

## Building Language Using LEGO® Bricks

Building Language Using LEGO® Bricks is a flexible intervention derived from the original papers written in 2004 and 2008, but significantly adapted to meet the needs of children with severe receptive and expressive language disorders, including those on the autism spectrum.

Building Language Using LEGO® Bricks has been used as a successful tool to facilitate the development of receptive and expressive language and social communication skills within special and mainstream schools.

In the same way as described in LeGoff's paper in 2004, Building Language Using LEGO® Bricks uses LEGO® bricks as a medium for a division of labour task, with the end product being the constructed model. In both Building Language Using LEGO® Bricks and LeGoff's original approach, participants are assigned specific roles and have to work together to achieve the end goal (the constructed model).

It is not until you actually experience Building Language Using LEGO® Bricks first hand, that you realize just how much receptive and expressive language is needed to participate in what seems like a simple activity. Consider how difficult it would be to construct some flat-pack furniture without being able to see the instructions and only having someone tell you where to place and attach things. Then consider the same exercise, but you and your build partner both have learning disability, language impairment or autism. Maybe your partner has severe word-finding difficulties and they want to tell you to use the screwdriver but instead they tell you to use the hammer. A simple build may be fraught with frustrations and anger as communication breaks down.

We have worked with children with severe language disorders as well as those with autism. Due to the very nature of these diagnoses and the presenting needs of the young people we have adapted the sessions significantly; primarily by providing visual supports to aid language comprehension and use. During our Building Language Using LEGO® Bricks sessions, we have seen the children experience a range of emotions from joy and elation to anger and frustration. We guide them through these emotions and help them to problem

solve and practise skills, which we hope will help them in their adult life.

Although we have seen changes in social communication skills (as described in the original research), the most significant outcome for the young people has been development in receptive and expressive language skills. Over a period of time we have learned from these successes (and our less successful sessions!) so that our practice has evolved into what we now refer to as Building Language Using LEGO® Bricks.

Some of the differences in the two therapeutic approaches can be seen clearly in Table 2.1. Each of these will be expanded in this chapter.

Table 2.1: Significant differences between LeGoff’s approach and Building Language Using LEGO® Bricks

	LEGO® Therapy (described in the research paper: LeGoff, 2004)	Building Language Using LEGO® Bricks
Cognitive ability	IQ >70	Not specified
Age range	Below 14	No limit
Diagnosis	High Functioning Autism (HFA) and Asperger Syndrome (AS)	A variety of diagnoses included: autism (including Pathological Demand Avoidance (PDA)), specific language impairment, selective mutism, acquired brain injury, cerebral palsy (included Worster-Drought Syndrome), learning disability
Linguistic ability	Able to speak in phrases	Full range from verbal to non-verbal
Roles	Three roles: engineer supplier builder	Two roles: engineer (included supplier role) builder
Reinforcers	No external rewards	Tokens used

	LEGO® Therapy (described in the research paper: LeGoff, 2004)	Building Language Using LEGO® Bricks
Aims	Development of social communication skills: development of joint attention development of listening skills problem solving turn taking patience being part of a group eye contact (This is not a definitive list)	Development of: joint attention listening and attention control receptive and expressive language, particularly the number of information-carrying words that can be processed and used concept development (shape, colour, positional language, size and texture) problem solving turn taking patience eye contact (where appropriate) range of language functions, e.g. giving instructions, requesting, clarifying, communication repair increase self-esteem understanding self as part of a group. bilateral integration and fine motor skills

## Cognitive abilities

Cognitive abilities in this context refers to the underlying non-verbal skills that allow children to learn, for instance, memory, visual and auditory perception, reasoning and problem-solving skills.

Building Language Using LEGO® Bricks has been used successfully with participants with a range of cognitive abilities, from HFA (no learning disability) to those with a diagnosis of complex learning difficulties.

## Age range

This flexible intervention can be used with a range of participants regardless of age. Our experience has been with children and young people from 4 to 19. We have also trained people working in adult services.

## Diagnosis

We have successfully run groups where partners have a variety of diagnoses and verbal skills. Criteria for selection of suitable build partnerships will be discussed in Chapter 5.

## Linguistic ability

Building Language Using LEGO® Bricks can be adapted for use with a range of verbal abilities. Our experience has included children with high-level language skills to those with no verbal language, reliant on Alternative and Augmentative Communication strategies (AAC). Details of language and communication facilitation techniques will be expanded throughout the book. See Chapter 9 for an example of how to use Building Language Using LEGO® Bricks with a child who is reliant on AAC techniques to communicate with their build partner.

## Roles

There are only two roles in the Building Language Using LEGO® Bricks approach. These are:

- the engineer, who interprets the instructions and communicates these to the builder
- the builder, who selects the correct bricks and places them in the designated location on the model, according to the engineer's directions.

On rare occasions we have reintroduced the third role of the 'supplier' to target a specific goal. For example, a colleague of ours successfully adapted Building Language Using LEGO® Bricks when

working with a child with a total visual impairment. The child was given the supplier role, which enabled her to engage socially and feel part of the group from which she was often isolated. The bricks were organized into Brailled containers according to their colour. The supplier role allowed the child to participate meaningfully in the activity. This provided a safe and structured opportunity to begin to develop relationships with peers.

The children will experience both roles during a session.

To give the roles a clear definition, we introduced badges for the children to wear during the sessions (Appendix 10). We found this made it easier for the children to understand which role they were in and, more importantly, helped them with their transition into their second role. Badges for all three roles are included in Appendix 10 for those who may wish to include the supplier role.

## Reinforcers

Part of the facilitator's role is to provide tokens throughout the sessions. The tokens can be a powerful visual aid to reinforce a variety of goals and achievements. These tokens do not form part of a token economy. Guidelines for their use will be expanded in Chapter 6.

We have provided a template for a simple paper token that can be used in Appendix 11, however, it is important that tokens are motivating and thus may need to be based around your child's specific interests. Parents have successfully used stickers or food rewards in place of tokens to reinforce targeted skills.

## Chapter 3

# Aims

Building Language Using LEGO® Bricks can be used to facilitate the development of a wide range of skills. The most significant of these are discussed in this chapter.

### Development of joint attention

Joint attention is the ability to focus on the same stimuli as a communication partner. This is an important skill and is seen in early development. Joint attention is vital for many aspects of language development, particularly vocabulary learning and social skills development.

Michael Tomasello and Michael Jeffrey Farrar (1986) write about the importance of relatively extended episodes of joint attention focus between adult and child in providing non-linguistic scaffolding for the young child's early linguistic interactions (social skills).

The same authors also suggest that joint attention is vital for vocabulary development, presumably because such episodes are periods when the child is attentive, motivated and best able to determine the meaning of a communication partner's language. Lack of joint attention is an impairment often seen in autism and should be a target for early intervention.

Building Language Using LEGO® Bricks demands joint attention throughout the entire activity. Without it the end product (the constructed model) is not achieved.

## Listening and attention control

A child needs good attention and listening skills to remember what has been said. They are then more likely to understand and respond appropriately. Good attention and listening skills are needed so that a child can:

- develop early social interactions with adults and other children
- understand words and follow instructions accurately
- develop vocabulary
- develop grammar, e.g. –ed for past tense, –s for plural
- develop accurate speech sounds, which leads on to phonic awareness and literacy development
- participate in conversations and class discussions and make friends
- develop incidental learning from the world around them
- understand when to respond in a social interaction.

Levels of listening and attention skills are therefore highly correlated to language development and academic achievement.

Table 3.1 is adapted from information by Cooper, Moodley and Reynell (1978). It is still very relevant and widely used in clinical practice.

Table 3.1: Developmental levels of attention control

Attention level	Effect on language	Strategies to help
Level 1: 0–1 year Child very distractible Attention fleeting	Child cannot attend to what you say	Discover child's motivators and incorporate into their preferred activity
Level 2: 1–2 years Child can attend to own choice of activity for a longer period of time but cuts self off from everything else	Your speech interferes with the activity child is doing Child needs to ignore you to concentrate	Give child time to complete own choice of activity Gain child's attention by calling their name and/or touching them
Level 3: 2–3 years Still single channelled attention but begins to attend to adults	Child can listen if he stops activity and looks at adult Needs adult prompts to do this	Call child's name before speaking, adult should join in child's preferred activity and relate language to this
Level 4: 3–4 years Single channelled but more easily controlled	Child looks automatically when adult speaks Can shift attention from task to speaker	Tell child it's time to listen Tell them that they can carry on working whilst listening to you – practise skill using an activity they can do with ease like colouring
Level 5: 4–5 years Integrated attention for short periods of time	Child no longer needs to look up when adult speaks Can listen at the same time as working or playing	Praise for good listening
Level 6: 5–6 years Integrated attention well established	Child listens and attends well in class	

In Building Language Using LEGO® Bricks attention and listening skills are targeted through the highly motivational nature of the activity. Tokens are used to reinforce longer and longer periods where a child will wait for a build partner's response.



## Receptive and expressive language

The two key areas of language that appear to be influenced by Building Language Using LEGO® Bricks are:

- the number of information-carrying words understood and used
- development of early concepts.

These will be discussed below.

### Information-carrying words (ICW)

(ICW are sometimes referred to as keywords.)

Knowles and Masidlover (1982) first introduced the concept of the *information-carrying word* in the Derbyshire Language Scheme. The concept looks at the pressure that spoken utterances place on auditory memory (a form of working memory). This form of memory is often impaired in children and adults with language impairment, learning difficulties and dyslexia.

An ICW is a word that carries meaning. It must be understood in order to comprehend accurately what has been said. Much of spoken language is redundant, for example the ability to follow the instruction 'put the circle in the box' is dependent on context, that is, the demands on the child's auditory (working) memory will change according to the context of the instruction.

#### EXAMPLE OF 0 ICW

'Put the circle in the box.'

If the child is last to take a turn, and there is only one shape left, they can follow the example of their peers and complete the activity without having to understand or remember any words in the spoken command (0 ICW). The need to understand 'in the box' becomes redundant by there being only one receptacle to place the shape in and by the example of classmates.

**EXAMPLE OF 1 ICW**

‘Put the circle in the box.’

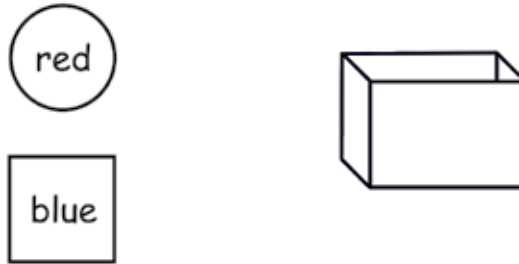


Figure 3.1: Context for 1 ICW

If there were two shapes left (circle and square), the child would have to understand the name of the shape ‘circle’ (as opposed to square) in order to select the correct shape. In this context the instruction becomes a 1 ICW command. The need to understand ‘in the box’ becomes redundant by there being only one receptacle to place the shape in and by the example of classmates.

**EXAMPLE OF 2 ICW**

‘Put the red circle in the box.’

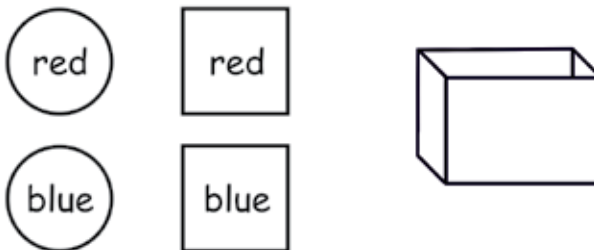


Figure 3.2: Context for 2 ICW

If the child must choose from a blue circle and a blue square *and* a red circle and a red square, they have to hold both the word for the

shape and for the colour in their working memory. This is then a 2 ICW command.

### EXAMPLE OF 3 ICW

‘Put the red circle in the box.’

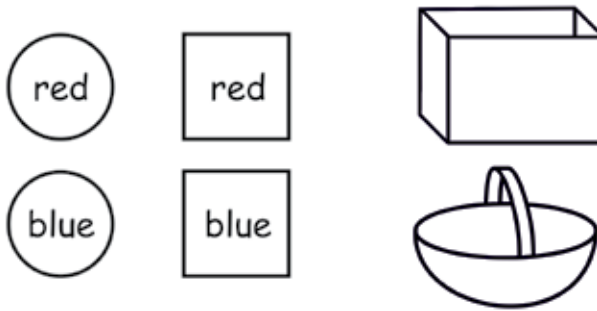


Figure 3.3: Context for 3 ICW

If the child must choose from a blue circle, a blue square, a red circle and a red square, and if there was also a choice of receptacle, for example a box and a basket, then the child must understand the colour, shape and receptacle name and hold this in their working memory in order to understand this command. This is then a 3 ICW command.

Building Language Using LEGO® Bricks challenges the number of ICW understood and used. The number of ICW can gradually be increased as the participant’s skills develop. Strategies to increase and decrease the number of ICW will be discussed in later chapters.

In typical language development, as a rough guide, a child of two years should understand 2 ICW, at three years they should understand 3 ICW and at four years they should understand 4 ICW.

## Development of early concepts

Basic concepts are ideas that help us represent tangible and less tangible aspects of our world within our memory (often referred to as semantic memory). They help us to understand the relationship between things within it. Labels (words) can then be assigned to these concepts to help us represent them in our internal thought processes and to express them to others.

Basic concepts needed for success in school can be divided into categories.

- Colours, e.g. red, blue, pink, brown.
- Quantities, e.g. more, less, few, many, some, least.
- Directions, e.g. around, through, open, close.
- Sequences, e.g. first, next, before, after, finally, now.
- Size, e.g. big, small, huge, tiny.
- Shapes, e.g. circle, square, oval, diamond.
- Textures, e.g. smooth, rough, blunt, sharp, hard, soft.
- Time, e.g. day, week, month, year, morning, afternoon, evening, late, early.
- Positional, e.g. in, on, under, next to, behind, above, below, between, opposite, end, corner.
- Descriptions, e.g. empty, full, loud, quiet, young, old.
- Social/emotional, e.g. happy, sad, angry, frightened, surprised, worried.

Positional language and social/emotional are particular issues for children with autism.

Early concept development is strongly linked to academic success (Breen, 1984). Gardner (1991) stresses the importance of word and concept knowledge for academic achievement, literacy and lifelong learning. Concepts help us to represent complex ideas as language in our thoughts. They therefore help us with the process of higher level thinking skills like problem solving, inference and deduction.

To progress in the education system even children at preschool level need to be able to understand many of the labels (words) that we use to represent these concepts. Take the following for example: ‘*First* go and wash your hands. *Then* get your lunchbox. It’s *behind* the *big, red* cupboard.’

Understanding of basic concepts is vital to success in many curriculum areas, particularly maths and science. The education

system within the UK recognizes the importance of understanding these concepts and many good preschool and reception teachers will specifically teach them. However, due to the less tangible and changing nature of these concepts, children with language impairments or autism or those with learning difficulties will find them more difficult to understand and will need additional help.

Consider the concept of 'big'. This changes according to context. A big mouse will always be much smaller than a small elephant. The concept of 'yesterday' changes too. If today is Tuesday then yesterday was Monday, but tomorrow yesterday will be Tuesday (today)! It is no wonder these concepts are so hard to learn.

## Learning to label emotions

In order to label an emotional state, we first have to experience the emotion. We need to recognize the 'symptoms' of this emotion in our own bodies. We may all feel emotions in different ways. Take 'anxiety' for instance. Some may feel 'butterflies in the tummy'; some may feel a tightening across the chest or a stiffening of the shoulders. How we experience the emotion does not matter. What is important is that we can recognize this emotion and can then match this to a spoken label of 'anxious' or 'nervous'.

It can be difficult to evoke emotions in children in order to label them in a classroom or home setting. Often the routine and security of these settings result in passivity or neutral emotions.

Building Language Using LEGO® Bricks can be used to evoke emotion in a manageable way. For some, waiting for a build partner to respond can provoke increased frustration or anxiety. This can then be highlighted, labelled and controlled.

The first step in learning strategies to control our emotions is to identify them.

The facilitator can gradually increase the demand on a child so they can experience enough of an emotion to help identify and label it without it leading to a total meltdown. To do this the facilitator will have to have good knowledge of the child. For this reason, this target is best worked on during the later stages of the intervention.

## Problem solving and communication repair

Communication breakdown occurs when the message you are trying to convey has not been understood as you had intended. The issue may be with the speaker, the listener or environmental factors. Communication breakdown is a feature of typical communication and happens to us all. It is how we repair the breakdown that demonstrates our skill as a communicator. This process is complex and involves the following stages.

- Identify the breakdown: Something has gone wrong!
- Identify what has gone wrong: Was it me or them? Is it too noisy and they didn't hear me? Did I use the wrong word? Did I speak too fast? Were they listening to me?
- Choosing a repair strategy: How can I make it better (taking into account the listener and the environment)?
- Formulate and implement the repair strategy: Say it again, say their name to gain their attention, use a different word etc.
- Learn from my successes to help me communicate more successfully in the future.

Children with autism and those with language impairments will experience breakdown in communication more frequently than most. They may not recognize that communication has broken down and will assume the listener has understood them. They will often also lack the skills to repair the breakdown without help.

Developing socially acceptable ways of repairing communication breakdown is fundamental in being accepted in society. An example of this in a Building Language Using LEGO® Bricks session follows.

If I asked you to pick up a blue brick and you picked up a red one, my attempt to repair this could make or break our relationship. Compare: 'No stupid, I said the red one!' with: 'Sorry, I'll say it again: red.'

This skill is frequently challenged and practised in Building Language Using LEGO® Bricks sessions. The role of the facilitator

is vital in developing this skill. Work on this process is discussed in Chapter 6. Resource prompts are included in Appendix 9.

## Turn taking and patience

Deficits in turn taking are common in autism and can be a feature of language impairment for some. Turn taking is a vital, early-developing skill. It forms an essential building block for many higher level abilities.

The division of labour to achieve a joint goal is at the core of Building Language Using LEGO® Bricks and naturally facilitates turn taking in a highly motivating way.

Participants will have to learn to wait their turn if they are to achieve the end goal. The facilitator's role in this will be expanded in Chapter 6 and strategies will be discussed in the case studies in Chapter 9.

## Range of language functions

Many functions of language are challenged in a structured way during Building Language Using LEGO® Bricks sessions. These include directing, questioning, repairing, confirming and following direction. Our experience has been that this intervention is particularly powerful in developing skills in repairing communication breakdown; that is, the ability to correct people in a socially appropriate way when they have not understood you.

A list of communication functions targeted by this approach can be found in Chapter 8. This list can be used to establish a baseline for intervention, to set targets and to measure progress.

## Bilateral integration and fine motor skills

Fine motor skills are the skills that use the smaller muscles of the hands, for example when we fasten buttons, use scissors or pencils or manipulate building bricks. Difficulties in the development of fine motor skills impact upon developing independence and academic success.

The building blocks necessary to develop fine motor skills include developing bilateral integration and the ability to cross the midline.

*Bilateral integration* means the ability to use both hands together with one hand leading, for example when you open a jar lid using the other hand to stabilize the jar, or when you add a brick to a build using the non-dominant hand to stabilize the structure.

*Crossing the midline* is the ability to cross an imaginary line that runs down a person's body from their nose to their pelvis, dividing the body into two halves. Children who do not cross the midline tend to pick up things placed on the right with their right hand and things placed on their left with their left hand. It is important that the child develops the ability to cross the midline as this helps the two halves of the brain to communicate with each other. The cortex of the brain is also divided into two halves (hemispheres). These two halves usually have responsibility for different skills. Generally speaking, language skills are predominantly based in the left hemisphere and spatial skills in the right. It is important that these two hemispheres communicate so that tasks requiring a range of skills can develop smoothly.

When constructing a model, children are required to use both hands together, providing vital practice of these skills through the use of a very motivating activity.

We have worked closely with our occupational therapy colleagues when developing Building Language Using LEGO® Bricks and have seen a clear progression of skills in this area.

Some children have required use of the larger bricks (DUPLO®) in the initial stages of the intervention. We have then gradually reduced the size of the bricks or altered the complexity of the build to increase the physical challenge.

If the child you are working with presents with fine motor control difficulties, we would strongly recommend seeking the advice of an occupational therapist.



## Eye contact

It can be beneficial to prompt those children who do not have a diagnosis of autism to look towards the person that they are engaging with. This promotes good social skills and can help with interaction. This should be done with caution though, as it may be that the child is using all of their concentration on formulating a sentence and cannot do this while looking directly at their partner (see information on development of attention control).

For those with autism, eye contact should never be forced. Many people with autism are hypersensitive to visual stimuli and eye contact is not only uncomfortable, but can also be unbearably painful.

We also have to bear in mind that some people with autism have sensory processing difficulties and may not be able to engage verbally if they are engaging visually. This inability to ‘switch channels’ can be seen in the autistic child in many classrooms. Pupils on the spectrum are often asked to ‘look at the teacher’ when in fact they may be fully engaged in the lesson using their auditory channel, as this is the one that is most helpful at the time.

In *Building Language Using LEGO® Bricks* we encourage build partners to use each other’s names to gain attention. We may prompt them by asking them to look up towards their partner and find a place to look at that feels comfortable. This may be their partner’s chin, forehead or shoulder area. Tokens can be used to reinforce this so that it becomes a more natural reaction.

## Chapter 4

# Why Building Language Using LEGO® Bricks Works

There are many reasons why we believe this intervention is effective. The activity itself is not age or gender specific. In fact, it is universally accepted that you can be 9 months or 99 years old and ‘play’ with LEGO® bricks. It can be a solitary activity or something to enjoy with friends or family. By using LEGO® bricks as an intervention to encourage language and communication, we feel that we are already winning a sometimes difficult battle. In an article about using LEGO® bricks therapeutically, Uta Frith (Emeritus Professor of Cognitive Development at University College London) describes the motivating sensory elements of LEGO® bricks in the way they look, sound and feel (2012).

When we look at the theories around autism we can see why Building Language Using LEGO® Bricks can tap into areas that can be difficult to reach.

Below are some of the psychological theories on the nature of autism. They are brief, simplistic snapshots of the theories in relation to Building Language Using LEGO® Bricks and are not complete in their explanations. These theories are highly complex. This book is not the forum to provide definitions for them in their full context.

### Theory of mind

Theory of mind is a term used to describe self-awareness and awareness of others. It is an understanding that other people have

intentions, desires and beliefs that are different to your own (Baron-Cohen, Leslie and Frith, 1985).

This is an area that can cause great frustration to those on the autism spectrum and their parents, carers, teachers and support staff. Some children are extremely rigid in their thinking and find it very difficult to accept another point of view. We have found that with this intervention we can introduce theory of mind in a very basic and naturalistic way. Even something as simple as deciding who is going to be the builder or engineer first is an initial step in the art of compromising and the start of understanding other people's desires.

During initial sessions, build partners are seated on the same side of the table, so that positional language concepts can be developed. To introduce basic understanding of theory of mind, we would place the children opposite one another. They then have to consider their build partner's perspective in order for the build to be successful. To understand, 'Put the red brick *behind* the blue one,' the child has to consider that what is *behind* to them will be *in front of* to a build partner on the opposite side of the table. This can sometimes take moving of chairs in order to experience the different perspectives.

## Weak central coherence

Frith (2003, p.134) describes weak central coherence as: 'the unusual ability to disregard context'.

For many people on the autism spectrum this can be the case. It can be very difficult to see something as a whole, as it is the tiny details that catch the child's attention.

Typically developing children will retain a general impression of a situation. They will use the details to gain an overall picture. Those with weak central coherence will not be able to piece together detail to form a whole. They will see the individual trees but not the forest.

Although the lack of central coherence can be very strong, an intervention like Building Language Using LEGO® Bricks may help some to see the 'bigger picture' or 'get the gist' by its very

nature of building, where all of the small pieces fit together to make a larger model.

## Executive functions

Boucher (2009, p.170) describes executive functions as: ‘the set of cognitive processes that are involved in the organisation and control of mental and physical activity’.

It is executive functions that enable us to switch from one activity to another or stop altogether and start on something else. It is also the ability to predict the behaviour of others. The cognitive thought process for this involves a great deal of flexibility of thinking, which can be difficult for some individuals on the autism spectrum.

Building Language Using LEGO® Bricks can help with planning, organizing and problem solving and therefore with the area of executive functioning. We feel that the task of building a model with a partner ‘forces’ the participants to engage their skills of executive functions in a structured but naturalistic way.

Take, for example, the difficulty that people on the autism spectrum may have in stopping an incomplete task. We have found that 99 per cent of the children that we have worked with have overcome this within Building Language Using LEGO® Bricks sessions.

You will see in Chapter 6 the process for facilitating this acceptance.

- We took photographs of the models that were ‘mid-build’.
- We placed the build in a locked cupboard until the next session.
- The children were also given a photograph of their model so they could match it when the build started again. Initially we were asked many times by the children to see their model, which we always complied with, so that they knew it was how they had left it.

By following this procedure consistently we found that it wasn’t too long before the children trusted us. This enabled them to

progress onto a more complex model built over a longer period of time (several sessions). They learned to stop the build when it was incomplete without experiencing feelings of stress and anxiety, knowing that it would continue again from the point they had left it.

## Poor ability to jointly attend

We have noticed many times that some of the children only needed to see the finished photograph of the model for a split second and they were able to recreate it perfectly without the need for the instructions. This negated the need for any social interaction with their build partner. For this reason we introduced a small screen to conceal the photos or instructions and establish joint attention from the very start of the sessions.

## Theories of word learning

The nature of vocabulary learning and acquisition is very complex. Much research has been dedicated to this subject over the years. We now have a much clearer idea of which word elements we need to learn as well as how we learn a word.

It has been estimated widely that the average adult has 30,000 words in their vocabulary (Clark, 1995). To get to this point a child has to learn an average of six to eight new words every day throughout their school years.

A child learns a spoken word through listening to spoken language, picking out which combination of sounds represent which objects and attaching meaning to them. In order to do this, they must experience exposure to the objects in their environment so that they can learn about them through their senses. Let's look at the example of learning the word 'cat'. The child will handle the cat and so learn it is soft and fluffy. It hears it and learns that it makes a specific set of sounds. It sees it and learns it has four legs and is a certain colour. All this information is called semantic knowledge. Semantic knowledge builds slowly with more exposures to the word in different contexts. So a child may encounter a different cat and realize that they come in a range of colours and patterns. They may

learn (painfully) that cats have claws and use them if you pull their tails! Children then begin to build more and more refined semantic understanding of a word. They refine this further through exclusion. They may see a dog and say ‘cat’; the adult will then correct them and label the new creature a dog. This exclusion refines the child’s understanding further. This process of gradual refinement through experience in different contexts is called mapping. Mapping helps the child to build organized associations between words in their growing lexicon. So they will learn a cat is an animal, it is part of a sub group called pets and is associated with words like purr, stroke, fur, claws and tail. Research has found that a child needs at least 12 mapping exposures to a word in different contexts to gain a full understanding of that word (Stahl and Nagy, 2005).

Building Language Using LEGO® Bricks helps with word learning, particularly the learning of concepts, as it provides numerous (mapping) exposures to concept words within slightly different but controllable exposures. It is the facilitator’s role, within sessions, to control the context of these exposures to ensure a gradual building of concept knowledge (see Chapter 6).

It is useful to think of the learning of vocabulary as compiling a filing cabinet full of words in your memory. For each word there will be sub divisions within the file for different elements of the word. Semantic knowledge as discussed above is one of these files. Others include: phonological knowledge, syntactic knowledge and orthographic knowledge (for those words we are able to read).

Phonological knowledge is the speech sound make up of a word, for instance, what sound does it begin and end with, what words does it rhyme with and how many syllables make up the word? These are the sort of things that we often recall during ‘tip of the tongue’ experiences. When we know a word but can’t quite retrieve it, we often are able to say, ‘It’s a short word and it begins with ...’

Syntactic knowledge is knowledge of the rules that govern how you combine the word with others to form a sentence. It builds from hearing words used within a variety of sentences. Through this process children ‘pick up’ what category a word belongs to, so they will understand that cat is a noun. They will of course not

know the term noun but will understand that you can add /s/ to make the word plural 'cats', but do not say 'cating'.

Building Language Using LEGO® Bricks can help build this knowledge by exposing the child to subtly varied sentences containing the target concept. 'Put the red brick *behind* the blue one.' 'Put the green rectangle *behind* the yellow one.'

Orthographic knowledge is stored memory of how the word looks when it is written down. That is, your ability to recognize and read the word. This can be facilitated during sessions through consistent association of the written word and symbol with the concept in varying contexts.

In conclusion, Building Language Using LEGO® Bricks can facilitate all these aspects of word knowledge by concentrating exposures to the targeted word in subtly varied contexts. It works on helping the child build up semantic knowledge and then helps them to know how the word can be used within connected speech. The repetitive nature of the builds allows mapping exposures to concepts in far greater concentration than would usually be experienced. This, then, speeds the natural process of word learning.