Chapter 10
Underlying Causes

1. The Social Learning System as the Final Common Pathway

In the preceding two chapters, we saw that social learning is a complex system which plays a central role in the development of the infant into a mature adult, and which continues to be important for the adult in both the social and the physical worlds. We also saw that deficits in that system can account for most of the traits of autism. As significant as this discovery is, however, we have still not found the cause of autism. What we have done is identify the mechanism whose dysfunction is responsible for the syndrome, not what causes that dysfunction. We have identified the *site* of the disorder (understanding, of course, that the term "site" is being used conceptually, not to refer to a physical location). The question of cause, however, has not been answered or even addressed.

At the beginning of our discussion, we noted that on the genetic and neurological levels there is no single unique cause, but rather a variety of diverse underlying conditions, all of which converge to produce similar combinations of traits which constitute the syndrome that we call "autism". Some earlier researchers, recognising this multiplicity of underlying causes, treated the locus of this convergence as an hypothetical entity, a black box, which they referred to as the "Final Common Pathway". What we have done, therefore, is to identify that hypothetical entity, the Final Common Pathway, as the Social Learning System. This, too, is significant, for it means that the Final Common Pathway is not a neurological or chemical condition, as might have been expected, but a functional one.

The complex nature of the Social Learning System is consistent with its identification as the Final Common Pathway. It includes many components interacting in different ways, so it is dependent upon many factors' and there are many points at which it might break down. There are, therefore, many underlying conditions that might disable it. In some cases it might be a single factor, in others a combination of several. They might be hereditary or developmental, biological or environmental. Self-contained mental modules such as the proposed Theory of Mind Module, by contrast, are sensitive to only a narrow range of potential disruptions, so they are less consistent with the evidence of multiple underlying causes.

This identification is also supported by the variety of types of autism. While all underlying causes ultimately affect the *entirety* of the Social Learning System, thereby producing the combination of traits characteristic of the syndrome, since each interferes with the functioning of that system in a different way, each may also produce other traits not produced by the rest. Some of these may be produced by way of the Social Learning System itself and others by simultaneous interference with other systems. Earlier theories had little to offer in this regard. As we have seen, some were consistent with only certain types of autism and required identifying other types as essentially different syndromes. Others, while not inconsistent with a variety of types, could do nothing to explain the relationship between them. Rarely, indeed, has the question of variety been addressed. The ease with which the Social Learning System can account for the variety of types of autism is therefore further support for its identification as the Final Common Pathway.

So, while identification of the Social Learning System as the site of the disorder does not tell us what ultimately causes autism, it provides a framework within which the various traits can be understood. It also makes the search for underlying causes easier, because it is no longer necessary to look for a direct connection between the cause and each of the specific traits. Anything that interferes with the functioning of the system is a potential cause, and the various traits such as delayed language acquisition or insistence on regularity would then follow from it. So although it is not our final destination, it is an important milestone on the road.

2. Innate Aptitude: The First Category of Primary Causes

The Social Learning System is dependent upon a variety of factors, most of which fall into the two categories of *aptitudes* and *dispositions*. Since most of the primary causes proposed by earlier theories are abilities, we shall examine the category of aptitudes first, beginning with the four most fundamental and essential for any kind of learning, *memory*, *recognition*, *structuring* and *sensitivity*.

2.1 Memory

The First and foremost among them is memory. Without memory one cannot learn. The functions involved in memory are performed by a variety of mechanisms. Dysfunction of any of them might interfere with learning, which would certainly result in some degree of mental handicap and perhaps also autism. Equally essential is recognition. To learn socially or in any other way it is necessary to be able to tell which things are the same and which are different, that is, to recognise them and not confuse them with one another. Recognition itself does not require memory. Seeing that two things experienced simultaneously are the same, as when one looks at two paint samples to see whether the colours match, is recognition without memory. Nor is ability to recognise dependent upon ability to learn. Recognition can also be based on innate knowledge. Recognition and memory are therefore essentially independent. Most cognition, however, involves a combination of the two, since it involves recognition of things experienced at different times and knowing that something seen now is the same as something that was seen in the past.

2.2 Recognition

There are many levels of complexity of recognition. The lowest is recognition of sensations, such as being able to distinguish between the feelings of hunger and cold or between different colours, and being able to remember having had a particular sensation before. These abilities need only be functional, not conscious or conceptual. It is not necessary to name sensations or to imagine them, but only to be able to respond differently to one than to another. Considerably above that is recognition of physical objects, because it also involves processing combinations and configurations of sensations. Above these are recognition of complex experiences and of one’s own behaviours. Recognition of properties of things and of simple relationships between them require, in addition, certain kinds of reasoning and perhaps some abstraction. The ability to distinguish between oneself and what is not part of oneself is also a kind of recognition. Like memory, these abilities are essential for all learning. With regard to autism, however, there is no evidence for specific deficits in the first two aptitudes. Although some mentally handicapped children may suffer from such deficits, the impairment in these cases is so severe that they do not reach a level of functioning that could be considered autistic.

2.3 Structuring

Deficits in the third and fourth categories, however, are consistent with various traits found in severe autism. Many severely autistic children can distinguish individual stimuli from one another and can remember them, but are unable to combine them meaningfully. While they show attraction or aversion to individual tastes, smells, sounds, and visual and tactile sensations, they show no comparable responses to patterns, neither spatial nor temporal. They show no signs of pleasure when hearing music or seeing faces or other forms. Nor do they direct their senses in ways that could be considered examination, such as

gazing at objects or exploring them with their hands, the sort of behaviour normal human beings engage in when they are trying to get to know something or to understand it. Rather than focussing and concentrating, they glance briefly and move on. When they do rest their gaze, they do not focus but simply stare blankly.

This behaviour has long been noted, but has generally been interpreted simply as “lack of attention”, the implied assumption being that the child has the capacity to derive some meaning from the object by looking at it longer, but does not because he is not interested or otherwise motivated. The pervasive nature of this trait, however, indicates that the actual deficit is much more profound, and that the reason these children do not direct their attention is that there is nothing they can gain by attending. They look at the world around them as one would the pages of a book in a foreign language and script. There is no point in trying to understand it, since it is obviously impossible. But their lack of understanding is even more profound than that, because, unlike the English speaker looking at a page in Chinese, they do not even realise there is any meaning at all. They cannot even conceive of what they are missing.

But, while there can be little doubt that not only interest but also understanding is lacking, the exact nature of the underlying deficit is not clear. Normal infants don’t know the world has meaning either, but they find it out soon enough. How are these children different? One hypothesis is that it is in this third category, in the capacity to combine simple sensations into spacial, temporal, or other meaningful structures. Even when the phenomena that are the sources of these sensations are themselves structured, in that their simple components bear certain relationships to one another, these children are unable to form corresponding internal mental structures. They cannot combine separate human features into a body, separate speech sounds into words, or events that follow one another into causal pairs. Even the form of a human face, to which normal infants respond shortly after birth, elicits no behaviour indicative of recognition. Unable to process faces, words, melodies or other spatial or temporal patterns, they experience the world as disconnected components of which no sense can be made. No training can enable them to transcend this essential deficit, no scaffold can substitute, because it is not only the ability to form these structures on their own that is lacking, but the very capacity to support them.

So not only are these children unable to reason normally, their basic experience of the world is radically different from that of other human beings. Children who are born blind or deaf, though they cannot experience certain aspects of the world, nonetheless form the same spacial-temporal structures as children who can hear and see. Though the senses they use to form them are different, for the most part they conceive of objects, places and events in the same ways that others do, so they live in more or less the same world. By contrast, these severely autistic children, though they are able to see, hear and feel, cannot construct comparable structures, so the world in which they live is radically different.

Of what, then, does their world consist? They are not devoid of awareness and intelligence. They clearly exhibit pleasure, pain and excitement. Being capable of recognising and remembering things by single sensations such as colour, odour or tone, they know where they are, what they are doing and who they are with. They are aware of individuals as distinct from one another even if they do not conceive of them as thinking, volitional beings. Whether they recognise them by odour, tone of voice, or some other sensation, they know which ones they like and which they do not. When they are with some of them they expect pleasant experiences and with others unpleasant ones. So too, even though they cannot conceive of space and objects as we do, they distinguish between different locations and can recognise which one they are in. They may also have some kind of historical memory and be able to remember experiences they have had with certain individuals or in certain places. They certainly learn from their experiences and their behaviour changes accordingly. Indeed, there is quite a bit about the world that they do know and that they are capable of using.

Perhaps they experience the world the way a normal human being experiences smells and tastes, the way one recognises a sauce or a salad dressing. When you taste a sauce, even if you can identify what

spices are on it, the components are not structured in any way comparable to the spatial arrangements of objects in a scene or the sequential order of sounds in speech or music. At most, you have some idea of their proportions. Often there is no analysis at all. You don't think "garlic, oregano, pepper" but simply "tasty sauce". The minimal recognition that these children have of faces, places and words may be similar. If so, it is the lack of structure that precludes the solution of even simple problems. Such a world might be described as "unstructured experience". Of course, the mental processes themselves are not unstructured, since all intelligence involves structure. What is lacking is, rather, *referential structure*. There are no mental structures being created to reflect the structure of the objects being experienced, little or no sense of distinction between self and non-self, and no recognition of themselves as beings similar to those around them.

But, while this hypothesis is consistent with much of their behaviour, there are certain aspects that seem to contradict it. Most of these children are able to learn behaviours of considerable degrees of complexity. They can be trained to sit at a table and eat, wash and dress themselves, and even ride a bicycle. Moreover, they can achieve a considerable degree of flexibility in those behaviours that they have learnt, modifying them in accordance with variations in the situation. They can adjust their steps to walk over rough terrain and can reach for objects of varying shapes and weights, grab them and place them on a table or in a box. Referential structure cannot, therefore, be entirely lacking.

This combination of abilities and deficits suggests a second hypothesis, that the aptitude to form referential structures is not entirely lacking, but is limited to *structures involving physical actions*. The deficit is in structures which, while they do involve sensations, do not involve physical interaction. As long as there is a physical action such as eating, grabbing or walking, they are able to form structures around it. Every action they are able to perform can potentially become the kernel of a structure into which they can then assimilate any relevant sensations such as the appearance and feel of the objects to which it can be applied. They can expand and improve the structure, such as by developing ways to hold objects of different shapes and weights, and variations of the structure can branch off and become new separate structures of their own. But without a physical action to serve as its kernel, the formation of a mental structure is essentially impossible. When the normal infant watches his mother walking across the room or the toys swinging above his crib, or when he listens to music playing, he forms mental structures corresponding to his experience. These children do not. As in the first hypothesis, the deficit is in essential aptitude.

When a normal infant holds a cube whose faces are different colours, he forms two kinds of mental structures. One is an action-structure. "I hold the red thing. I turn it, now it's green, I turn it again, now it's yellow." The other is an object-structure. At first it is simply, "This thing has many colours". Eventually it becomes, "It is an object with many sides, and each side has a different colour". This structure, although it was arrived at by his actions, does not involve them. It involves only the sensations derived from the cube itself. It is this latter kind of structure that these children are unable to form.

Lack of object-structures and other concept-structures then impinges on the formation of action-structures, severely limiting the kinds of action-structures that can be formed. Without the capacity to form the complex concept of a jacket as having two sleeves and therefore fitting onto a hanger only a certain way, they cannot form the action-structure of putting the jacket onto the hanger. Although they can be taught the special modification of the putting-structure needed in this case, they cannot figure it out by themselves or even understand it once they have learnt it. They cannot imagine that there is a reason that the jacket falls off the hanger when they try to put it on the way they would put it on a hook. Indeed, their behaviour appears to be largely rote, and none of it, successful or unsuccessful, indicates awareness of why actions do or do not work.

Unlike autistic children with normal intelligence, these children have no specific deficit in social learning as long as it does not involve a behaviour that is too difficult for them. On the contrary, they are

more severely impaired in independent discovery. They cannot solve even simple physical problems, although if taught a solution they are able to perform it. They can be trained to put the jacket on a hanger even though they cannot figure it out themselves. That is consistent with the second hypothesis, that they have the aptitude to form structures involving their own actions, even though they cannot form ones involving only sounds, sights, or other sensations.

It is even harder for us to imagine what their world is like according to this hypothesis than according to the first one. It is not amorphous and chaotic like the world of an infant, but on the contrary, very complex and developed. Unlike the world of a normal human being, however, it consists not of physical objects but only of actions. There are no cars, people or houses in their world. Cars and houses exist only as part of action-structures such as getting in and getting out. Food, clothing and other small objects exist as part of grabbing-structures. Food exists also as part of eating-structures, chairs also as part of sitting-structures. An apple is not an object as it is for a normal child, a theory integrating the various qualities of redness, hardness, edibility. It is, rather, part of the grabbing-structure, part of the eating-structure and so forth. Each of the sensations that for a normal human being is part of the apple-concept is incorporated separately into each applicable action-structure. Thus actions become complexly interrelated. Reach, grab, put in the mouth and eat. The sensations derived from the apple connect these actions, but since they are never integrated into an independent apple-structure that does not involve any action, it is not the apple-object that connects them but simply the overlap of sensations. Such a world is utterly foreign to us, for whom all sensations are integrated into a world of objects which then serves as the context for all of our actions.

What is the relationship between the various sensations derived from the apple? The apple-image that is part of the grabbing-structure is certainly the same as the apple-image that is part of the eating-structure. Furthermore, when they exercise the grabbing-structure with the apple-image, they certainly expect apple-feel. Nonetheless, if they see an apple in a context in which it is impossible to interact with it in any physical way, it’s meaningless for them. Although they experience the same visual sensations as everyone else, they have no cognitive structure into which to assimilate them. A car is something that one can get into, sit down in, close the door and put on a seatbelt, but cars moving along the road do not seem to have any meaning for them. Without an action around which to form a structure, only very simple relationships between sensations are possible. The sight or smell of food cooking is pleasant because it precedes eating. If they have experienced a dog barking at them and then jumping on them, the sound of a dog barking becomes frightening. So too, certain places become pleasant or unpleasant for them because of the experiences they have had in them. In this way too, they are able to attain a certain degree of language comprehension. These mental structures do not involve patterns, but simply one sensation evoking the expectation of another.

This hypothesis explains why most parents report that development seemed normal until around the child’s first birthday. During the first year of life, the most salient aspect of normal mental development is the expansion of basic actions. The extensive cognitive development that is also taking place during this period is less obvious because it has less effect on behaviour. So if a child is making more or less normal progress in actions, absence of behaviours that indicate cognitive development is likely to be overlooked. It is therefore generally only in the second year, when cognitive development normally begins to contribute significantly to behaviour, that deficits are noticed.

2.4 Sensitivity

Even more basic is degree of sensitivity to stimuli. Children who fail to register stimuli at normal levels live in a world impoverished of sensation. If their nervous systems are not excited by sounds unless they are loud or by lights unless they are bright, even with potentially normal memory, recognition and

structuring capacities, they may not notice enough about the world around them to form meaningful structures. Finding the sensations provided by the environment bland and boring, they fail to take enough notice of them to respond to them or to identify patterns. They therefore never form a foundation on which to build more advanced learning in the future. All learning and cognition suffer. The Social Learning System suffers doubly, because without response to any but the most intense stimuli, it loses the special impetus that normally keeps it going. Like other kinds of learning, it is left too sluggish to develop normal cognition.

Hypersensitivity to stimuli, too, can interfere with learning. If normal levels of stimuli are experienced as unbearably intense, it becomes difficult to process sensations and make sense of them, so experience remains chaotic. Positive reinforcement is also lacking because sensations that should be experienced as pleasurable are experienced as painful instead.

Innate lack of sensitivity might be the primary cause of autism in some of those children who are continually jumping, running, banging their heads and making loud noises. They seem to be seeking more intense stimulation than their environment provides, which suggests that for them, normal levels are too bland, perhaps sometimes so bland that they are not even noticed. Similarly, those children who are extremely passive, who avoid sensation and prefer to sit quietly by themselves, and who become agitated when sensations rise above a certain level, may be globally hypersensitive. For them, the normal levels of stimulation may be too high. In both cases, extreme abnormality in sensitivity would interfere with all kinds of learning. If experience is either too bland to be noticed or so intense that it is overwhelming, the child will not be able to abstract laws and patterns, resulting in both autism and mental handicap.

Inability to differentiate between intensities, too, can result in poor development. An infant that responds equally to weak and strong stimuli may be overwhelmed by the sheer volume of stimulation. Without the criterion of intensity to guide him to attend to some and ignore others, he is unable to create meaningful structures and thereby to transcend chaos.

Closely related is level of arousal, the strength of an experience or feeling necessary to evoke a response. If level of arousal is too high and there is no response to stimuli unless they are exceptionally strong, the child may not interact sufficiently with his surroundings for there to be proper development.

All of these might cause autism with severe mental handicap, but autistic children whose intelligence is normal or only slightly below could not be suffering from deficits of this kind. Early theories, such as those of Rimland, Hermelin and O’Connor, and Delacato, which saw the primary cause of autism in abilities of these sorts, were therefore unable to explain autism with normal intelligence. It is however possible that if the Social Learning System is not functioning properly for other reasons, mild deficits of these kinds might exacerbate that dysfunction, tipping the balance from normal to autistic development or increasing the severity of autism. They might therefore be contributory causes of autism with normal intelligence or with only moderate or mild mental impairment.

2.5 Abstract Thinking

Another possibility is that the primary deficit is in abstract thinking. Although this characterises neither those with normal intelligence nor those with severe mental deficit, it may be appropriate for some who have mental deficits in the middles range. We have used the term *moderate mental deficit* to describe this group. As children, their development is significantly behind, and as adults they function on a level roughly comparable to that of normally developing children of around seven years of age. They can comprehend and produce language, using all parts of speech with correct syntax, although their diction may be poor.

In the limitations of their language can be seen reflections of limitations of thought itself, specifically, abstract thought. This is nowhere as profound as that of those with severe mental deficits described above,

who are incapable even of forming concepts of physical objects. They form concepts of mountains and clouds, even though they cannot interact physically with them, and their concepts of apples and shoes are not simply ‘something to eat’ and ‘something to wear’, but of objects separate from themselves. So, like most human beings, they live in a world full of objects. These objects can have certain physical relationships to one another, such as “next to” and “under”, “bigger” and “smaller”, and properties such as “big” and “small”, “red” and “blue”.

Their deficits fall, rather, in the area of reasoning. They are incapable of answering simple questions, such as: “If Jim is taller than Pete and shorter than Bob, who is the tallest?”, or “If Paris is in France, and France is in Europe, is Paris in Europe?” Even when the reasoning involves only observable concrete concepts, all of which are familiar to them, they are incapable of the minimal abstraction needed to perform it. Similarly, they have trouble with ‘if’ and ‘or’. They can only understand ‘or’ when the two possibilities are presented very clearly before them. If you hold out two fruits and say, “Which one do you want, the apple or the peach”, they can understand it.

Their understanding of quantification never gets beyond that of the very young child who understands that two pennies are more than one penny, so something that costs two pennies costs more than something that costs only one. But they cannot understand that it’s better to get three together for two pennies than three separately for one penny each.

They cannot do even simple analogies or comparisons, such as “How is a cat like a dog?” That does not mean that they do not know that cats and dogs are animals, or that they have eyes and ears and feet. They can answer those questions correctly. The problem is in the concept of ‘like’. It is in how the question was asked, not in the world knowledge needed to answer it. They are also limited in their ability to process language. Most of their utterances are simple sentences. Complex sentences that involve subordinate clauses are beyond their ability to parse.

They also tend to fail to make certain kinds of connections. This has been noted in the absence of ‘why’ questions, and the corresponding absence of ‘because’ statements in their speech. A normal child of six or seven might look at a picture of a bear and say, “Oh, he looks dangerous! Better be careful! Do you think he’s going to get into someone’s garbage? I hope he goes to his cave and stays there all winter!” He connects the picture of the bear to the things he knows about bears. These children would not. They might get as far as “Oh, he looks dangerous! Better be careful!”, but unless they had actually had an experience with bears getting into their garbage, they would not make that or the following remarks. And if the would, they would be more of the sort, “Last year a bear got into our garbage. He left pieces of plastic jars all over the driveway. Mum had to clean them up” This is somewhat like the characterisation of not connecting current experiences to past memories, except that it is more specific. The potential for making such connections exists, but it is only made if the connection-path has already been established. Knowing that bears get into garbage or sleep in caves in the winter is not enough to evoke a connection. These are separate bear-structures, and for these children, not only the inclination but the very ability to independently make connections between them is absent. Even if the teacher reads them a book or teaches them a lesson about bears, it will rarely have any effect on their future thinking. It is generally only when some experience makes a strong impression that a new connecting-structure is formed, and henceforth any experience that evokes the one will evoke the other as well.

Normal children of six or seven can play games that involve rules of how to move pieces, and goals to strive for. Though some do not play them very well, and indeed have no idea of strategy at all, that is, no idea of how to reach the goal, they nonetheless proceed to make moves, generally legal ones, and do know what they are trying to achieve even if not how to do it. Children with moderate mental handicap not only never learn to play effectively, but are very slow to learn to play at all. With effort on the part of the teacher they can be trained to make legal moves, but their playing never becomes oriented to the goal. From the start they miss the point, and even with training they still fail to get it. For this reason such

games hold no interest for them. If they do learn to play them, it is like other meaningless activities that they learn to do to please their teachers.

Contrast this to things that the moderately mentally deficient autistic child can do. He can learn to put together jigsaw puzzles, play music, recite poetry or follow a route travelled. All these involve patterns of various sorts, but each pattern is a single structure, albeit a complex one. Each evolves from a simple structure acquired earlier by adding more and more new elements, but never requiring combining it with another different structure. In the case of following a route, the structure does not involve any pattern but only a sequence of expectations. When A is experienced, it evokes the expectation of B. When B is experienced, it evokes the expectation of C. There is no looking ahead. When A is experienced, there is no thought that after B will come C. Individuals whose intelligence is normal don't usually think of this either, but they are able to do it if they try.

What is missing in all the things these children cannot do is the ability to combine two structures. In the games, it is the move structure and the goal structure. In the syllogisms, it is the two statements. In the spontaneous comments about experiences, it is combining older knowledge with the current situation. Normal children do this automatically, that is, without special effort. Among their innate cognitive mechanisms is one that combines structures. It is this that these children lack.

In all human beings, one of the factors that affects level of intelligence is how close structures need to be to one another for them to attempt to combine them. A genius sees a potential for connection between two structures that seem to have nothing at all to do with one another. Most people do not. But for every normal human being, if two structures are sufficiently close he will attempt to combine them. Goal and legal-move structures are both part of a given game, so any child who has the capacity to combine them will do so. So too, the structure of connecting a given letter to a given sound and the structure of combining sounds into a word. That is not to say that learning to read or to play games comes without effort. Actually combining the two structures involves considerable work, and therefore some time. But the normal child does it, and he does it by himself. The activity of combining structures is not done in response to problems, as an attempt to achieve a solution, but is done spontaneously. Rarely is it even done consciously. The very existence of two structures invites the mind to try to combine them in some way. The normal human being spontaneously plays with existing structures.

This is then followed by another important step. Once two structures have been successfully combined, a new structure for combining them is created. This can then serve as a mechanism for combining other similar structures. Thus there is an increasing development of structures, and with it, increasing strength of mental ability.///

This reveals something very important about the development of thought and the mental workings of the normal human being. There are two processes of which not only is the normal human being capable, but he naturally performs them spontaneously and indeed, constantly. One is the formation of structures combining sensations and other elements of experience. The other is the combination of existing structures to form new ones. In severe mental deficit both are lacking, in moderate mental deficit one is intact but not the other.

These, then, are three qualitatively separate levels of mental functioning. At the lowest, there is the potential to incorporate elements of experience into structures of physical action or structures of pain or pleasure, but not to form structures consisting of sensations alone. In the middle one there is the capacity to form such structures, but not to combine separate structures. At the highest, that of normal intelligence, there is also the capacity to form novel combinations. Furthermore, such combinations are performed spontaneously.

For those who lack this highest capacity, it does not seem to matter what kind of structures it is that need to be combined. They cannot combine them by themselves. Only when they have already been provided with a combining structure can they do it. That is why training can be so effective for these

children. By teaching them a combining structure, they become able to operate with two different structures that they could not have combined on their own. In this, language becomes a valuable scaffold. Learning to use a linguistic formula can enable them to perform the actual process before they understand it. By being taught to the use the word “like” in answering “How is an apple like an orange?” and “How is a cat like a dog?”, they eventually become able to independently answer “How is a car like a train?”. For some, abstract reasoning structures corresponding to these scaffolds may eventually form. Not only are they able to correctly form statements such as “An apple is like an orange because both grow on trees and both as to eat”, they begin to look at objects in the world as being similar in some ways and different in others. For others, it may never get beyond a behavioural structure. Like those with severe mental deficit who cannot form basic concept structures even with the help of scaffolds, they are incapable not only of forming connecting structures independently, but even of learning them. Connecting remains on a completely behavioural level.

For the former, the deficit lies not in the kind of structure they are able to maintain, but in what they are able to construct by themselves. Such gaps between what one can learn and what one can arrive at independently are characteristic of all levels of intelligence, both of those who are autistic and those who are not. But since children who are not autistic are constantly learning socially, they learn standard forms of linguistic reasoning easily, without special training. They listen to people saying “this is like that”, “this is in that”, and learn the language patterns involved. So in day to day activities and conversation, they are not deficient. Furthermore, their thought processes are then moulded by their speech, so not only are they able to respond correctly, their abstract reasoning itself improves. Even if they could not have developed a reasoning process reasoning independently, the deficit is not obvious. It is only later on, in school, when they are required to do certain kinds of reasoning such as mathematics, that it becomes apparent.

However, even though inability to form connecting structures indeed seems to be// may be// the characteristic / trait of this kind of autism, distinguishing it from autism with normal intelligence, it cannot in itself be the cause, for were it so, all children who have this trait would be autistic, which we have seen not to be. There is, rather, a different root deficit that causes them to have weak social learning, because of which they do not learn these speech patterns in early childhood as the other children do. Thus the deficit in connecting structures is not comparable to the deficit in forming basic object structures, that seems indeed to be the root of autism with severe mental handicap.

2.6 Abilities to Hear and to See

It has never been claimed that blindness or deafness cause autism, since most blind and deaf children are not autistic, but it is important to recognise that there is a relationship between these conditions and the Social Learning System. Both sight and hearing play important roles in social learning, and while even complete lack of these senses does not impair the Social Learning System enough to cause autism, even partial deficits can interfere with its optimal functioning. To the extent that sight is being used in social coordination and social learning, the blind child cannot coordinate and cannot learn. Some of his behaviours therefore resemble those found in autism, though not for the same reasons. Unless specifically trained, both fail to adopt standard posture and carriage, the one because he cannot see how other people hold their bodies so he cannot imitate them, the other because although he sees them, he does not pay attention to them and is not inclined to imitate them. Blind children are also more inclined to self stimulation than normal children, which may be simply because they do not see that others do not do these things and therefore that they are not socially acceptable. Since speech is the primary medium of communication and therefore of social interaction, deafness interferes with social learning even more than blindness does, though not in the same ways. Both therefore impair the social learning process, but not enough or in the way that would cause autism.

However, children who are blind or deaf and also mentally handicapped are generally autistic as well. It may be hypothesised that without visual or aural input, a greater part of the burden of social learning falls on reasoning abilities. If these are weak as well, the Social Learning System cannot function properly. It is also possible, however, that in those cases there are neurological conditions that cause multiple handicaps including not only blindness or deafness and mental impairment, but also autism.

2.7 Executive Functions and Central Coherence

Earlier, we discussed the hypotheses that the primary deficit lies in the areas of Executive Functions and Central Coherence. We saw that although the high incidence of such deficits in autism implies that there is a connection between them, no cogent explanation of the nature of that connection had ever been offered. One suggestion was that they interfere with social learning more than with purely physical learning because the social world is more complex than the physical world and requires more complex mental organisation, but that explanation was contradicted both by the low level of these abilities among those who are mentally impaired but not autistic and by the relatively higher level among those who are autistic but have normal intelligence.

Searching for a more satisfactory explanation, we note that while autism implies deficits in Executive Functions and Central Coherence, such deficits do not imply autism. It therefore seems reasonable to suggest that the causal relationship is in the opposite direction, that they are a result, not a cause, of autism. This is also indicated by the absence of such deficits in early childhood and their appearance only after other autistic traits, such as deficits in communication. The high correlation indicates that some part of the autistic syndrome consistently produces deficits of this sort.

Having identified the Social Learning System with the Final Common Pathway, we can hypothesise that Executive Functions and Central Coherence, while derived partially from innate and biological foundations, are also derived from certain kinds of development in which social learning plays a crucial role. In certain areas that role can indeed be clearly documented. For the normal child, many of the techniques of planning, reasoning, and of organisation of both experience and behaviour are derived from social learning. Some, such as putting toys away in their places, keeping columns straight and writing outlines for essays, are learnt through explicit training. Others, and indeed the majority, are derived by implication from participation in social activities and from practical skills acquired socially. By imitating the behaviour of others the child learns to plan and to solve problems the way they do. Even if he imitates only parts of their behaviour and those parts do not encompass the entire process of problem, plan, and goal, the separate pieces of behaviour serve as models for him which he later reproduces when he tries to solve his own problems. Moreover, that reproduction rarely involves explicit awareness of the value of those behaviours or recollection of their origin. When the child produces them he may not remember having watched someone else behave that way, and may not even be thinking of himself as trying to solve a problem. His own behaviour has simply been moulded in those ways. So too, by learning to see and experience the world as others see it, the child learns to structure it as they do, including various kinds of hierarchy and central coherence. By learning language, in particular, he is guided to classify things certain ways and to see certain kinds of relationships between them.

To the infant, the world presents itself as disorganised elements, so his behaviour is unstructured and often haphazard. The first steps toward organisation he must make on his own, because his Social Learning System is not yet sufficiently developed. Before long, however, he begins to be moulded in cultural thinking, and soon social learning becomes the main source. Whatever his ability to develop organisational skills independently, social learning generally provides him with them before he needs them, so he has little opportunity to discover them himself. It also directs his development so that certain

organisational skills are ensured. A normal child cannot fail to learn those skills that are current in his culture, provided he has the mental ability to perform them.

It is at this point that the development of the autistic child begins to deviate. To the extent that he fails to learn specific cultural patterns of behaving or thinking he fails to develop the fundamental methods that underlie them. The effect that lack of social guidance has on a child depends very much on his cognitive aptitudes. For the child whose aptitude is low, who can create new structures only slightly more complex than those he already has, failure to acquire those preformed cognitive structures by social learning is a handicap even in everyday reasoning. He may fail to attain even basic methods of reasoning such as comparison and implication. Since he cannot construct them himself, if he does not acquire them by internalising the behaviour of others he will remain without them. For the child who is not limited in this way, the effect will more often be one of delay. When faced with a new problem he will be able to solve it, but not having learnt the building blocks of solutions that others use, it will take him longer and he may make mistakes that others would not have made. Once he has solved it, however, he will no longer be at a disadvantage with respect to this particular problem and related ones. His ability to apply that solution again later on will be comparable to theirs.

Nonetheless, even the autistic child who is very intelligent will tend to end up thinking differently from his normal counterparts. Both his methods of solving problems and the underlying reasoning processes will tend to differ slightly. Even in later life, he may be weak in certain problem-solving strategies that are normally acquired by implication from social ways of thinking.

One of the ways autistic children tend to differ is in relative degree of attention allotted to different levels of generalisation. Of total attention, how much is directed to details and how much to the larger picture? Whereas a human being could not survive if he directed his attention exclusively to either of these extremes, how much of his attention he directs to each and how much to the many steps in between can vary. Social learning favours attention to generalisations, because society collectively deals with the details, digests them, and returns to its members useful generalisations that are more efficient to work with than raw data. Individual discovery, on the other hand, requires attention to detail, so one who learns more this way needs to maintain a narrower focus.///

Autistic children also focus more on detail because attention to detail is the cognitive default. When the infant explores an object, whether by looking at it, feeling it, or putting it into his mouth, he experiences one part or aspect of it at a time. There is no act of composition or of fitting into a larger context. That can only come after the individual parts have become known. As cognitive development proceeds there is increased generalisation and creation of broader cognitive structures. It is this cognitive advance that makes choice of level of attention possible. How quickly and to what extent preference for attention shifts to the larger unit, however, is dependent upon many factors. Though every individual will eventually be drawn away from his infantile narrowness by the advantages of broader attention, social moulding greatly hastens this process. The normal child therefore moves toward greater generalisation more quickly and surely, while the autistic one is more conservative. Both his behaviour and his reasoning tend to remain more primitive.

Since, like other components of the Social Learning System, Executive Functions are part of positive feedback cycles, deficits in these areas contribute to other autistic traits. Failure to structure experience as others do interferes with further social learning, so preference for attention to detail contributes to its own perpetuation.

2.8 Coordination and Other Abilities

This exhausts the mental abilities that have thus far been proposed as primary causes of autism. Of the many other abilities that comprise normal human intelligence, as discussed in earlier chapters, few are

needed for social learning. Higher reasoning processes in particular, such as generalisation, induction, deduction, analogy, abstract reasoning, and even concrete reasoning are needed, if at all, only to very limited degrees. Mentally handicapped children are weak in these abilities but few of them are autistic. They learn language and interact socially within the limits of their overall cognitive potential. Nor does social learning require internal intelligence such as originality and balance. As long as a child can learn to reproduce patterns of behaviour he has seen performed by others, he can learn socially without being able to originate his own. Deficits in these areas would therefore not be expected to be among the primary causes of autism.

One ability that has not yet been suggested is *coordination*. This is a tempting possibility because, while coordination plays an important role in social learning, it does not seem to be necessary for other areas of cognitive development. Social interaction involves coordinating one's own actions with those of other individuals and of the group as a whole. Without the ability to coordinate, the Social Learning System would not function properly. Other kinds of learning, however, would not be affected, especially those that involved stationary rather than moving aspects of the world. A child who was unable to coordinate with things outside himself would still be able to learn about them. He would interact with them even though he could not adjust his actions to theirs, so he would still be able to reason and learn about the world. The behavioural and cognitive structures that he would develop would not be normal, but might be just as complex and extensive.

This seems consistent with the facts of autism. Lack of coordination with other human beings is among the core traits, and indeed the defining one according to the definition we presented in the first chapter. Even if autism is defined in the usual way, by deficits in the three main areas, all those who satisfy these criteria also lack coordination with other human beings, and conversely, those who lack coordination with other human beings have deficits in these areas as well. Only when lack of coordination is the result of specific circumstances, such as the lack of coordination of a foreigner in an unfamiliar culture, is autism not implied. It therefore seems reasonable to hypothesise that the primary cause of autism is an innate deficit in potential to coordinate.

Closer examination, however, does not support this hypothesis. Most autistic individuals of normal or near-normal intelligence are able to coordinate their actions with non-human objects. Even though they lack coordination in social situations, they can catch a ball, ride a horse, or play in an orchestra. They are even able to coordinate with humans in limited ways, especially in familiar situations. Complete inability to coordinate is therefore not a necessary part of autism, and is, in fact, quite rare. The lack of coordination with human beings that is both universal and so significant in autism is not, therefore, a manifestation of a more general inability to coordinate. It involves, rather, the specifically human aspect of the activity. Coordination with other human beings is a particular kind of interaction with human beings, indeed, among the more advanced kinds. Like other kinds of interaction, it develops through social learning. Deficits in it are therefore results of dysfunction of the Social Learning System, not primary causes of that dysfunction.

2.9 Summary of Deficits in Abilities

In conclusion, innate deficits in certain abilities can account for autism accompanied by mental handicap but not for autism with normal intelligence. Any deficit in ability sufficiently severe to impair the Social Learning System would also impair other kinds of learning and other mental processes. We shall therefore turn to the realm of *dispositions* to search for primary causes of autism without mental handicap.

3. Deficits in Dispositions

Dispositions, the tendencies an organism has to behave in certain ways under certain circumstances, are an essential component of cognitive development, and indeed, of all behaviour. It is dispositions that cause an organism to actualise its abilities, and through that activity to develop new ones. Ability alone is not enough. Unless something motivates it, an organism will do nothing no matter what abilities it has. Social learning, and learning in general, is therefore dependent not only of upon abilities but also upon dispositions.

3.1 The Role of Motivational Factors in Developmental Systems

Motivational factors are especially important for developmental systems because in such systems most abilities are themselves produced by the functioning of the system, so they do not exist until the system has been active. Unlike innate abilities, which exist latently within the organism in their complete state even if they have never been used, developed abilities evolve gradually by means of the continual functioning of the system. If the system does not function due to lack of motivation or opportunity, or for any other reason, the abilities will not exist at all, or will exist only in weak primitive states. In developmental systems motivations therefore play a double role. They activate the system so that existing abilities are actualised, and through that activity cause new abilities to develop and existing ones to improve. Each cycle of the system begins with whatever abilities and motivations are already present and ends with enhancement of those abilities and motivations themselves and with the acquisition of new ones.

There is therefore a reciprocal relationship between dispositions and abilities. By providing new modes of interaction, new abilities make it possible to recognise things that could not have been recognised before, and therefore to acquire new dispositions. Aspects of the environment which until now were necessarily meaningless because there were no structures into which they could be assimilated, now become potential subjects of attraction or aversion. And when, by the combination of abilities and dispositions, new behaviours are performed and there are new kinds of interactions, it becomes possible to recognise new things and to direct attention to them.

Dispositions therefore evolve and develop as abilities do. Like abilities, they can improve, they can become more extensive and more powerful, and new ones can be created. An illiterate person cannot interact with a book as a source of knowledge. He can interact with it only as a physical object, as he would with a block of wood. He cannot even recognise those specific aspects of it, the words, and attend to them and interact with them. They are just patterns, like the grain of the wood. Even if he lives in a culture in which there are others who are literate, so that he knows about writing, he may have no interest in books. Although he understands that the marks are words and are made of letters, for him they have no meaning. But if he learns to read, he gains new kinds of recognition, and with them new interest. The behaviour of reading can then become enjoyable for him, and he may be attracted to it. Learning leads to recognition, to attention, to interest, to interaction, and to further learning.

In such systems, the initial abilities are generally minimal, so the first cycles of the system are simple and limited. There is very little that can be accomplished at these early stages. It is only by repeated passage through gradually enhanced cycles that abilities and dispositions are built up and strengthened, and the system increases in complexity. Now it becomes capable of significant accomplishment. A small child grasps a crayon and scribbles around and around on a piece of paper. He lacks both cognitive ability to recognise letters and behavioural ability to form them. He cannot control the crayon to make the shapes he wants. He may not even realise that one scribble is different from another. But gradually, as he continues, abilities to form and to recognise contribute reciprocally to one another. He gains increased control and begins to recognise shapes. He forms crude letters, learns to write within the lines, and after years of practice becomes a fluent reader and may even develop a graceful handwriting. All the powerful

abilities that the adult constructs are derived from those minimal original ones. The initial abilities are like seeds that have the potential to grow into mighty trees, but only after going through this process. Until they have, there is very little they can actually do. Though they have the potential, they have not, as yet, any of the properties of trees.

This is one of the fundamental differences between dynamic developing systems, and static ones in which all activities are produced by causal chains. In static systems, the necessary abilities are all fully pre-existent, and the role of motivation is only to initiate activity. Even if that activity has never been performed before, it may be performed perfectly the first time and the result achieved completely, like a machine that is taken out of the package and connected to the electricity. An animal might have the abilities to hunt for prey, to catch it and to kill it, but might never have actually performed any of these behaviours because it has been kept in a cage all its life. But if one day it escapes, it will become hungry and begin to hunt, and if it succeeds in finding prey, it will catch it and kill it. At each of these steps, pre-existing abilities are actualised. They had been latent in the organism, and now they have become activated. But in a developmental system, that is not possible. It must go through many repetitions of the cycle before the abilities are perfected, and since each repetition requires motivation, lack of appropriate motivational factors alone can leave such a system dysfunctional.

3.2 Substitution of Sources of Motivation

Though dispositions and abilities are both components of learning systems, and though both are subject to gradual development, there are important differences between them. One is the possibility of *substitution*. For the most part, abilities cannot substitute for one another. No matter how good a speller a child is, it will not help him do arithmetic. They can supplement one another, but even then, rarely can one fill in when another is missing. If a person has trouble remembering things, he can write them down to remind himself, but writing cannot completely replace memory. He must remember to look at the note he has written and remember how to read. He must also remember the context of the reminder, for without that it is meaningless. So too, addition can substitute for multiplication, but only in a limited way. A student who does not know how to multiply can find the product by repeated additions only if one of the numbers is relatively small. Sources of motivation, on the other hand, can often substitute for another. For a given action there may be several essentially different sources of motivation, any one of which can serve to motivate the system to perform it.

Moreover, sources of motivation need not be internal. External forces can provide the necessary motivation just as well. To successfully learn to read, a child needs neither desire nor pleasure in his accomplishments. If he is sufficiently coerced by his teachers, either by threats or by incentives, he will learn even though he does not want to. And neither internal nor external sources need to be directly related to the goals of the system. One may be internally motivated to achieve not because he enjoys learning the material or is interested in it, but because he wants to use it for some practical purpose or to be respected for his achievements. One person learns to hunt because he enjoys the activity itself, another because he needs food, another to raise his social status, and another because he is aggressive and bloodthirsty.

Motivational factors therefore bear a different relationship to the system than abilities. In that complete substitution of motivational factors is possible, no source of motivation can be considered an essential part of the system, especially when a replacement for it can be found outside of the system itself.

4. Interest

There is a broad category of motivational factors that can be referred to as “interest”. In the most restricted sense, the word “interest” refers to conscious recognition of an entity and desire to know more about it. However, the term is commonly used for desires other than knowledge, as in being *interested* in going somewhere or doing something. Here we shall extend the meaning farther to include any sort of attraction that motivates a being to attend to something, even without explicit awareness. By this extension of the term we shall say that when a kitten, seeing a piece of string moving about, jumps on it and grabs it, the kitten is *interested* in the moving string. Thus we shall define interest as *attraction of attention*. Attention can be for negative as well as positive reasons. There are things, such as snakes, to which one attends in order to avoid them. And while interest generally includes activation of action-schemes, it may still be considered interest even if only perception-schemes are activated.

Interest is a very effective motivating force in learning systems, because when a being responds to something with interest, it tends to interact with it, and by interacting it learns. Of course, in certain cases what can be learnt from the interaction is very limited. There is very little that can be learnt from a chocolate bar, although one can become quite adept at unwrapping them. But one who finds machines or animals or numbers interesting, will learn about them by interacting with them, and thereby move up from one cognitive level to another. Every time he learns something new he becomes able to interact in a new way, and through the new interaction may acquire new abilities. Thus interest itself is a component of the learning cycle. Interest leads to interaction, which leads to new understanding and abilities, which lead to new kinds of interest and new kinds of learning. The system continues to progress as long as there is opportunity to interact in the new ways.

There are two distinct kinds of interest, *innate interest*, which we shall also refer to as *primary interest*, and interest developed through learning and experience, which we shall call *secondary interest*. Both are important motivational forces in human cognitive development, each in its own way. Primary interest is similar to the innate stimulus-response mechanisms of lower animals. A certain sound, smell or other sensation evokes the directing of attention toward it and perhaps a specific kind of response or interaction. Even though an innate interest is felt more strongly at certain times than at others, and some interests, such as sexual attraction, only emerge at certain times of life, the interest itself is not a product of the individual’s experience or his actions. Furthermore, although an individual has some control over the interest in that he may be able to suppress or evoke it, he cannot change it.

Secondary interests, by contrast, are essentially dynamic and therefore always open to change. Indeed, a secondary interest does not exist at all until the appropriate experiences occur to produce it. Some secondary interests develop from innate interests when activity and experience combine with innate interests and with feelings of pleasure or pain, to produce new interests whose form and direction may be very different from the original innate ones. Others are entirely new, being derived from behavioural development, imitation of the behaviour of others, and other sources.

Any of the various aspects of an interest, the attraction to a particular stimulus that directs attention to it, the response, and the feelings that result from interaction, can be either primary or secondary, innate or learnt. When the kitten plays with the moving string, its interest and its response are both innate. However, when a dog or a rat learns to open the latch of a door to get food that is on the other side, its interest in food is innate, but its response is learnt. An infant’s interest in bottles in learnt, but when it responds to the sight of a bottle by opening its mouth, that response is innate. In most of mature human behaviour both stimulus and response are learnt.

For those human needs that are universal, such as food and reproduction, the human being is endowed with innate interests. But to be able to function in the many vastly different climates and physical and social situations in which human beings find themselves, they must also be able to develop new interests. This aspect of human flexibility is parallel to the development of new abilities. In both, the individual adapts to his own personal needs, not to the general needs of the species. Many of the abilities

and interests that an individual develops involve things of which his ancestors were not even aware. He learns not only to speak and understand the words of his own language, which are abilities, but to respond with attention to danger words such as “Watch out!” and most specifically, to the sound of his own name, which are interests.

Moreover, neither abilities nor interests can be static. They must be dynamic, constantly open to change, so that the individual can continue to adapt to new conditions. Flexibility of interests, like flexibility of abilities, is achieved through the learning process. Within the dynamic of a learning system, biological constitution interacts with experience, and as experience changes, interests change to stay in tune with it.

Both primary and secondary interests are extremely powerful. They are among the main sources of motivation, and as such they play a key role in determining what a system does and how it evolves. That evolution includes the modification of current interests and abilities themselves. Here again we see the reciprocal nature of the relationships among the various components of the system.

Intelligence and interest are two separate aspects of mental activity which develop alongside one another. Each involves a complex of developed structures built upon an innate foundation, and the development of each is continually connected with that of the other through the dynamics of the learning process.

4.1 Individual Differences in Interest

There are many factors that contribute to the specific interests that an individual has at any moment in his life, as well as to the overall nature of his interests. These factors can be divided into two main categories, *biological constitution* and *life experience* - nature and nurture. Biological factors include both primary interests and mechanisms by which new interests are acquired. Some are global and others relate to only specific kinds of interest. Some children acquire new interests easily, others only extend their interests slowly. Children who are curious and interact spontaneously with their surroundings tend to develop broad ranges of abilities, knowledge, and interests. These are generally the children who find novelty pleasurable, so interaction is reinforced and new elements are readily assimilated into existing mental structures. Children who are not curious are less motivated and also tend to experience less excitement when they discover something new or find out the answer to a question. There are some children who are not even bothered by problems or mysteries. They do not interact with new things spontaneously but only when pressured, and when they do, that interaction is not rewarded by feelings of pleasure, so they do not acquire secondary behaviours of exploration of inquiry. Unless they are subject to intense and well planned education, their range of abilities, knowledge, and secondary interests remains narrow.

There are also individual differences in *intensity* of interests. Some experience interests as powerful attractions and become deeply involved in them. When their attention is drawn to something they focus on it and occupy themselves with it, and only with difficulty can they be distracted. They return over and over again to the things that interest them. Others experience only mild attraction and are easily distracted when something else presents itself.

In some cases, lack of interest is due to *failure to make predictions*. Without predictions there are no expectations, so there is no possibility of surprise when an expectation is not fulfilled. There is no anticipation, no waiting anxiously to see whether one’s predictions will prove true. Some may make predictions but not experience failure of expectations as disturbing. Such children lack not only motivation to learn and discover, but also *humour.* Humour involves surprise, the failure of an expectation to be fulfilled. Without expectations, nothing is funny (which is also why a person doesn’t laugh when he tickles himself).

Lack of interest can also be derived from more fundamental disorders in sensitivity or in arousal. But whatever the primary cause, without interest the child does not interact so he does not develop. The deeper the disorder, the more pervasive its effect and the more difficult it will be to circumvent.

4.2 Interest Deficits in Autism

Global interest deficits are found in many autistic children. They are rare in those of normal intelligence, but common at all levels of mental impairment. Among the most severely impaired children, some never direct their attention to anything in their surroundings, rocking back and forth or engaging in other kinds of self-stimulation. Others sit quietly and stare at the ground. Some never react to anything around them except for direct pain or pleasure, to take food or to push away things that cause them discomfort. Others are obedient and accept direction, but are not attracted to anything and show no interest in things that are presented to them. Among those who are only mildly mentally impaired there are some who, in spite of their ability to speak and to learn many normal life skills, have no curiosity about their surroundings. They are not inquisitive, do not explore, and rarely ask questions. They lack wonder. Nothing catches their eye and draws them to examine it and get to know it better. They have no desire to solve problems or see how things fit together. Puzzles and mysteries do not arouse their curiosity, failure to understand does not bother them, jokes do not amuse them.

By contrast, there are mentally impaired children who are not autistic and who, within the limits of their reasoning aptitudes, explore, ask questions, enjoy solving puzzles, and laugh at jokes. They wonder, are bewildered by mysteries, make predictions and have expectations, so they learn and develop. So too, autistic idiot-savants, whose cognitive development is limited to specific areas, do not suffer from global deficits in arousal or interest just as they do not suffer from global inability to remember, reason, or focus attention.

4.3 Range of Interests

Even those autistic children who do not have innate global interest deficits develop secondary interests more slowly than normal children, so the scope of their interests tends to remain narrow. Normal children are constantly being introduced to new things through their interaction with others. Sometimes they engage in activities they find meaningless simply because other children are doing them. This enables them not only to gain new skills but also to understand and appreciate new aspects of the world, and thus to expand their range of interest. Few autistic children imitate in this way. Rarely do they even notice what others around them are doing, and when they do, they are not inclined to imitate it. The activities they choose are therefore most often ones they have done before, because those are the ones in which they already have interest. Interests and activities therefore tend to form a closed circle.

There are, of course, mechanisms by which this circle gradually expands. There is internal development, by which existing abilities and cognitions develop and branch out, and there is curiosity and exploration. But only for the exceptionally bright and self-motivated autistic children can these match the simple path of imitation. For some, lack of inclination to imitate and learn socially can even be beneficial. Left to follow their natural inclination to explore, they discover things ignored by other children. They develop even more varied activities and interests than do normal children of equal curiosity, for whom social learning acts as a damper on mental growth and expansion. But these are a small minority. For the vast majority of autistic children, the range only expands slowly, and they end up with fewer and less varied interests than other children of comparable intelligence.

Narrowness of interest, whether for innate or developmental reasons, does not mean that those interests the autistic child does have are any weaker than normal. On the contrary, when the range of

interests is narrow, the few interests in it may be more intense. This is especially true among those who are mentally impaired, some of whom have obsessive interests in limited areas. There are also children who cannot speak, but love to explore and are constantly busy getting into things. They clearly have interests, although perhaps not the kind that other people can understand.

4.4 Asking Questions

In our discussion of interests, we also need to consider the lack of question-asking characteristic of autism. There are many autistic children who do not ask questions even though their language skills are otherwise good, or whose questions are only of a very limited nature. Characteristically, it is questions about reasons that are absent, not requests for information about physical states. They may ask, “Where is my book?” or “When are we going home?” but not “Why is school over early today?” or “What makes cars go?” Failure to ask a question is sometimes due to lack of interest, but not always. Indeed, some of the “why” questions that autistic children fail to ask concern immediate and practical topics in which they certainly do not lack interest, so there must be other reasons for the dearth of questions.

When normal children ask questions, it is neither because they are innately programmed to, nor because is it obvious to them that when there is something they don’t know, they should ask and find it out. Asking questions is not a behaviour that a normal child produces spontaneously. He does it because he has learnt it, and, like wearing clothes, eating at the table and drawing with crayons, that learning is accomplished socially by a combination of training, imitation and other avenues of social learning. Once he begins to practise the question-asking behaviour, it contributes to his cognitive development, in particular to the construction of concepts of knowledge and thoughts, both of himself and of others. He comes to realise that a human being can be a source of information. Thus here, as in much of mental development, behaviour precedes and is one of the sources of cognition. After that, behaviour and cognition become united into a system in which each contributes to the development of the other.

For many autistic children, the deficit therefore begins not with lack of innate interest or of capacity to become interested, but in failure to learn the social practice of question-asking. Without the question-asking behaviour, concepts of thoughts and knowledge are slow to form. Some children get these concepts by other routes, some get them only partially, and some not at all. For those who do, question-asking may follow. Realising that there is something they want to know and that others might be able to help them know it, the question-asking behaviour that they have observed being practised by others begins to make sense. But to construct these concepts without the socially acquired scaffold of question-asking requires more than average intelligence, so only a minority achieve systems of relevant concepts and behaviours comparable to those of normal children. Those who have only the capacity to maintain such a system but not to construct one on their own remain deficient, unless they receive specific training in question-asking and in knowledge-related concepts. Some may want to know something, but not ask because they don’t realise that another person might be able to tell them the answer. Others may not even realise that they have a question. They have not yet grasped the concepts of knowledge and ignorance, and above all, of propositional knowledge. They are not yet aware of themselves as beings that can have knowledge, so even though there is much that they actually know, they are not yet aware that they know it. The concepts of question and answer are therefore beyond their grasp. In their lack of these realisations, such autistic children are like normal children of a much younger age, even though they are otherwise much more advanced in both behaviour and cognition. Their cognitive development has moved ahead in other ways, while in this way it has remained behind.

For many autistic children, especially those with moderate mental handicap, but also some who have normal intelligence, even learning the scaffold is not enough. Even with training, they never achieve true question-asking. The questions they ask always remain rote behaviours, never genuine requests for

information. Some repeat the same question to everyone they meet, such as “Where do you live?” or “What did you have for breakfast today?” which are not true questions but techniques for achieving simple social interaction. They may repeat the same question over and over even though they have received the answer. Or they may not answer questions correctly. Thus the child might say, “I have a baby sister”, and if the listener then asks, “What’s her name?” the child responds, “I have a baby sister.” Even if the question is repeated to them over and over, they never give the appropriate answer, always responding instead with their original statement. They have not mastered the question-response behaviour. Whether or not such a child has curiosity and interests, not having grasped question-asking even on a behavioural level, he will not use questions to satisfy them.

Even for autistic children of normal intelligence, who eventually do learn question-asking, since they learn it later, after cognitive development has already become advanced, it may never attain the central position in cognitive behaviour that it does for children who learn it early. The mode of independent discovery has already become so ingrained by the time they learn to ask questions that it continues to be their first choice. So, whereas most normal children will first try to find out the answer from someone else, and only if they cannot, will they try to figure it out themselves, for many intelligent autistic children it is the other way around.

There are also some autistic children who know about asking questions but are afraid to ask. These are generally children who find all social interaction uncomfortable. Some are so quiet that they seem to be unaware of their surroundings, when in fact they know very well what is going on around them but are afraid to do anything that might make others approach them or interact with them in any way. These psychological problems are secondary to the basic condition of autism. Such children may begin to ask questions if they feel that they are in an environment that is safe and in which asking will not be punished.

Thus the behaviour of question-asking is related in multiple and complex ways to the rest of the syndrome of autism, and no conclusions can be drawn from the presence or absence of question-asking alone. Each case must be analysed separately. In particular, if an autistic child does not ask questions, it cannot be concluded that he lacks interest unless there are other aspects of his behaviour that support that conclusion.

4.5 Deficits in Global Interest as a Primary Cause of Autism

Global interest deficits put a child in danger of compromised cognitive development because interest and curiosity play an important role in motivating interaction and learning. Questions are structures into which answers can be incorporated to form new knowledge-structures, so they facilitate learning. It is easier to learn things that one has already thought or wondered about. Children who have deficits in the underlying process by which curiosity and interest are stimulated therefore find learning more difficult, do not learn as quickly, and end up learning less.

In the preceding chapter, we discussed the function of social learning in guiding cognitive development and directing attention, and how the lack of this social guidance affects cognitive development in autism. Lacking social motivation, deficits in global interest are a more serious problem for autistic than for normal children. For a normal child, social motivation compensates if there is a lack of innate interest, and ensures at least minimal cognitive development. Even if he is not interested in the world around him, he learns everything that society deems necessary, so he develops and functions at a normal level. He lives up to the standards demanded by society even if it means struggling to complete school assignments that he finds boring. Not so the autistic child. If he lacks internal motivation, he learns neither independently nor socially. He does not interact and does not learn, so he remains cognitively underdeveloped. Functionally, he may end up mentally impaired even if he has the aptitude to develop normal intelligence.

Even for those autistic children who do have global interest-deficits, however, these cannot in themselves be the primary cause of autism, because comparable deficits are also found in children who are not autistic. Many normal children have little curiosity, rarely explore, and ask few questions, but still develop healthy Social Learning Systems and do not become autistic. It would be circular to argue that their social motivation has compensated for lack of independent interest. So, while such deficits can contribute to the severity of autism, they are never the sole primary cause.

5. Interest in Human Beings

There are also innate factors that do not affect interest globally but only specific kinds of interests. As a general statement, this is fairly obvious. Individuals have vastly different interests from one another, and all this is saying is that those differences are not only the result of different experiences and course of development, but of innate factors as well. It is also well known that people learn best in areas in which they have strong interests. So it would not be at all surprising to find that interest affects social learning. Of the various kinds of interest that can would affect specifically social learning, the one most important is *interest in human beings*. While interest in human beings is of little direct importance in other kinds of learning, in social learning it serves as the main motivating force. Indeed, one of the reasons the Social Learning System is normally so strong is the strength of this crucial factor. Beginning early in infancy and continuing throughout life, a human being's attention is consistently being drawn to other human beings around him, putting him in a state of readiness to learn socially. By giving human beings precedence over competing attractions, it strengthens the Social Learning System, often at the expense of other kinds of learning. Not surprisingly, this is the kind of interest most conspicuously lacking in autism. Though there are many vastly different ways that this lack is manifest, never is interest in human beings completely normal.

Interest in human beings is not a single factor, but a complex combination of interconnected ones. In the normal infant, certain interests are already evident shortly after birth. There are certain specific stimuli that elicit his attention, including human odour, the texture of human skin and hair, the appearance of a pair of eyes, the feeling of being held, and the sound of the human voice. He is also attracted to certain characteristically human rhythms and other patterns of motion which may be composed of visual, auditory or tactile sensations. Some involve features that are in themselves attractive, while in others the sole attraction is the pattern itself. Attention to the sound of a human voice, for example, is evoked by both the characteristic human tone and also by characteristically human patterns of raising and lowering the voice, especially those used by mothers when talking to their babies. Normal infants may themselves share these innate rhythms or other patterns of neural activity, and they might thereby evoke in them feelings of pleasure when experienced in sensations.

Infants' responses to these sensations indicate that even at this early stage they are experienced as pleasurable. It is the early appearance of such behaviour that indicates that both the attention-response and the positive feelings it produces are innate. Although the infant's experiences, such as looking at the mother's eyes and hearing her voice while nursing, immediately begin to reinforce and expand these innate feelings and responses, they cannot be attributed entirely to experience.

Within a short time after birth, learning and development have begun to reinforce and enhance the innate foundation of primary interests in human features and innate pleasure evoked by attention to those features. These put the Social Learning System into motion and begin the formation of secondary interests. The first developed interests are virtually the same as the innate ones from which they were derived, except that they are now attractive also because of the reinforcement they have received. While at first the infant looked at his caregiver's eyes simply because he had an innate inclination to do so, having experienced pleasurable feelings while looking, either of seeing the eyes themselves or of being held and

fed, he is now also attracted because the eyes evoke thoughts of those pleasures. Soon, however, in addition to old interests being reinforced, new ones begin to develop. He becomes able to recognise features that were not part of his innate repertoire, and to be attracted to them.

This recognition then makes new kinds of attention and interaction possible. The innate interest and attention responses evoked by the two-eye pattern, and perhaps by other aspects of the human face, for instance, make the infant gaze at human faces. By that gazing he learns about the shape and characteristic motions of the face. By listening to human voices he becomes familiar with the specific sounds and sound patterns of his caregivers' language. By spending time paying attention to human beings and interacting with them, he also begins to become familiar with some of the complexities of human behaviour, and these too then become subjects of interest. Each time, the system moves up to a higher level and a new cycle. Thus innate interests in human features contribute to social learning, both by providing a foundation of knowledge about human beings upon which subsequent knowledge can be built, and by directing the infant's attention to his caregivers so that he interacts with them and develops new behaviours and cognitions.

These innate factors continue to motivate social learning throughout life. Secondary interests supplement but never completely replace them. The simple attraction to human features and the pleasure of experiencing them remain strong connections between an individual and the rest of humanity throughout his life. At each successive level they motivate him to attend to other human beings, to interact with them, and to acquire new social skills. The adult's inclination to look at the faces of others, whether while talking to them or while walking through a crowd, and the speed at which he takes notice whenever anyone else is looking at him, are still, in part, the innate attraction of his infancy.

5.1 Interest in Human Beings over the Course of Autistic Development

Though lack of interest in human beings is one of the most striking and universal characteristics of autism, it is not always immediately apparent during infancy. Since normal infants do not consistently manifest these interests either, the autistic infant's lack of them may not appear abnormal. Only a minority of the normal infant's behaviour involves interaction with others, and that minority is not consistent. Many infants will sometimes respond to a human face or voice and sometimes ignore them. In any given encounter with a caregiver they may or may not make eye contact or exercise their current repertoire of responses. So when, on any single occasion, an infant fails to respond, it is not an indication of autism. The sort of interaction with humans simply as objects, that later becomes a distinct sign of autism, is also normal during this period. Even continual observation over an extended period of time may not be sufficient to identify autism in infancy.

There is also a broad range among normal infants, some showing more interest, some less. Most autistic infants fall within that range, albeit toward the lower end. Some autistic infants have normal innate interest in human beings. This is true, in particular, of those who are mentally handicapped discussed above, in whom autism is caused by deficits in aptitude. Some infants gaze at their caregivers' eyes and enjoy being held or sung to, yet are later found to be severely autistic. In some, interest in human beings is not entirely absent, but has lower priority than other interests. They respond minimally when approached and may even participate in some social interaction, but are more attracted to physical objects or self-stimulation. They do not to miss the company of others, especially when they are occupied with something else, and may prefer to be alone most of the time. They are aware of human beings, but human beings are not an important part of their world. On the other hand, even where innate interest is lacking, secondary interests may begin to develop early on. The absence or presence of interest in infancy is therefore not a reliable indication of autism during the first year unless there are also other positive signs of autism, such as intense self-stimulation or preoccupation with lights or spinning objects.

In some cases it is only later, when the child is diagnosed during his second or third year, that earlier interest deficits are recalled. Parents then remember that as an infant he was not attracted to faces or to the sound of the human voice. When smiled at or spoken to he did not respond in normal ways, such as smiling and cooing, and did not begin to follow the gaze of his caregivers toward the end of his first year as most other children do.

Many parents do not become aware that something is wrong until the child fails to speak at the normal age. Failure to develop language, however, is only one step in a process that has been going on for many months, in which lack of interest in human beings has been a key factor. Autistic and normal development have already begun to diverge during the first few months after birth, the one being guided heavily by these interest responses, the other not. Early social interactions of normal infants, however, are so crude that it may not be apparent that they are actually learning, so it may be difficult to tell the difference between a normal child who appears not to be learning and an autistic one who really isn't. Even late in the first year, when the normal infant's social development becomes obvious, an autistic child may still seem just to be developing slowly.

It is in the second and third year, when the child has begun to move around on his own and when interaction with other human beings normally increases dramatically both in kind and in quantity, that the contrast becomes clear. By the second year, the normal child interacts consistently with other human beings, never ignoring them as he sometimes did before, so when the autistic child seems to be oblivious to human beings around him it is clearly abnormal. He wanders off by himself to explore the world, or sits and plays alone, never approaching other children or adults who are nearby. He does not point to things or bring them to his caregivers to show them. Even when others approach him he may not respond. He is not interested in interactive baby games or in imitation of sounds or motions. This is the time when lack of interest becomes most pronounced.

In later childhood and in adulthood lack of interest in human beings tends to become less obvious again, but for different reasons. One is that by now the child's behaviour is abnormal in other ways that caregivers and professionals find more disturbing, so lack of interest attracts little attention. This is especially true of the child who is active and disruptive, whose other behaviours are more immediate problems both for himself and for those around him. But more important, unless a child is severely mentally impaired, by mid-childhood he has developed secondary interests in human beings, and those interests increase as he continues to learn and develop. To those who do not understand autism, it may seem that now that he no longer ignores human beings but talks to them and interacts with them in various ways, he has become normal in this respect. It may seem that lack of interest has been transcended and is no longer a problem. That is a very serious and fundamental error. For some children, the new-found interest is entirely practical. They still have no interest in others as people. Human beings have simply been recognised as useful tools to be appropriated when needed, such as to get them something they cannot reach by themselves. Even those who have come to recognise the value of friendship, as most whose intelligence is normal eventually do, still lack the kind of attraction to others simply as human beings that other children have. Even the intelligent autistic adult who becomes involved in humanitarian causes and who is caring and concerned for individuals may still lack this normal primary interest.

We can divide autistic development into four stages, each involving a qualitatively different kind of interest in human beings. In the first, the child does not interact with human beings at all and shows no evidence of being aware that there is anything special about them. In the second, he interacts functionally but not personally. He recognises that they have certain unique qualities and can do things that tables and chairs cannot. In the third, he forms primitive friendships. He interacts with other people, knows them by name, talks to them, and plays with them. He recognises that they have feelings, desires, and knowledge. In the fourth he becomes able to share feelings and thoughts with others. He experiences feelings of togetherness, of being part of a group. Even if he can only feel this with one other person at a time, it is

qualitatively different from earlier stages in which he knew only the feeling of being by himself, alone and separate from the rest of humanity.

These stages represent a paradigm course, but by far not a universal one. Not all autistic children go through all of these stages. In mild autism the first two are not completely devoid of recognition of human beings and minimal personal interaction. In severe autism the fourth and sometimes even the third are never attained. On the other hand, gradual acquisition of appreciation of other human beings is not unique to autism. Normal children, too, begin with neither recognition of the feelings of others nor sense of kinship and belonging. The course that normal children travel, however, is essentially different. The normal child is never at the first of these stages. There is never a time when he interacts with the physical world but not with human beings. Nor is he ever at the second stage, in which he recognises them as special physical objects but does not relate to them socially. There is never a time that he comes to them for food but not for comfort. In his first year, the normal infant is already developing personal relationships along with physical knowledge and skill. It is the profoundly different synchronisation of these various aspects that sets normal and autistic development apart.

5.2 Causal Relationship between Lack of Interest in Human Beings and Autism

Like other traits discussed earlier, interest in human beings is subject to the kind of ambiguity typical of components of systems involving positive feedback. Since interest in human beings is related reciprocally to the other components of the Social Learning System, it can be difficult to determine whether the deficits in interest found in autism are primary or secondary, whether they are innate causes of its dysfunction or products. On the one hand, dysfunction of the system results in abnormal patterns of interest. Without sufficient social participation, the autistic child does not achieve normal social learning, so he does not develop all the new patterns of interaction that children normally do. These patterns in themselves constitute interest, because they can only be performed together with other human beings. On the other, deficits in behavioural-interest lead to cognitive ones. Without the appropriate behaviour, cognition does not develop, so human beings do not gain all the increased significance they do for other children, and to the extent that the autistic child is not interested in other human beings, he does not participate in social interaction and his Social Learning System does not function as well.

As we have already explained, however, there is considerable evidence that some interest-deficits are innate. In many cases. normal interest-responses to human features are already lacking during the first months after birth, before significant acquired behaviours have yet developed. Evidence from normal development indicates that the tendency to gaze into the eyes of caregivers is an innate response, so lack of it is an innate deficit. Similarly, pleasure-responses to being held, to hearing a human voice or to seeing a human face are normally evident very early but are often lacking in autism.

Another indication that interest-deficits are innate is the nature of interests that develop later. Even when, later in childhood or adolescence, they become interested in human beings, many autistic adults still lack the kinds of interests that most others have. Their interests in human beings tend to remain centred on the practical aspects of others rather than the purely personal ones. They don’t enjoy talking to other people, listening to them, or simply being in their company. Indeed, the contrast between normal and autistic social interest reminds us how independent of practical purpose normal social interest is.

5.3 Social Learning without Innate Interest in Human Beings

Since neither innate interest responses to human features nor the innate pleasure derived from social interaction directly affect areas of cognitive development other than social learning, their lack does not cause mental impairment. Such deficits could therefore be the primary cause of autism with normal

intelligence. There is considerable evidence in the behaviour and development of autistic children who are not mentally handicapped to support this hypothesis. As would be expected of children with such deficits, the rate of mental development is normal but does not follow a normal course. Direct discovery of the physical world constitutes a much more important source than social learning. Not only does social development itself lag behind, other areas proceed in abnormal ways due to lack of social guidance. While for the normal child most activities and the interests that develop from them are guided by interaction with caregivers and peers, and are therefore culturally standardised, the intelligent autistic child, not being motivated in these ways, chooses his activities by other criteria, so both activities and interests tend to be more uniquely personal. The entire system of skills, interests, cognition, and actual behaviour develops and functions very differently because it is not under social guidance.

A Social Learning System gradually develops, but one that is radically different from those of normal children. At first, the autistic child learns about human beings as he does about his blanket and his toys, for while not evoking any special interest, they are still no *less* interesting than other physical objects and other aspects of experience. Furthermore, although the special kind of learning driven by innate interest in human features is missing, from the moment of birth, human beings occupy a central place in his world, and he experiences them in more varied ways, so he learns more about them. Gradually he develops secondary interests in them. He discovers that human beings are more significant than the rest of experience and begins to pay more attention to them. They become a special class of physical objects. On the one hand, they provide him with his needs, so they are useful. On the other, they bother and restrict him, so they are a disturbing part of his environment. But, whether positive or negative, they are important, so he pays attention to them. This interest and the resulting attention, however, are qualitatively different from the primary interest-response of the normal child. Though they may become just as strong and dominate his behaviour just as much, they remain secondary, grounded in the practical aspects of human beings, how they relate to him and how they affect him.

Those social interactions in which the autistic child participates involuntarily are also a source of social learning. By being dressed in certain clothes, fed certain ways and made to follow certain schedules, he develops corresponding behaviours and cognitions, so even without the special innate qualities that normally make children prone to social influence, his development is being socially moulded. As time goes on, and more and more of his caregivers' actions are directed toward training him, this influence increases.

Eventually, language and some degree of understanding of human beings are attained. Though he has not participated in the interactive games which are normally the foundation of language acquisition, by hearing language all around him and by the secondary interests in human beings that he has developed, he becomes aware of the significance of the sounds they make. Once he begins to acquire language, the intelligent autistic child becomes connected to the culture around him and gains access to cultural learning. Language is incorporated into the existing Social Learning System, strengthening and enhancing it.

For some autistic children there are periods of abrupt transition in which concepts and skills are acquired so rapidly that they seem to appear overnight, as in cases of children who do not speak until four or five and then suddenly begin speaking in complete sentences. For most, progress is less dramatic. But whether it is attained suddenly or gradually, each new awareness of a social aspect of the world constitutes a qualitative cognitive change. Structures are formed into which human beings fit in new ways and play new roles. A new stage of development has begun.

Acquisition of language and awareness of the significance of human beings and of their relationship to him are but two of the many hurdles an autistic child must clear, and as significant as they may be, there are still more to go. He is still far from normal, not yet living in the social world but still in the largely physical world in which he has been living up until now, and he continues to see everything from

that perspective. At first he simply appends the social world to it, fitting it in into a subordinate position. The social world becomes just a new means of satisfying physical needs, of gaining physical skills, and of acquiring knowledge about the physical world. Interpersonal relationships and the pleasure and emotional value that they give to the normal child are still absent. He does not yet express emotions or play with other children. Nonetheless, having discovered the world of human beings, he begins to learn about it and to develop social skills. Although he is years behind his peers, his capacity for social development is not necessarily less than theirs. Given the appropriate motivation and guidance, many intelligent autistic children eventually catch up. Though they still lack certain innate responses and are therefore still fundamentally autistic, they no longer seem grossly abnormal. They are able to attain more or less normal social behaviour and personal relationships, and autism, though perhaps still a handicap, is no longer an impediment to effective functioning.

In autism, social development can be a long, slow process. For normal individuals, it proceeds rapidly during childhood, tapers off in adolescence, and is completed by early adulthood. For most of those who are autistic, it rarely begins until the early school years. Even then, it proceeds slowly until adolescence, when it picks up speed for a while. However, rather than stopping, it continues for many years after that. An intelligent autistic adult may still be learning new social skills in his twenties, thirties and beyond. Progress can be difficult and even painful. Without the normal interests and enjoyment of social interaction, attending to human beings and learning about them remains a chore that requires constant effort. Some autistic adults come to enjoy it, but for others it remains a necessary evil, forced upon them by the inescapable daily crisis of ordinary social interaction.

Some autistic children develop genuine concern for other human beings as they become aware that others have feelings and thoughts. They become upset when they see other children suffer, and try to help and protect them. The capacity for this very normal empathy was present all along, but without awareness of others, there was never an opportunity for its actualisation. They may also begin to enjoy sharing their own thoughts. When they discover that human beings are repositories of thoughts that can be shared through language, they become interesting in a new and unique way.

But even for the intelligent adult who has succeeded in adjusting socially, the nature of interest in human beings is not normal. The normal adult retains the innate interest-response to humans even after he has become interested in them instrumentally, socially, and intellectually. He still enjoys just watching them and being with them, so he continues to attend to them and learn about them in ways that few intelligent autistic adults ever do. Many autistic individuals find spectator sports boring, and some find little interest in story plots. Some are unable to tell the characters apart at the cinema, and even in real life, they may have difficulty recognising individuals other than close friends and acquaintances. Some have no desire to be with people, participating in social activities only for practical reasons. Although none of these are universal, each is found in enough otherwise intelligent autistic adults to be included among the traits of autism. All indicate lack of innate interest and failure to derive pleasure from the experience of social interaction. This contrast between normal and autistic interest reveals the importance of innate interest in human features as a motivating factor for normal social development not only during infancy and early childhood but throughout life.

Deficits in innate interest impair not only the development of social interaction skills, but also their effective application. No matter how well a skill is learnt and developed, without appropriate attention at the time of interaction it cannot be effectively performed. So even if an autistic child has successfully acquired a particular social skill, he has more difficulty using it than does a normal child. Not being naturally inclined to attend to the other participants as the normal child is, he needs to make special effort to pay attention during social interaction. Training autistic children in social skills, therefore, while valuable, does not completely solve the problem. They also need to be taught how to pay attention to other participants in social interactions.

6. Primary Causes of Autism with and without Mental Handicap

We have now seen several radically different kinds of primary causes of autism, which we have divided into the two broad categories of aptitudes and dispositions. While deficits in dispositions need not impair intelligence, deficits in aptitudes always do, and the resultant mental handicap can range from mild to severe. Conversely, severe mental handicap always involves innate deficits in cognitive aptitudes, and is never caused by deficits in dispositions alone. As for moderate mental handicap, it seems that most cases also involve deficits in aptitudes, but there may be some in which cognitive potential is normal, but learning systems do not function properly, so those potentials are never actualised. Deficits in dispositions are certainly among the reasons for failure to function properly, but they not the only ones. Education and other environmental factors are also of great importance. Appropriate help or training can enable a child to transcend a developmental impasse, while children who do not receive it may remain stuck forever. Psychological factors, too, play an important role. Some children become stubborn and resistant to change, or afraid to take steps that may be necessary for their development.

In all human beings, there is a combination of diverse factors that contribute to effective learning and development, including both motivational factors such as interest and cognitive aptitudes such as memory and reasoning. To a certain extent, strength in one can compensate for weakness in another. Those who have strong memories or who notice relationships quickly and easily learn even in situations of minimal interest, while those who do not remember as well and who reason more slowly need greater interest to keep them focussed on the information until it is retained and until conclusions can be drawn. For those who are not autistic, strong innate interest in human beings powers a healthy Social Learning System which provides them amply with the cognitive and behavioural skills that constitute normal intelligence. The comparable autistic child, lacking this source, may remain functionally retarded. This multiplicative effect contributes to the degree of mental impairment in the autistic population. Only those whose innate aptitude for reasoning is very strong, and who are inclined to be curious and explore their environment, is it possible to achieve normal intelligence with only minimal social learning.

This might also explain the lower incidence of autism among females than among males. Females have certain innate dispositions involved in child-rearing. These might include certain responses to human features independent of those that normally motivate social learning in both males and females. When there are deficits in the latter, these might take their place and motivate social learning so that development proceeds in a normal rather than autistic mode.

There are also external factors that can play important and sometimes even decisive roles in development. For those whose deficit is in interest, extra social stimulation may be sufficient to enable the acquisition of enough basic social skills to keep the Social Learning System going. Siblings can therefore be very beneficial for an autistic child’s early development.

7. Summary and Conclusion

We have seen a number of conditions which evidence indicates are innate and that might be the primary causes in certain cases of autism. Of some we can be relatively confident of the causal relationship, of others it is at best tenuous. At this point we must reiterate that none of these underlying conditions, in itself, means that a child is autistic. Autism is functional, the combination of traits derived from dysfunction of the Social Learning System. If a child has any of these underlying conditions, yet, for whatever reason, his Social Learning System functions well, he is not autistic. Especially when the underlying condition is mild, other factors can have decisive influence on actual functioning and therefore on whether the child is autistic or not.

Long before this analysis, it was clear that within the broad category of autism there are several sub-divisions, some so radically different from one another that they are clearly distinct syndromes. This heterogeneity brought into question the validity of including them all in a single category. Part of the significance of identification of dysfunction of the Social Learning System as the factor common to all of them has been to show that autism is indeed a meaningful concept and not simply a superficial similarity. Now we have begun to analyse some of the sub-syndromes. Although much of our analysis is still rough and tentative, we have seen that they are not all simply variations of a single underlying condition. Severe autism differs from autism without mental handicap not only in its manifestations but in the underlying primary cause from which it is derived. Within the range of autism with mental handicap we have been able to identify several different primary causes corresponding to observable variations. In the next chapter we shall analyse sub-syndromes of autism without mental handicap.