.
3. Many infants are used, and though there are individual differences, patterns appear.

WEAKNESSES

1. The child's reaction is interpreted by the researcher as meaning certain things. For example, the child may look at one picture because it is more colourful rather than novel.
2. It has to be assumed what is happening in the child's mind.
3. Laboratory experiments are artificial situations and have low ecological validity.

Table 4.1 - Strengths and weaknesses of the F/NP method.

In the latter method, children are presented with objects one after another for thirty seconds. The children are allowed to touch the object and the interest is measured. Initially, objects of the same category are presented (eg: toy cars), and then a novel category (eg: toy animal). If the child shows more interest ("active examination") in the new category, then it is assumed that they have realised the previous items were from the same category.

These techniques have strengths and weaknesses (table 4.2).

STRENGTHS

1. Controlled laboratory experiments as with the F/NP method.
2. Letting the child touch the objects is a better measure of interest than just looking.

WEAKNESSES

1. Assumptions are made about the child's behaviour as with the F/NP method.
2. Young children may touch objects as an impulse rather than as a sign of preference. This challenges the validity of the "active examination" measure.

Table 4.2 - Strengths and weaknesses of touch-based techniques.

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5. EXECUTIVE FUNCTION AND DYSFUNCTION

"Executive Function" (EF) is the term used to cover "high-level cognitive functions that enable people to plan, initiate and carry through goal-directed behaviour in an organised and 'thought out' way" (Hughes et al 2004 p207).

EF, which is based in the prefrontal cortex, can be divided into three abilities (Hughes et al 2004):

- Cognitive flexibility - How individuals organise thinking and behaviour in the face of complexity; ie: change behaviour to reach a goal when the first route is blocked;
- Planning;
- Inhibition control - Controlling automatic responses.

This can be tested by "The Handgame" (Hughes 1996). Children initially learn to copy two hand actions (fist or pointing) made by the experimenter, then they are asked to make the opposite. So when the experimenter makes a fist, the child points, and vice versa. This is the conflict condition and the number of errors made is a measure of inhibition control. The number of errors declines from three to four years old.

If EF does not develop properly, the child will have "executive dysfunction" which includes cognitive inflexibility, planning difficulties, and under-developed inhibition control.

This has been applied to children with Attention Deficit Hyperactivity Disorder (ADHD). For example, under-developed inhibition control would show itself as more impulsive, less able to regulate emotions (eg: sudden outbursts of anger), and less able to say "no" to peer pressure (Hughes et al 2004). These are characteristics of children with ADHD.

They are advantages for the child as EF matures:

As executive function develops, so children's abilities to learn new skills improve, and they are increasingly able to behave in a planned, strategic and organised manner. They are able to stay "on-task" longer. They are able, when necessary, to override habitual responses to prepotent stimuli. They become more skilled and flexible in "orchestrating" elements of their thinking and behaviour, and they are able to engage in increasingly sophisticated planning and decision-making (Hughes et al 2004 p224).

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6. BULLYING CHILDREN: SOCIALLY INADEQUATE OR SOCIALLY SKILLED?

In an extensive survey in Sheffield, Nabuzoka (2003) found that children reported physical bullying in the last week varying from "tried to hit me" (22.5%) to "demanded money from me" (2.7%).

The prevalence of bullying does depend upon the definition used. For example, Smith and Sharp (1994) defined bullying as "the systematic abuse of power", which allows for indirect forms, like turning people against the victim with lies and rumours, as well as the physical and verbal types.

Randall (1997) described bullies as "socially blind" and not able to "process social information accurately". In other words, socially inadequate or lacking social skills.

Dodge et al (1986) described social skills around five processes:

- Social perception - how other people are perceived;
- Interpretation of social cues - how the behaviour of other people is interpreted as meaning;
- Goal selection - choosing a response to the other person's behaviour;
- Response strategy generation - how to achieve the goal;
- Response decision - acting out the chosen response.

It is argued that children lacking social skills have deficits or biases in these processes which leads to inappropriate behaviour, like bullying or aggression. In a crowded playground, one child runs into another, for example. Is it an accident or deliberate provocation?

Aggressive children tend to perceive such acts as provocation, and are more likely to respond with aggression than non-aggressive children (Feldman and Dodge 1987). The aggressive children are showing a hostile attribution bias - ie: to attribution hostile intent to ambiguous situations, and this requires an aggressive response.

This idea has been criticised:

i) The social skills deficit idea is based on studying aggressive children or those with conduct disorders, and are not necessarily the same as bullies (Sutton et al 1999a);

ii) There are different types of aggression including "reactive" used in conflict situations, and "proactive" used to dominate peers (Dodge 1991). The latter type of aggression, which could be more associated with bullies, is not necessarily linked to attributional biases (Crick and Dodge 1996).

The alternative view is that bullies are highly socially skilled and able to imagine how the victim feels. Bullies score well on social cognition skills like theory of mind. Theory of mind is the ability to take the other person's place and know what they are feeling or thinking. It can be associated with manipulation and lying.

"Having a grasp of the internal mental states of those involved, along with an ability to manipulate those thoughts and beliefs may be crucial for the bully in developing and maintaining such inter-role relations" (Sutton et al 1999b p437).

For example, Keating and Heltman (1994) found that pre-school children who terrorised others and dominant in the playground were good at deception as shown in an experimental situation where one child was asked to deceive another child that a nasty-tasting drink was pleasant.

Sutton et al (1999b) set out to test the alternative views on bullies. Will bullies score lower than other children on social cognition skills (social skills deficit) or higher (socially skilled)?

One hundred and ninety-three children aged between 7½ and 10½ years from eight classes in four south-east London schools were studied. Key measures were taken for each child:

a) Role of bullying - The Participant Role Scale (PRS) (Salmivalli et al 1996) distinguishes between bullies (ringleaders), assistants ("follower bullies"), "reinforcers" (who watch and encourage), "defender" (of the victim), victims ("gets bullied by 30% of same sex classmates), and "outsiders" (not involved). Child allocated themselves and classmates to each category (table 6.1).

b) Assessment of social cognition - Eleven short stories were used to assess the children's understanding of beliefs and emotions in social situations. For example:

During the war, the Red army captured a member of the Blue army. They want him to tell them where his army's tanks are; they know they are either by the sea or in the mountains. They know that the prisoner will not want to tell them, he will want to save his army, and so he will certainly lie to them. The prisoner is very brave and very clever, he will not let them find his tanks. The tanks are really in the mountains. Now

	TOTAL (%)	MALE (%)	FEMALE (%)
Bully	13.0	11.0	14.7
Assistant	6.2	6.6	5.9
Reinforcer	7.8	8.8	6.9
Defender	44.0	36.3	51.0
Victim	18.1	25.3	11.8
Outsider	10.9	12.1	9.8

(After Sutton et al 1999b)

Table 6.1 - Percentages of children in each category in relation to bullying.

when the other side asks him where his tanks are, he says, "They are in the mountains" (p439).

The children are asked, "Why did the prisoner say that?". The answers were scored as 0, 1, or 2. A score of 2 involved knowing that the Blue army would look by the sea because they think the prisoner was lying and the prisoner knows. it is testing double bluff which is a sophisticated form of theory of mind.

c) Teachers rated, from their knowledge, a child's involvement in physical, verbal or indirect (eg: spreading false rumours) bullying.

The children categorised as "bullies" scored higher on the assessment of social cognition (mean percentage correct responses - 46) compared to "assistants" (38%), "reinforcers" (34%), "defenders" (39%), victims (38%), and "outsiders" (44%). So "ringleader bullies" were most aware of how the victim would feel. Usually such awareness is associated with empathy and less likely to produce bullying behaviour.

But research on sociopathy and psychopathy refers to "cold cognition" (Mealey 1995): the ability to manipulate others by understanding their thoughts and feelings without any empathy. So the deficit for bullies is not in social skills, but in empathy (ie: sharing the emotions of others).

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7. TWO MODERN WAYS TO STUDY THE BRAINS OF CHILDREN

Modern technological developments have allowed researchers to study the brain in detail. Some of the technologies are not applicable with young children (eg: injection of radioactive substance with PET scans), but others are.

1. Event-related potentials (ERPs) - measuring electrical activity.

Sensitive electrodes placed on the surface of the scalp measure minute electrical activity in the brain in response to stimuli, like a picture of a face. It can be used with young children to show brain activity even before they can speak, and it is non-invasive (table 7.1).

STRENGTHS

1. Use with children of all ages including pre-lingual.
2. Shows the electrical brain activity in relation to a stimulus.
3. Non-invasive and thus no harm to the child.

WEAKNESSES

1. There is only a correlation between brain activity and the stimulus. In other words, it has to be assumed as to what the child is experiencing or seeing.
2. Uncomfortable for young children, particularly sitting still for long periods.
3. Not as detailed as brain scanning techniques.

Table 7.1 - Strengths and weaknesses of measuring ERPs.

EXAMPLE: Mills et al (1993)

This study found that young children (below one year old) process words with electrical activity over much of the cortex. By the time the child's vocabulary reaches 200 words (over one year old) only the left temporal lobe is activated.

2. Functional Magnetic Resonance Imaging (fMRI) - seeing the active brain.

fMRI measures the cerebral blood flow on a moment-

by-moment basis. The blood flow to different areas of the brain is taken as a sign of activity in that part of the brain. Though it is non-invasive, it tends not to be used with children under 4 or 5 years old (Mareschal et al 2004)(table 7.2).

STRENGTHS

1. See the activity of the brain in real time.
2. Can watch the changing brain (ie: not static images).
3. Non-invasive, and no need for injection of radioactive substance.
4. Better than other methods like measures of electrical activity.

WEAKNESSES

1. Findings only correlations not necessarily causation (ie: brain activity causes the behaviour).
2. Young children distracted or frightened by the noise and vibration. It also requires lying still for a long period of time.
3. Risk of effects of high magnetic fields.
4. Expensive to use, and so usually only small samples in the studies.

Table 7.2 - Strengths and weaknesses of using fMRI with children.

EXAMPLE: Casey et al (1997)

Nine children (aged 7-12 years) and nine adults (21-24 years old) were scanned while performing the Go/NoGo task (Drewe 1975). Participants are asked to respond as quickly as possible by pressing a button when letters appear on the screen ("Go"). This is except for the letter "X" ("NoGo"). Pressing the button in response to the letter "X" is an error of commission, and is taken as a failure to control behaviour (inhibition control)(Hughes et al 2004).

This task produced activity in the prefrontal cortex for children and adults, but there was greater activity for the children.

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8. MALNUTRITION AND COGNITIVE DEVELOPMENT: SOME RESEARCH PROBLEMS

Malnutrition influences the child's cognitive development in two ways - in the womb (the mother's level of malnutrition) and in the first few years of life. The effects of malnutrition can be direct (ie: the level of food upon the brain's development) and indirect (in other behaviours). For example, severely malnourished young children explore their environment less, and exploration aids in intellectual development. This deficit is not necessarily overcome by adequate food later (Grantham-McGregor 1995).

After children receive food, there are still problems for formerly severely malnourished children; eg: poorer attention and more distractible than classmates (Grantham-McGregor 1995). This is particularly so if they return to poor environments.

Malnourished and underweight children are also vulnerable to short-term food deprivation, like missing a meal. For example, underweight schoolchildren in the West Indies given breakfast showed a short term improvement in cognitive abilities which was not evident in adequately nourished children (Grantham-McGregor 1995).

Malnutrition can occur in a number of key ways:

- Overall lack of food;
- Protein deficiency (eg: meat);
- Nutritional deficiencies (eg: vitamins, iron).

So it is possible that children from countries without food shortages could suffer the effects of malnutrition. For example, in an inner city study in Britain, children classed as the lowest 10% of the population for height and weight had an average IQ of 20 points lower than the control group at four years old (Skuse et al 1994).

RESEARCH PROBLEMS

1. Separating multiple causes.

It is often difficult to separate the effects of malnutrition from the general effects of poverty (as these two things usually go together). For example, Sigman et al (1991) found that animal protein intake at 30 months old (and parental socio-economic status) predicted cognitive scores on a verbal meaning test at five years old, better than parental IQ and literacy, and early schooling in a Kenyan study.

Malnourished children usually come from families suffering from multiple disadvantages like overcrowding, poor sanitation and water supply, and low income. The environment is lacking in stimulation (eg: few toys or books), and the health of the parents themselves is poor leading to less responsiveness towards the child (Grantham-McGregor 1995).

But research by Sally Grantham-McGregor (quoted in Grantham-McGregor 1995) found that malnourished children who had been stimulated did not show the deficit in play and exploration usually seen in malnourished children. So these deficits could be due to a non-stimulating home environment rather than lack of food.

2. Causal relationships.

In order to establish the causal relationship between malnutrition and cognitive development, it would be necessary to have comparable groups (as in an experiment). But the deliberate manipulation of food levels for a study has obvious ethical problems, as does giving one group supplements and not the other (Grantham-McGregor 1995).

3. Measuring intelligence.

Measuring intelligence is also problematic. Most studies use global IQ scores, but it could be that malnutrition affects the different elements of intelligence (eg: language skills, mathematical abilities) in different ways.

4. Malnutrition can also be difficult to define.

A standard definition of malnutrition often used is from the WHO (1983): height or length for age more than two standard deviations below median of National Centre for health Statistics/World Health Organisation reference population (Drewett 1996).

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9. STUDYING THE DEVELOPMENT OF LANGUAGE COMPREHENSION IN THE FIRST YEAR OF LIFE

The development of language use by children has two elements - the understanding of words (language comprehension) and the production of speech. Each of the processes has a number of stages. Language comprehension, which comes before production, includes (Harris 2004):

- Identifying a word from the stream of speech; ie: the beginning and end of the word;
- Remembering the sound of the word for future recognition;
- Linking the word to a particular object or event.

IDENTIFYING SPEECH SOUNDS

There is evidence that unborn babies have begun this process in the womb. For example, DeCasper and Spence (1986) asked pregnant women to read aloud, twice daily, a particular story for the last six weeks of pregnancy. A few days after birth, the recognition of the story was tested using a pressure-sensing dummy. This is commonly used with newborns and measures the rate of sucking. An increased rate of sucking is taken as a sign of interest in the baby, which was the case for the familiar story (read by the mother or a stranger) compared to an unfamiliar one.

DeCasper et al (1994) developed this study idea and tested babies in the womb. Foetal heart rate was used as the sign of recognition of a rhyme recited three times daily for four weeks up to the 39th week of pregnancy. The heart rate decreased for the familiar rhyme, but remained unchanged towards an unfamiliar one played through a speaker 20 cm from the mother's stomach.

Part of the process of identifying speech sounds includes a preference for the human voice compared to non-speech sounds. DeCasper and Fifer (1980) tested this with few day-olds with the pressure-sensing dummy technique.

This technique is now controlled by computers which can record the moment and strength (amplitude) of each suck, and, importantly, what stimuli trigger the suck (table 9.1).

Identifying individual words in the speech stream is aided by cues, like syllable stress and transitional probability (the likelihood of certain syllables appearing together)(Harris 2004). These cues are often tested using "invented" words (eg: "daropi", "pakibu"; Johnson and Jusczyk 2001)(table 9.2).

STRENGTHS

1. Good way to measure interest and response in very young babies with limited abilities.
2. Accurate measure of sucking by computers.
3. Controlled laboratory experiments.

WEAKNESSES

1. Assumptions made about what the change in sucking means to the baby.
2. Some experiments are very complex to interpret the results.
3. Based in laboratory. so low ecological validity.

Table 9.1 - Strengths and weaknesses of using the pressure-sensing dummy technique.

STRENGTHS

1. Avoids any prior learning, and all children begin at the same level.
2. Allows researchers to control exactly the aspects of language being studied.

WEAKNESSES

1. Artificial; ie: not real language.
2. Could be confusing to the child.

Table 9.2 - Strengths and weaknesses of using "invented" words in language comprehension experiments.

REMEMBERING SOUND OF WORDS

In terms of remembering sounds, Woodward et al (1994) introduced 13 month-olds to a new object. Over a five-minute session, the object (eg: a "tukey") was named nine times. Then another new object was introduced, but it was not named. Tested one day later, the children could point out the "tukey".

Memory ability is linked to a form of quick learning called "fast mapping" (Bloom 2000). it seems that children are able to learn new words and their meaning with little explicit teaching.

Carey and Bartlett (1978) presented 3-4-year olds with two trays (blue and green), and they were asked by the experimenter to "Bring me the chromium tray, not the

blue one the chromium one". Six weeks later the children still remembered the word despite a brief reference in the original experiment.

LINKING SOUNDS TO MEANINGS

This is the ability to know that a particular sound (word) means a particular thing (object, event, person). Gaze direction and pointing aid this process of early word comprehension which occurs around 7-8 months old.

Harris and Chasin (1999) collected data on the word comprehension of six children as they went from six months to two years old. The data were parental diary records, home observation and video-recording by the researchers, and a checklist of common words. Once a parent reported comprehension of a particular word, the researchers confirmed it with a test. Traditional studies have used only parental reports (table 9.3).

STRENGTHS

1. Parents can record more information than researchers because always with the child.
2. Parents know their child's reactions as to whether the word is understood.
3. Parents benefit from recording information as it makes them more attentive to their child.
4. Standardised checklists like the MacArthur Communicative Development Inventories make it easy for the parents to record information.

WEAKNESSES

1. Parents may miss recording information during childcare or recall incorrectly later.
2. Parents can be too involved and assume understanding that is not there; ie: child responding to non-verbal cues not word comprehension.
3. Parents not able to distinguish different categories of words; eg: over-estimation of object names because context-bound object words missed (Harris and Chasin 1999).
4. Parents may miss the context of a word which could be important to researchers.

Table 9.3 - Strengths and weaknesses of the use of parental reports in word comprehension studies.

Harris and Chasin found that the type of words comprehended changed as the vocabulary size grew. For

example, at sixty words vocabulary, 40% of them were object names (eg: cat)(table 9.4).

TOTAL COMPREHENSION VOCABULARY SIZE	20	60	100
Personal names	32.5	18	15
Object names	35	40	43
Context-bound object words*	15	15	15
Action words**	17.5	27	27

(* eg: hears word "bird" and in garden)
(** eg: goes to table on hearing word "dinner")

(After Harris 2004)

Table 9.4 - Mean percentage of words in each category comprehended.

Children initially show "whole object bias". This is the tendency to see a new word as relating to the whole object rather than part of it or as an action using the object (Bloom 2000).

Spelke (1979) devised the inter-modal preferential looking task to test children's perceptual abilities. The child is sitting in front of two screens which present two different events (eg: something being dropped, and hands clapping), but the sound of only one is played through a speaker in the middle of the two screens. The length of gaze is taken as the child's understanding that the sound and event go together (Plunkett and Wood 2004). This technique has been adapted to test understanding of words.

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10. THE DIARY METHOD AND LANGUAGE DEVELOPMENT

The diary method is usually the unstructured record of what is happening concerning certain behaviour over a period of time. For Breakwell and Wood (2000) this is the characteristic of the diary method - the recording of information in relation to the passage of time.

It may be kept by the researcher or the participant. Where the diary is kept by the participants, it may be subject to content or discourse analysis afterwards. There are structured versions also that record specific information only. Almost any type of data can be collected including respondents keeping diaries on themselves and others.

Diaries today can also include photographic or video records as well as written or verbal records (Breakwell and Wood 2000).

Bryman (2001) distinguishes three main uses of the diary method:

- As a method of data collection - participants record details of behaviour based on instructions from the researcher;
- As a document - kept by individuals without instructions from researchers;
- As a log of the researcher's activities - most commonly in ethnographic research.

"Since diary techniques have no simple uniform guise, it is not easy to draw up simple lists of the pros and cons associated with them.. Some forms of diary technique have some types of advantage and disadvantage; other forms have different costs and benefits" (Breakwell and Wood 2000 p296). So table 10.1 lists the strengths and weaknesses of the diary method in relation to studying child and language development.

The diary method is ideal for studying language development. Many researchers have kept them including Jean Piaget (of his own children's development).

EXAMPLE: Goldfield and Reznick (1990)

This longitudinal study of eighteen children from the age of 1 year 2 months to 1 year 10 months old asked mothers to keep a diary of their child's words. The mothers were asked to record the word used, the situation in which it used, and if the usage changed.

The researchers rang the mothers every two and a half weeks to check the diary being kept, and every two

STRENGTHS

1. Collect rich data about behaviour.
2. Use over a long period of time.
3. Recording information at the time overcomes memory problems.
4. Can follow sequence of behaviour (data are "temporally ordered"; Breakwell and Wood 2000).
5. Access to "intimate" behaviour.
6. Gives ideas for future research.
7. The concept of a diary is familiar to most people and less threatening than other methods, like the experiment (George et al 2006).
8. Can collect both quantitative and qualitative data.
9. Can be used by either the researcher or the participant.
10. More accurate than the limited time sampling of an observation.
11. Modern technology allows the use of reminders like emails or electronic paging devices.
12. Cost-effective way to collect data from the same person over a long period of time.
13. Choice of correct medium - audio or video recording of language rather than written records.

WEAKNESSES

1. Self-selection or bias in what is recorded. Selectivity, noticing special events and giving undue weight, "resulting in an anecdotal flavour to the investigation" (Plunkett and Wood 2004).
2. Comparison with other diaries difficult.
3. Usually small number in study.
4. Diarists forgetting to record events.
5. Reaction to know that someone will read it. "In the simplest terms, diarists who seek publication of their diaries are unlikely to wish to represent themselves negatively. They will wish, most probably, to justify or excuse themselves" (Breakwell and Wood 2000 p297). Thus an under-reporting of socially unacceptable behaviours and an over-reporting of social acceptable ones.
6. Replication difficult.
7. No independent record of utterances, which could have been misheard.
8. Participant misunderstands instructions and what is recorded is misleading or unusable. This is most important if children are keeping the diary (George et al 2006).

9. Over long period of time, participants may lose interest and even drop-out. Therefore it is necessary to make diary tasks not too demanding but interesting.
10. Time-consuming and vast amounts of data produced if child's every word recorded.
11. Too simple entries can miss information. The quality of the data linked to time spent by participants in recording information.
12. Need to train participants to keep complex diary records and to use categories properly.
13. Studies often use volunteers.

Table 10.1 - Strengths and weakness of the diary method in studying child and language development.

months the children were tested by the researchers at the laboratory.

The study recorded the different types of words used in early language development and the "vocabulary spurt" and "naming explosion" (dramatic increase in size of vocabulary). For example, children between 1.5 and 1.7 years old increased their new vocabulary from 1.95 words per week to 5.14.

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