Chapter 3
Background: Some Past and Current Theories of Autism

Autism was first identified by Leo Kanner in the early forties. In his original article in 1943, he attributed it to biological causes, concluding with the statement that "these children have come into the world with innate inability to form the usual, biologically provided affective contact with people".[1] Though he noted the lack of warmth and normal emotional atmosphere in their homes and considered the possibility that these might be the cause of their abnormal development, he felt ultimately forced to reject this possibility, and relegate to environment at most a contributory role. The spirit of the time, however, favoured psychogenic theories, and for two decades his biological statements were largely ignored. Psychogenic aetiologies were more consistent with the positions of both psychoanalytic and behaviourist schools of the fifties and sixties. They were also more appealing because they provided a potential basis for therapy. If the condition were caused by experience, then appropriate later experience might reverse it. But if it were biological, it seemed that there would be little that could be done to alleviate it.

1. Psychogenic Theories

In psychogenic theories, autism was considered a psychological disturbance. The autistic child had been born a normal infant, but early experiences had interfered with the course of his development, leaving him psychologically impaired. Responsibility was generally placed on the mother. Cold, unresponsive, so-called "refrigerator" mothers failed to positively reinforce the natural social behaviour of their infants, so their development stopped and their personalities withered. The primitive drive, frustrated and unfulfilled, persisted nonetheless, evolving in various abnormal ways, producing fixations and repetitive behaviours.

Ultimately, the psychogenic approach proved wrong in its identification of the primary cause. As more data was collected and the syndrome was better understood, it became clear that whatever the cause was, it was to be found in the child himself, not in his environment. Nonetheless, psychogenic theories yielded important insights into the dynamics of autistic behaviour, so we shall find it valuable to begin by studying them.

1.1 Bruno Bettelheim

Of all the psychogenic theories, the most famous is that of Bruno Bettelheim[2]. There were two distinct parts to Bettelheim's theory, one behavioural and one psychoanalytic. According to Bettelheim, one of the essential achievements of normal development is a feeling of *control*. A human being must feel that it is able to have some effect on its world. Specifically, it needs to feel that it is able to attain what is pleasant and avoid that which is unpleasant. It must develop the conviction that through its actions it is able to modify its future experience. This develops as a result of early interactions with the environment. From the start, the infant is an active being, and slowly, in the course of many experiences, it learns correlations between its actions and its sensory experience. From this relatively simple concept of ability to affect experience develop the more complex ones of *self*, *volition* and *control*, which are so central to the essence of humanity. For the existence of an act implies an actor, and from the awareness of his ability to move his body, the infant becomes aware of himself as distinct from the rest of the world. Ability to control leads further to the awareness of volition, that the effect that he exerts has no source other than himself.

1 Kanner, 1943 p250
2 Bettelheim, 1967

According to Bettelheim, concepts of self, others, and ability to influence the environment first begin to develop through early interactions of the infant with its caregivers, especially the interaction of the nursing infant with its mother. It cries and is answered by warmth and food. In nursing, it turns, reaches, grabs, and all these actions hasten the coming of food and the pleasure of sucking. Later, by smiling, crying, and babbling, it evokes varying responses in its caregivers. The pleasurable results that these actions bring reinforce them and encourage the infant to repeat them. With those special parts of external experience, the *mother* and other *caregivers*, the infant develops a relationship of mutual activity and interaction. They respond to it in consistent ways and those responses work together with its own actions to bring it pleasure.

Autism is the result of the failure of this process. If mother and other caregivers consistently fail to respond appropriately to the infant's behaviour, it learns instead that those actions have no effect on the world and eventually gives up trying. Some parents are so insensitive to the infant's efforts that they give it exactly the opposite of what it wants. From this, the infant learns that its action, rather than making things better, only makes them worse. Others are so inconsistent in their response that it seems arbitrary. The same action on the infant's part brings different results on different occasions, with no apparent pattern. From this the infant learns that its actions have no effect at all. It experiences only frustration over its inability to bring relief from discomfort. Without the feeling of control, no sense of self develops, and without mutual action, no sense of other human beings develops either.

Bettelheim considered the personality of the parent to be the main determining factor in the success or failure of this process. He saw the parents of autistic children as being insensitive and rigid. But he recognised that circumstances, too, could contribute to the disruption of the normal development, in particular, adherence to rigid and mechanical methods of childrearing. If the infant's life is forced to conform to a strict routine, if it is fed, changed, held, put to bed, not in response to its requests but when prescribed by schedule, it learns that it is a helpless passive being that can in no way affect its environment. Nonetheless, it is only the insensitive parent that carries this to the extreme. Normal parents, even if they subscribe to such methods, always respond and interact with the infant within the schedule.

Insensitive parents also tend to be insecure and nervous in dealing with children, and failure to receive positive response from the infant after trying to give it what they thought it wanted only serves to reinforce that insecurity. They begin to doubt their worth as parents. This is a vicious circle that leads to less and less interaction with the infant.

Although Bettelheim considered nursing central to the infant's earliest experience of interaction and the paradigm for all subsequent ones, he maintained that autism would not result from unsound nursing practices alone, but only in conjunction with others which together put the infant into an environment that was unresponsive and offered no opportunity for the development of a sense of self.

Bettelheim identified two periods in the child's development during which the feeling of control is formed, and therefore during which interference with this aspect of development can lead to autism. The first is between six and nine months, during which time the infant learns to recognise individuals and develops attachment to familiar people. The second is between eighteen and twenty-four months, when he becomes able to move around by himself and therefore for the first time has the opportunity to gain significant control over his environment.

The specific manifestation during the early period is failure to acquire patterns of coordinated activity with caregivers and to thereby develop interactive relationships with them. But the underlying flaw is lack of activity in general, and therefore failure to develop an active mode of behaviour. During the next year and a half, however, there are other opportunities to develop active relationships with the environment, so most infants that at nine months exhibit pre-autistic traits and seem on their way to becoming autistic, afterwards proceed to develop normally. On the other hand, some who developed normally during the early period become autistic during the second period when their attempts to achieve independence and

control are thwarted. This unfortunate minority, through an unlucky combination of circumstances, fails to become activated, and develops the conviction, which Bettelheim call the “autistic Anlage”, that they are totally powerless to influence the world. This produces a pattern of passivity, and later insistence on regularity and compulsive ordering as an attempt to make the world, though unresponsive, at least regular and predictable.

By the end of the second period this has become a deep fundamental part of the personality, and therefore extremely difficult to change. It becomes incorporated into future development, so even if it is contradicted by later experience, the behaviour pattern established during that period is not altered. Unfortunately, during the early period when it would have been easy to correct, passive behaviour was considered normal and caused no alarm. It is only later, when active behaviour is expected, that withdrawal and autistic behaviour produced by this inactive mode shocks parents. By then it is too deeply entrenched to be easily reversed. That is why autism is not outgrown, even when later experiences are normal. On the other hand, if development proceeds normally during the formative period, subsequent experiences do not produce autism. Once the active mode and the concepts of self, others and control have developed, they are not in danger of being lost.

Though Bettelheim considered these two to be critical periods with respect to autism, he did not consider their effect to be *essentially* irreversible. This was an extremely important aspect of Bettelheim’s theory, because it implied the possibility of effective therapy and eventual cure. Though correction becomes increasingly difficult with time, through special therapy it remained possible to uproot the conviction of helplessness and the pattern of inactive behaviour and reform them at the source.

This, the first part of Bettelheim’s theory, is basically developmental, and is based on behavioural learning principles. But Bettelheim combined with it a second part that was very different, based on a foundation of Freudian psychoanalysis. Bettelheim realised that the explanation thus far was insufficient, because there are many children who grow up in equally unresponsive environments, yet the overwhelming majority of them do not become autistic. Many caregivers fall far short of ideal, and many infants receive little positive response, yet develop normally. It was therefore clear that only a particularly unfortunate combination of circumstances could produce this aberration of development. Bettelheim postulated that those few had, at some point during this early period, interpreted the situation they were in as being life threatening. The belief that their very existence was in danger was too traumatic to bear, so they withdrew in this extreme way, into a mode of detached passivity. It is this extreme emotional response, developing within the broader autistic Anlage, that results in actual autism. The response to the psychologically unbearable “experience” of mortal danger is behaviour designed not as physical protection from actual danger, but as psychological protection from the unbearable truth.

The personality of the infant itself played little part in Bettelheim’s theory. A completely normal infant could become autistic, given the right circumstances. Certain personalities, however, were considered more prone to it than others. A child that is particularly sensitive, who fusses, cries, and reacts negatively to things that are not quite right, is liable to discourage parental interaction. More positive easy-going children, on the other hand, bring out positive interactive behaviour even in insensitive and insecure parents. The traumatic reaction too, and interpretation of circumstances as being life threatening, is also more readily evoked in children of certain temperaments.

1.2 George Victor

Other radically different psychogenic theories have been proposed, though none gained as much attention as Bettelheim’s. George Victor[3] saw autism as the result of social moulding. The autistic child is cast by his caregivers, generally his mother, into a role that he grows to fulfill and eventually assume himself.

3 Victor, 1985

This role might involve inferiority and handicap, but it might also involve exceptional ability and overall superiority. Victor saw the origin of this role in the cultural motif of the hero, destined from birth for greatness, and whose childhood is replete with signs of future greatness, some even preceding his birth. More even than Bettelheim, Victor placed the responsibility on the mother, but, by strange reversal, saw her not as cold and insensitive but as overly attached and involved. He believed that the mother of the autistic child had experienced a crisis and change of life at the time of the birth, in response to which she imagined that the child to be born would be very special.

Actual reactions at the time of birth might then vary from a feeling of fulfillment, that this was indeed the special child she expected, to one of disappointment and rejection, that it was ugly and repulsive. In either case, infancy would be filled with intense involvement and attempt to train the child as a prodigy. To some extent these efforts might prove successful, but eventually, since the ability of any child is limited, when pushed too far, end in disappointment. Meanwhile, the child suffers stress from the excessive demands that are being put upon him and frustration and feeling of rejection from continual criticism and insufficient praise and approval. He also discovers that fulfilling demands only leads to greater and more difficult ones, and eventually discovers that only complete failure can bring sympathy and cessation of demands. This, then, becomes his new behaviour pattern. At this point he regresses, losing any precocious abilities that might have developed earlier.

The mother then goes through a period of confusion and disappointment, emerging with a radically altered picture of the child, of herself, and of their relationship. She now sees him as a poor handicapped creature, still endowed with potential greatness but unable to actualise it. This is a modification, not an abandonment, of the role originally imposed upon the child, and here begins the true autistic personality. The child, for the reasons described, becomes withdrawn, uncooperative and nonperforming, while the mother, for her own reasons, interprets his behaviour a certain way. The contradictory expectations of the mother account for the contradictory behaviours of the child. There is an interaction of personalities of mother and child that proceeds through various stages to produce the final autistic personality and relationship.

The behavioural part of this theory is similar to that of Bettelheim. Like Bettelheim, Victor considered autism to be the result of a process that starts in infancy and continues through early childhood, and he too considered the continued abnormal interaction to be essential. Also, like Bettelheim, he considered the feeling of helplessness and inability to control or affect the environment to be central. There is also an element of trauma in Victor's theory, but it is different from that of Bettelheim. It involves reaction to separation from the mother. This trauma, like Bettelheim's, plays a crucial role in his theory. The trauma of separation from the individual with whom the child was most attached and dependent produces extreme insecurity, helplessness and eventually despair and depression. Later, instead of showing attachment to the mother, he seems to withdraw and reject her. But, according to Victor, far from lacking attachment, the autistic child is intensely attached to her. The central feature of autistic behaviour is *disturbed personal attachment*.

As in Bettelheim's theory, the personality of the child plays at most a minor role in this process. Victor too saw the problem in a mismatch of personalities of mother and child, but here again in exactly the opposite way. It is the quiet, inactive child who is prone to this disturbance in development. Such a child fares well if he has a secure aggressive mother, but if the mother is prone to depressions, the child, who has already begun to abandon activity, becomes even less active.

2. Early neurological theories

While there are indeed valid reasons for rejecting psychogenic explanations, as will be discussed later, their actual rejection was due more to incidental and perhaps invalid ones. During the latter decades of the

twentieth century, there was a general decline of psychoanalytic and behaviourist schools, due in part to advances in technology. The discovery of DNA brought increased interest in heredity and provided a theoretical basis for explaining personality and other human qualities as being derived from hereditary biological sources rather than development, learning, and other environmental factors. Improvements in medication for the treatment of mental illness provided new avenues of therapy so that even disorders that were of biological origin were no longer necessarily incurable. Opposition to psychogenic theories also arose from the resentment of parents who had been made to bear the guilt of the responsibility for having, albeit inadvertently, injured their children so severely. Furthermore, the promise of cure implicit in psychogenic theories had proven almost universally unfulfilled. So psychogenic theories of autism fell out of favour and were finally rejected.

2.1 Bernard Rimland

The first alternatives to psychogenic theories looked toward low-level neurological processes. The best known of these early theories was proposed by Bernard Rimland[4]. He attributed autism to impaired ability to relate new stimuli to remembered experience. According to Rimland, the autistic child can relate new sensations only to fragments of memory. While the normal infant gradually learns to make sense of the multitude of stimuli with which it is bombarded, for the autistic child the world remains chaotic. Being unable to relate one experience to another, he cannot integrate sensations into a comprehensible whole. He therefore cannot understand relationships or think in terms of analogies, symbols, concepts or abstractions.

In analysing the language of verbal autistic children, Rimland noticed the absence of certain kinds of connective words such as “because”, and failure to ask questions, especially those involving “why?” Analysis of narratives of autistic children revealed that this was not simply a matter of verbal or conversational style, but of underlying thought processes, involving failure to connect events in causal ways, recognise causal relationships, and, indeed, to fully grasp the very concept of causality.

Cause is a specific kind of relationship between events. If a child cannot recognise relationships in general, he will not be able to understand cause. He will also be unable to understand the relationship between himself and the rest of the world. Without that, the concept of “self” fails to develop. In this way Rimland explained the phenomenon of pronoun reversal, in which the child uses the word “you” in place of “I”.

While Rimland’s theory represented a return to Kanner’s original thesis that autism was at root a biological condition, it was a departure from Kanner as well as from the psychogenic school in identifying the primary deficit as cognitive rather than affective. For while Kanner had said that the deficit involved the “ability to form the usual, biologically provided affective contact with people”, Rimland considered it to lie in the processes of memory, reasoning, and sensation, and saw the emotional and psychological abnormalities as secondary.

2.2 Hermelin and O’Connor

A somewhat different explanation was offered by Beate Hermelin and Neil O’Connor[5]. Hermelin and O’Connor differed in their methodology from most earlier researchers of autism in that they based their theory on carefully conducted controlled experiments rather than observations of case studies and anecdotal evidence. On the basis of their experiments they concluded that autistic children’s lack of response to human contact was not a specific aversion to human beings, but merely part of a general lack

4 Rimland, 1964
5 Hermelin & O’Connor, 1970

of responsiveness to stimuli. They found that autistic children failed to orient toward or attend to visual and auditory stimuli whether or not they involved human beings. They concluded that autistic children were not aloof, that is, did not specifically separate themselves from other human beings, but were globally unresponsive and therefore not behaviourally connected to their surroundings. They had neither aversion to human stimuli nor preference for nonhuman ones.

Lack of responsiveness was found, however, to vary modally. It was especially low for visual and auditory stimuli, but not for tactile ones. They concluded that autism involved a preference for proximal over distal modalities, and that the basic deficit was inability to encode stimuli meaningfully. The distinction was therefore along the lines of the modality rather than the source of the stimulus.

So, whereas Rimland explained abnormal response to sensation as being secondary, due to lack of development of appropriate response inhibition, Hermelin and O'Connor considered it to be primary. This reflected an underlying difference in cognitive theory. They saw more of the normal processing of sensation as being innate rather than learnt, and therefore subject to primary biological defects. They therefore located the neurological defect in the processing of sensation itself rather than in its connection to memory.

They also saw greater significance in deviant patterns of memory and ordering. They found that, unlike normal children, autistic children could remember random sequences of words just as well as meaningful ones such as sentences. They did not, however, completely lack appreciation of pattern and structure. The difference lay in the kind of patterns and structures that were salient for them. Given unstructured lists of words, they were able to arrange them, but rather than choosing meaningful patterns, they arranged them according to simple structures, such as the sound of the words rather than their meanings, the way small children do. Even when words were presented already arranged according to a complex structure, they would rearrange them according to a simple one. This was interpreted as indication that deep complex structures, such as those of sentences and meaningful lists, were beyond their grasp.

This was seen as a neurological deficit that limited the complexity of interpretation of stimuli, leading to a limited range of behaviour. In particular, it precluded normal social development, which is based upon correctly interpreting the complex patterns of human behaviour and is heavily dependent upon exactly those two modalities, visual and auditory, in which autistic children are weakest.

2.3 Carl Delacato

A somewhat similar theory was developed by Carl Delacato[6]. According to Delacato, the nervous system of the autistic child responds abnormally to intensity of sensations. For some autistic children, levels that are mild for normal children are experienced as intolerably intense; for others, normal levels are too bland to be noticed. In the former, they may be so disturbing that they interfere with learning and other cognitive functioning; in the latter they are not learnt from because they are ignored. In both cases, the result is failure to learn. Such abnormal levels of sensitivity could also explain obsessive and self-stimulative behaviour, which Delacato saw as methods of coping either with pain of overstimulation or with relative sensory deprivation. He even went so far as to suggest that they were adaptive mechanisms by which the organism attempted to remedy the sensory imbalance.

These early cognitive theories were only intended to explain autism in which intelligence was significantly below normal. They could not explain cases of normal intelligence, since the deficits they postulated precluded advanced cognitive development. At that time, however, this was acceptable, because such cases were then considered a different syndrome, referred to as "autistic-like". However, as it became generally accepted that autism spanned the entire range of intelligence, and that even some

6 Delacato, 1974

children who initially appeared to have low intelligence later developed to have intelligence that was normal or above, a different kind of deficit was sought. Increased knowledge and better understanding of autism had again made old theories untenable, and at the same time pointed the way toward new ones.

3. Later Cognitive and Modular Theories

Among the discoveries made during that period were consistent cognitive patterns in autism that transcended level of intelligence, and were therefore, like emotional abnormalities, integral parts of the syndrome. These involved more subtle functions than those addressed by the early theories, and seemed to involve more complex abilities. Among those who study the mechanisms of human thinking, there are those who maintain that specific kinds of thinking are innate, that is, they are produced by genetically generated biological mechanisms, rather than by experience and development. These mechanisms are referred to as 'modules', and this school is called 'modularism'. According to the modularist school, the underlying cause of autism might be a genetic abnormality that causes a specific mechanism to malfunction.

3.1 Theory of Mind

The most promising modularist explanation involved the module by which an individual understands other human beings and is able to interact with them[7]. Since deficits in these areas lie at the heart of autism, this seems a reasonable area to look for the cause. In the course of research into the behaviour of humans and some other primates, adherents to the modularist school hypothesised that there is a specific module that enables and indeed causes them to attribute *emotions*, *volition*, and finally *thoughts* to other members of their own species and to other living beings as well. Since together, these comprise what is ordinarily called a “mind”, the concept of such an entity was given the name “Theory of Mind”. This expression was chosen to indicate that mind is not an observed phenomenon, but rather a “theory” – an interpretation imposed upon sensory data that serves to explain certain observed phenomena by postulating an unobserved and essentially unobservable entity that underlies them.

The function of Theory of Mind is, in this way, comparable to the functions of other such “theories”. The concept of a “physical object”, for example, is a theory unifying various visual, auditory, tactile, and olfactory sensations that tend to be correlated in an individual’s experience. He *sees* the shape and colour of a tree, *hears* the leaves rustle in the wind, *feels* its bark and *smells* its flowers. These experiences he then unifies under the concept of *tree*, an object whose existence he postulates and which he considers himself to be experiencing in these different ways.

Theories such as Theory of Mind and Theory of Physical Objects are cognitive tools. They provide a person with ways to conduct himself that are more efficient than dealing with each sensation separately. Theory of Mind helps a person interpret and predict the behaviour of humans and other creatures to whom a mind has been attributed. Rather than having to analyse each of their actions separately in terms of the circumstances within which it occurred, with a Theory of Mind he postulates certain unobservable entities – emotions, desires, thoughts – produced by the combination of circumstances, which make predicting their future behaviour easier.

In accordance with the general modularist approach, the ability to conceive of a mind was seen as being performed by a distinct innate mental module, a system of mechanisms separate from the mechanisms that serve other areas of cognition. Furthermore, this module not only enables human beings to form these concepts but indeed causes them to do so whenever they are presented with the appropriate sensations. If so, autism could be explained as the condition resulting from a defect in that innate module.

7 Baron-Cohen, 1995

Without a properly functioning Theory of Mind module, the autistic child does not perceive humans as being different from inanimate objects. Furthermore, according to the modularist paradigm, it is essentially impossible for an individual to produce one of these unifying theories without the appropriate specific innate module, so a child born with a defective Theory of Mind module will never be able to make sense of human behaviour.

Proponents of this explanation referred to the function of this module as "mind-reading", which consists of interpreting the behaviour of human beings and other living creatures by attributing to them "mental states" such as feelings, thoughts and desires. When the normal infant sees a human face, it innately knows that this is a being having mental states. When it observes human behaviour, it innately explains it by the appropriate mental states. Thus upon hearing a laugh it innately thinks, "Someone is happy" and when it sees a human moving toward something, it thinks "He wants it."

Lack or dysfunction of this module would explain many aspects of autism. One of the most striking characteristics of autism is lack of awareness of other human beings. The severely autistic child is apparently unaware that humans are conscious beings at all. He treats them no differently than inanimate objects. He may use them as tools, taking one by the hand to get him something that is out of his reach, but he does not appeal to them for assistance. So although he has sufficient intelligence to understand what people are capable of doing for him, he does not see their behaviour as intentional or in any way indicative of thoughts or feelings. Children who are less severely autistic, while not lacking this basic awareness, nonetheless have difficulty recognising and understanding the feelings and thoughts of others. They are generally able to recognise simple emotions such as happiness and sadness, but may have difficulty with more complex ones like surprise or envy. Even intelligent autistic adults are often deficient in their appreciation of the feelings of others.

According to this explanation, deficits in language and communication are a direct consequence of a dysfunctional Theory of Mind module. Although there are various modularist theories of language acquisition, some of which involve a separate language module, in all the innate mechanisms of social interaction are prerequisites for normal language development. According to one theory, when normal infants hear people speak, they innately know they are trying to say something. They figure out the meanings of the words by "reading the speaker's mind", that is, figuring out what he is thinking. Since autistic children lack this ability, they are unable to make sense of the sounds humans make and therefore fail to learn language.

This explanation immediately ran into problems, because whatever ability it predicted autistic children would not be able to acquire, there were always some who did. The first was that autistic children whose intelligence is normal eventually do acquire language. Analysis of the difference between the ways autistic and normal children acquire language provided an answer to this problem. The general pattern of autistic language acquisition involves early use of language for requests and statements, but not for expression of emotion as in normal children. This deviant course is therefore seen as a support for the hypothesis that unlike autistic children, normal children learn language by attending to the speakers and reading their minds, not by concentrating on the words themselves.

3.11 Decoupling Thoughts from Reality

Working within this general hypothesis, a variety of explanations of how the Theory of Mind module works in normal children and what parts of it are defective in autism were offered. Alan Leslie[8] proposed that the defective mechanism involved recognising the existence of thoughts as distinct from reality. Normal children, he claimed, even though they do not yet understand the abstract concept of representation, innately know that human beings have thoughts, and that thoughts are different from

8 Leslie, 1987, Leslie and Roth, 1993.

reality. So when the child sees a person looking at a tree, he innately knows that the person is thinking about the tree. He says to himself, "There's a tree, there's a person, and the person is thinking, 'There's a tree.'" This, Leslie claimed, is accomplished by a special innate mechanism, which he called a "decoupler", because it disconnects the thought from what it is about or "coupled to". Without this mechanism, it is impossible to conceive of thoughts at all. There is only reality, and whatever people say or do is a function of what really is.

Autistic children, lacking this module, cannot conceive of what we call "minds", or of something going on inside of people that we call "thoughts". So, while capable of understanding the sentence "It is raining" and looking out the window and stating whether it is true, they are nonetheless incapable of correctly understanding the sentence "John thinks it is raining." If it is not really raining they will say this statement is false. They cannot imagine that John might be mistaken and think it is raining when it really is not, that he can have a thought different from reality. To them "think" is simply a word that is inserted in a sentence to indicate the connection between a person and a fact.

According to Leslie, the lack of this mechanism in autism is revealed by a trait that had been documented earlier, but to which no special significance had originally been attached: Autistic children do not engage in pretend play. Pretence is one of the forms of play that is universal among normal children. From small children pretending that a toy block is a car or pretending to drink from an empty cup, to older ones making elaborate games of "shop" or "school", normal children enjoy pretence. Autistic children do not. They play with blocks as blocks, to build with. They enjoy lining up their toy cars or spinning the wheels. But they don't make up stories about them or games in which something is what it is not, in which one thing represents or stands for something else.

The first to see significance in lack of pretend play was Lorna Wing[9]. Unlike earlier researchers, who saw it as just one of the many peripheral traits that tend to be associated with autism, she considered it an integral part of the syndrome. She saw it as indicative of the lack of a fundamental normal human ability, which she called "imagination", meaning the ability to imagine things different from reality. So central did she consider it that she listed it together with impaired language and social interaction as one of the three main categories of autistic traits.

Leslie carried this argument an important step farther by identifying this ability with the broader function of *representation*, which, according to a widely accepted theory of cognition, underlies essential aspects of thought and language. According to this theory, thoughts are *mental representations*. Just as a painting is a physical representation of a scene or object, a thought is a representation composed of neural structures rather than paint and paper. To think about the thoughts of others, requires forming thoughts about thoughts, which are therefore considered *metarepresentations*, representations of representations. According to Leslie, since the autistic child is able to think about things he must be able to form mental representations. His deficit is the inability to form metarepresentations. He cannot think about the thoughts of others because he cannot conceive of a representation, whether physical or mental. Nor can be introspect, that is, think about his own thoughts, because that, too, requires this ability.

Leslie saw the apparently spontaneous joy that normal children have in pretence as evidence of an innate decoupler. Not only are they able to pretend, the inclination to pretend seems to be one of their primitive drives. In keeping with the position that functions performed by these innate mechanisms cannot be attained by development, for one born without an innate decoupler, representation is impossible. Without representation there can be no pretence, because pretence, even on the very simplest level, requires the ability to recognise thoughts as being distinct from reality. One who cannot conceive of a thought as being anything other than a reflection of reality cannot pretend. He cannot say, "Even though this is really a block, I am thinking of it as a car." If it is really a block, one can treat it as nothing else.

9 Wing & Gould, 1979

So, while normal children are, by means of this mechanism, automatically able to correctly interpret an act of pretence by another human being, autistic children never can. The normal child innately thinks, "It's really a block, but we are pretending it's a car. In our thoughts it is a car." To the autistic child this is incomprehensible. Not only is he not inclined to pretend and does not enjoy pretending, he is essentially incapable of it.

3.12 Testing the Theory of Mind Hypothesis

The Theory of Mind hypothesis as presented so far already consists of several distinct hypotheses, each of which needs to be tested separately. Firstly, is Theory of Mind really lacking in autism? At first it certainly seems not to be. Even autistic children who are mildly mentally impaired appear to understand the concepts of thoughts, feelings and desires. They speak of people as being happy or wanting or knowing about things. The use of such words, however, can be misleading. In situations in which thought and reality are the same, the use of mentalist words does not prove that the speaker really grasps the concept of a thought as distinct from reality. Young children use words like "think" and "believe" as adults do, thereby appearing to understand these concepts correctly, but perhaps all they mean by them are expressions of reality. When Mom says, "I think we'll go for a walk today", the child might understand it simply as, "We'll go for a walk today". So when an autistic child says "John wants the apple" he may mean nothing more than, "John is reaching for the apple", and when he says, "John is happy" he may mean, "John is smiling."

If, however, a child correctly describes other people's mistakes and lies, then he must understand that there are mental entities that are separate from the physical world. It was therefore generally accepted that the most reliable way of determining whether a child has a genuine Theory of Mind is to test his appreciation of false belief. Does he recognise that others might have beliefs that do not conform to what he himself knows to be true? If a child sees someone looking at a tree and, upon being asked what the person is thinking about, replies, "a tree", it is not clear whether he really understands what "think" means. He might imagine that it is simply another way of asking, "What is the person looking at?" But if he sees someone looking at a bowl of fruit that appears very real but that he himself knows to be artificial, then if he understands the meaning of "thought" he will say, "He thinks it is fruit", but if he does not, he will say, "He thinks it is artificial fruit."

This sort of test was first proposed by Henry Wellman[10] to study the development of these concepts in normal children. It was found that by about three years of age normal children were able to pass such tests, indicating that they already grasped the concept of thought. Many autistic children however, fail even when they are considerably older and of higher mental age. Numerous variations of these tests have been performed, and the results are solidly established. This seemed to support Leslie's hypothesis.

Other well-known autistic traits such as gullibility, extreme literalness, and naive honesty can all be accounted for by inability to grasp metarepresentation. Here too, carefully designed experiments have confirmed anecdotal evidence. Autistic children have been found to be unusually inept at simple deception. When asked to hide a penny in one hand and have someone guess where it was, some failed to close the empty hand, some hid the penny in full view of the other person, and others showed the answer without waiting for the other to make a guess.

3.13 Shared Attention

10 Wellman, 1990

A modification of this theory was developed by Simon Baron-Cohen[11]. In his version, "mind-reading" is performed by a complex module composed of several elementary innate mechanisms, of which he identified four. The first, which is similar to modules proposed earlier by Premack[12] and Leslie, interprets self-propelled motion by postulating an *agent* and a *motive*. Whenever an infant observes something moving with no apparent external cause, this mechanism causes it to assume firstly that the moving thing has the ability to make itself move, and secondly that it is experiencing some sort of internal feeling, such as a desire or an aversion. The innate tendency to interpret experience this way is not limited to motion, but applies to other kinds of change as well. Whenever there is an unexplained change, the infant tries first to identify a known object as the agent, and if that is not possible, assumes an unknown agent. So if there is a sudden sound, even an infant who has not yet had the opportunity to learn about the world innately thinks, "Something is making that sound. It wants something." It does not simply say, "It's just a noise" or, "It just happened." Baron-Cohen called this mechanism the "Intentionality Detector" (ID). It is amodal, attributing intention whether the motion or other change is perceived visually, tactally, or by any other sense.

The second module is devoted specifically to vision. Baron-Cohen called it the "Eye Direction Detector" (EDD). It does three things. First, it recognises eyes or configurations that resemble eyes. Then, it computes whether the eyes are looking at the subject, and if not, what they are looking at. Finally, it innately infers that the being to whom the eyes belong knows about the thing it's looking at. By virtue of this mechanism, if the eyes are directed at the child himself, he innately knows "So-and-so sees me." Like the first mechanism, this one interprets visual stimuli as indicative of mental states, but whereas the first one attributed *intention*, this one attributes *knowledge*.

On the basis of experiments that he performed, Baron-Cohen concluded that these mechanisms were intact in autistic children. They use the word "want", both with respect to themselves and others. They can "distinguish animacy" and can understand that desires cause emotions. When asked to explain stories involving emotions, they can explain that a child was sad because he didn't get what he wanted. Most autistic children correctly identify facial expressions of happiness and sadness. They can tell what someone is looking at and they use the word "see" spontaneously. They too, therefore, know that there are conscious beings around them who have thoughts and desires, and who have knowledge gained from sight.

According to Baron-Cohen, the missing module is one that connects the subject himself with the other person. He calls it the "Shared Attention Mechanism" (SAM). Unlike the first two, each of which involves only two entities, this one is triadic - it involves three. It causes the normal child to innately know that when someone else's eyes are directed at its own, that person knows what the child himself is looking at. This mechanism uses the second mechanism to tell it that the other person is looking at the subject and therefore sees him, but it goes a significant step further by attributing to the other person knowledge of the thoughts, that is, the mental states, of the child himself. In situations in which the child and the other person are not looking at each other but are both looking at some third object, the mechanism causes the subject to innately know that they are both having the same thoughts, hence the label "Shared Attention". It is this module that is responsible for the ability to form meta-representations.

Baron-Cohen saw evidence for the lack of this module in the absence of pointing and related behaviour in autistic children. He observed that, while autistic children do point or otherwise indicate things for practical purposes, they don't point just to get the other person's attention and direct it to something they find interesting. This latter is referred to as a "proto-declarative gesture" because it serves the same function as a verbal declaration, but without using language. Thus pointing at a bird serves the

11 Baron-Cohen, 1995
12 Premack, 1990

same function as saying, "What a pretty bird!" By contrast, pointing so that someone will get something or do something serves the function not of declaration but of request. ***

Failure to share attention may also be the reason for the abnormal vocal patterns of autistic children, such as speaking too loudly or too softly. Normal children modulate volume and other aspects of speech to make it more comprehensible and interesting to others. They are aware of the thoughts and interests of the others, and adjust their voice accordingly. But autistic children are not, so their speech may be too loud for too soft for the situation.

According to Baron-Cohen, this third mechanism involves not only the ability to recognise shared attention, but also a drive toward coordinating one's own attention with that of others. This can be achieved in various ways, some verbal and some nonverbal. Normal children not only point, but also like to bring things to other people to show them. It seems that they find sharing attention enjoyable, while autistic children do not.

Like the first mechanism, this one is amodal, so if the subject and another person are eating the same thing, the subject knows that they are both experiencing the same taste. When vision is involved, these three mechanisms work together sending information to one another.

The fourth mechanism is the "Theory of Mind Mechanism" (ToMM). It is similar to the one described by Leslie, but in Baron-Cohen's theory its function is more limited, since some of its job has already been taken over by the other three. ID has already provided volitional mental states and EDD certain perceptual mental states, though limited to vision. Two tasks remain. The first is to attribute *epistemic* mental states, that is, *knowing*, *thinking*, and *imagining*. The second is to relate these various states to one another. These two are done by ToMM.

In Baron-Cohen's theory, these mechanisms normally emerge according to a specific time-table. ID is present at birth and EDD has begun to function well before nine months. Between nine and eighteen months SAM emerges, which prepares the way for ToMM between eighteen and twenty-four months, as indicated first by the emergence of pretend play, and later by the use of words like "know" and "believe". The first three mechanisms involve two important cognitive concepts. One is that a being's actions are *about* other things – for instance, that a person is moving his hand because he wants a certain thing. This Baron-Cohen refers to as "aboutness". The other is that this aboutness may involve not the entire thing, but only one *aspect* of it, which he calls "aspectuality". In accordance with the general nativist-modularist position, these cannot be learnt or developed, but must be known innately. ToMM involves, in addition, the concept of *referential opacity*, the understanding that the thought in the mind of the other person could be different from reality, as performed by Leslie's decoupler. It is this that makes it possible to understand that the other person might be making a mistake, or that he might be lying or telling a joke, all of which are known to be deficient in autism.

3.2 R. Peter Hobson

A radically different approach was taken by R. Peter Hobson[13]. Though also nativist, he considered the primary deficit to be affective rather than cognitive. Hobson maintained that normal human beings have innate feelings and emotional reactions to various experiences, especially those involving the perception of other human beings, as well as natural emotional expressions. It is these feelings and their natural expressions that cause human beings to keep in tune with one another. Since they share the same innate feelings and have them in similar situations, they are able to understand one another

Over and above this basic commonality of feeling are innate responses to the natural emotional expressions of others. These form the basis for automatic production of social development. The normal infant, when it sees another human exhibiting the innately determined facial expressions, vocalisations or

13 Hobson, 1989, Hobson, 1990, Hobson & Lee, 1999

bodily motions, itself innately becomes aware of the corresponding emotions and feelings. When it sees someone smiling, for instance, it gets a feeling of happiness. This may or may not include, in addition to the affective aspect, a cognitive aspect of innately attributing these feelings to the other person. Though Hobson leaned toward the stronger claim, he did not consider it to be essential to produce the crucial feeling of commonality. It is sufficient that when the infant sees someone smile it innately smiles too, even if it doesn't know that it is doing the same thing as the other. As long as both the infant and those around it have these innate responses, others innately respond to its behaviour in appropriate ways and it to theirs. Together, these responses lead to a dialogue, a reciprocal relationship forming between infant and caregiver. Hobson calls this "preadaptation for reciprocal social exchanges"[14]. These innate responses then form the foundation for cognitive and emotional development. Through participation in such dialogues, the infant becomes aware that they are both experiencing the same thing.

Innate behaviours are then reinforced by experience. The infant has an innate fear-response to expressions of anger. When it experiences symbolic anger-expression being followed by behaviour such as attack, the innate response is augmented by a reaction of fear of the aggressive behaviour that tends to follow it. When the sight of a smiling face is followed by being fed or played with, the innate smile-response is reinforced by anticipation of pleasant experience.

According to Hobson, the deficit in autism is a lack of these innate feelings and responses. Without the normal feelings and behaviours and without the normal responses to human expressions, the autistic child fails to develop this feeling of commonality. He does not feel that other human beings are similar to himself and live in a world of similar experiences. This leads to failure of communication, because communication is based upon common feeling. The autistic child does not become part of the social interrelationship. Not understanding what other people are doing, he cannot coordinate with them, so he cannot take part in social activities.

Thus, according to Hobson, Theory of Mind, that is, cognitive awareness of the desires, feelings and thoughts of others, and awareness of human beings as sites of such feelings, need not in themselves be innate concepts, but can be results of living and interacting with others with whom one shares certain basic feelings and behaviours. The normal child comes to recognise other human beings as the sites of thoughts and feelings through this experience of common feelings, while the autistic child does not. Thus the order of the causal relationship in Hobson's theory is the opposite of Leslie's.

The exact nature of the deficit may involve a variety of feelings and responses. The normal mechanisms of emotional response may be entirely lacking, or the feelings and responses they produce to certain stimuli or in certain situations may be grossly abnormal. In either case, the inner experiences of the autistic child will not be like those of normal people, so his world will be different from theirs. He will not understand them, and abnormalities in both his own inner feelings and his behaviour will make it impossible for them to understand him. Normal human beings live in worlds similar to those of one another, so they develop mutual understanding. They can relate to the experiences of other people and understand them when they speak because they have had similar experiences themselves. But the autistic child has not had these feelings. He has had different ones, so he can't understand theirs, and since the sounds and movements that he makes are not typical human ones, they do not innately understand him either.

Rejecting the nativist tenet that all concepts must be innately granted, Hobson went on to explain that cognitive deficits in autism involving symbolisation, abstraction, and certain essential concepts of physical reality were the result of failure of certain normal patterns of development, due ultimately to lack of these innate elements. Adopting a basically Piagetian explanation, he attributed to participation in social interaction a central role in the normal course of acquisition of these higher cognitive skills. These concepts emerge through developmental processes that are extended over many years, beginning with the

14 Hobson, 1989, p25

very rudimentary social interaction of the infant and young child and passing through successive levels of social awareness.

The grasp of the concept of a symbol involves the ability to perceive the special relationship a symbol bears to the thing it symbolises, which is unlike other relationships between physical objects. This is the relationship of "aboutness", that one thing is *about* another, which Baron-Cohen considered to be an innate concept. According to Hobson, the paradigm from which aboutness is derived is that of *thought*. The thought of a person is *about* his experience. In human thought there are two kinds of aboutness, *emotional* and *propositional*. According to Hobson, the first to be grasped is emotional aboutness. The child becomes aware that a person's manifest emotional behaviour is *about* something in the world. He is acting angry *about* something or happy *about* something. As the child comes to see this behaviour as being derived from underlying feelings, feelings, too, are seen as being *about* something. From understanding human emotions as being *about* their experiences, the normal child goes on to achieve a general understanding of the relationship between human thought and the world, that a person's thoughts and knowledge, which he reveals through propositional statements, are also about things in the world. Through that he goes on to understand the relationship between the symbol and that which it symbolises.

From appreciation of humans as beings that have thoughts about the physical objects that both he and they experience, the child comes to the realisation that those objects have an existence independent of his own experience of them. For only if something has its own independent existence is it possible for different individuals to experience it differently and to have different thoughts and different viewpoints about it. Appreciation of that independent existence then makes it possible to conceive of those objects as having properties of their own, which is the foundation of *abstraction*.

It follows that without social interaction, awareness of reality and the abstract attitude will fail to develop. This is what happens in autism. The autistic child, lacking the basic feelings and responses upon which awareness of feelings and thoughts is built, does not become aware of their different viewpoints. His sense of physical objects therefore remains bound to his own experience, and awareness of the independent existence of the physical world fails to develop. Lacking that, he is unable to take the next steps to understand abstract concepts and then to develop a general appreciation of abstraction. That leaves his own experience fragmented and devoid of deeper meaning, for without an independent external world, he has no spatial and temporal context into which experience can be integrated.***

Hobson's theory is radically different from those of Leslie and Baron-Cohen in its rejection of the necessity of innately granted cognitive abilities. This fundamental philosophical difference is more significant than the question of whether the primary deficit in autism is affective or cognitive, for by accepting the philosophical position that concepts cannot be derived by developmental processes one is forced to maintain that the inability to understand abstraction must be primary.

But although Hobson's theory differs from theirs in these important ways, in other ways it is similar. The cause is an innate deficit, the lack of an ability which in normal infants is present by virtue of an innate mechanism; the ability is one that specifically involves relationships with other human beings; and the lack of this ability secondarily produces other cognitive and/or emotional deficits. These important similarities place them together, and the second separates them from the ones that follow, which, while nativist, are not modular. The abilities considered primary in the following theories are global rather than domain-specific, involving areas of cognition not directed specifically toward relationships with other human beings.

3.3 Executive Functions and Central Coherence

In the course of research, several traits were discovered that had not been recognized when autism was first identified[15]. In testing the intelligence of autistic children, it was found that they tended to excel at certain of the standard psychometric tasks, while at others they generally performed poorly. Aside from having difficulty with specifically social tasks and with those that relied heavily on language skills, which was to be expected, there were some, such as the Tower of Hanoi and the Wisconsin Card Sorting Test, that were hard for them even though neither of these factors was involved. On the other hand, at copying block designs and finding hidden pictures, they generally did very well, not only compared to their own performance on other tests, but to other children of their age. Even mentally impaired autistic children sometimes outperformed normal children at these tasks. Analysis of these strengths and weaknesses showed that it is at tasks requiring attention to detail that autistic children excel, while at those involving planning and flexibility their performance is relatively poor. This pattern was found at all levels of intelligence.

The deficits revealed by these tests resemble those sometimes found in adults who have suffered injury to the prefrontal cortices of the brain. In such injuries, mental abilities involved in planning and directing activity towards achieving specific goals are sometimes impaired, while others, including complex skills such as language and calculation, may remain intact. This phenomenon of selective impairment led to their identification as a separate category of cognitive abilities to which was given the name “Executive Functions”. Executive Functions begin with choosing goals and committing oneself to working toward them. Focusing and maintaining attention to a goal then entails disengaging from the immediate context, that is, not being distracted by unrelated events. It can also involve inhibition of responses that are not in themselves bad, but are inappropriate to the pursuit of the current goal. Especially difficult is the ability to temporarily shift attention to something else when necessary and then to return to the goal. Beyond the ability to maintain attention, Executive Functions include the ability to create plans and strategies based not only on that which is currently perceptually present, but also on mental models. They also include the ability to evaluate one’s current strategies and to modify them if they are not succeeding or if circumstances have changed. It has been found that some but not all Executive Functions are affected in autism. Most deficits lie in the areas of *set shifting*, *planning*, and *generativity*.

Closely related to Executive Functions is the ability to perceive common qualities in individual elements of experience, to put them into broader context and to perceive overall order. This has been given the name “Central Coherence”. While Executive Functions are involved in *behaviour*, in the organisation of action according to a larger plan, Central Coherence is involved in *perception*, in finding patterns in the individual elements of experience by which they can be seen as belonging to larger units. Deficits in Central Coherence have been suggested to explain the tendency, characteristic of autism, to attend to details and neglect larger patterns. The autistic child seems to lack the ability to put experience into context. He sees individual parts, but does not integrate them into a coherent whole, and therefore tends to concentrate on the parts themselves. This way of thinking is a disadvantage in situations requiring planning, but there are certain ones, such as copying block designs and finding embedded pictures, in which it is an advantage. Lack of Central Coherence may also explain desire for regularity, since a detail-oriented approach to experience makes it difficult to deal with change.

The strong correlation between these traits and the essentially social ones that are the main characteristics of autism is problematic for all theories. It is difficult to account for them in terms of a specifically social primary deficit. Some have suggested that there are actually two separate primary deficits, one social, such as those suggested by Leslie, Baron-Cohen or Hobson, and the other cognitive, similar, perhaps, to that proposed by Rimland, involving putting new experiences into the context of earlier memory. If so, it is the strong correlation between them that needs to be explained. The simplest

15 Hughes, 1996, Hughes and Russell, 1993.

explanation would be a biological link between them, but that seems unlikely given the biological heterogeneity found in autism, as will be discussed in later chapters. This evidence seems to indicate, rather, that it is deficits in Executive Functions and Central Coherence that cause the social deficits. Primary deficits in these areas, it is argued, constitute a more severe handicap in understanding human behaviour than physical phenomena, because human behaviour tends to be complex, while physical phenomena are often experienced in simple forms which do not require organising multiple data. This approach is less modular than the others, since the abilities involved apply to all areas of cognition, but it is nativist, in that these abilities are considered to normally be innate, and the deficits in autism to be the result of the lack of those innate abilities. However, no detailed explanation has been proposed, and most of the research in these areas has concentrated not on constructing hypothetical causal explanations, but on firmly establishing the correlation between these traits and the rest of the syndrome, and on carefully analysing the nature of Executive Function deficits in autism.