

The Early Sociocognitive Battery:

An evidence-based measure of early social communication and language skills guiding clinical decision-making, support and intervention.

White paper

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'When parents become concerned about their child's development their anxiety may be wide-ranging and include motor skills, feeding, vision and hearing and social and communication development. Many areas of development are linked e.g. vision influences motor, cognitive and social development. Parents can become sensitised to potential problems and make assumptions about progress and possible reasons for difficulties. In some cases, professionals are the first to identify differences and are required to raise concerns with parents. In both cases it can help to have an assessment process that highlights strengths and difficulties for parents with tasks that they can readily understand. The ESB is short, portable, and developmentally appropriate for young children. The tasks provide a shared understanding of important early skills in social and cognitive development which could facilitate discussion about next steps for assessment or intervention if it proves necessary. Our multi-disciplinary team in a regional children's neurosciences department gather information from local professionals about a child's development, to assess for neurodevelopmental disorders. Our evaluation would be significantly helped by scores from the ESB which would provide accurate information about early skills in key areas of development.'

(Dr Vicky Slonims, Senior Consultant Speech and Language Therapist, Children's Neurosciences, Evelina London Children's Hospital, Visiting Reader in Complex Communication Disorders, IOPPN, Kings College London)

Executive Summary

The roots of the ESB: theory, evidence, and practice

- Through the first years of life, infants show growing skills in social engagement and understanding: they observe and respond to other people, share interest in the outside world, and show understanding of other people's intentions and their use of symbols such as gestures, play objects, and words.
- These so-called 'sociocognitive skills' are known to be key foundations for the development of language and social interaction and show impairment in children with significant social communication difficulties and Autistic Spectrum Disorders.
- For these reasons, speech and language therapists often make informal observations about children's sociocognitive skills and take these into account in therapeutic interventions.
- However, sociocognitive behaviours occur with varying and unpredictable frequency in everyday life and a single clinical observation session may yield limited if any examples.
- There has previously been no formal standardised assessment allowing objective comparison and profiling of key sociocognitive skills.

What distinguishes the ESB

- The ESB is a systematic, psychometrically robust, and informative measure of sociocognitive skills specifically designed for young children whose language and communication are not developing as expected.
- Through a sequence of fun activities, the ESB provides 'triggers' for sociocognitive behaviours that are under the assessor's control, require minimal verbal comprehension, and seek nonverbal responses.
- As such, the ESB is quick to administer and yields scores that can be compared with norms.

- Interpretation of ESB performance is supported by a unique evidence base showing it to be:
 - applicable regardless of children’s cultural and language background;
 - predictive of long-term risk for social communication problems and/or ASD;
 - related to measures of receptive and expressive language.

Clinical applications and implications

- The ESB contributes to the diagnostic process and care pathway for the child, informing decisions on further assessment, onward referral, intervention, and discharge.
- ESB scores provide objective evidence of a child’s sociocognition outcomes that can be readily shared with other professionals.
- Profiles of ESB performance guide interventions to strengthen sociocognitive underpinnings of language and communication and may indicate sociocognitive strengths that can be deployed in language interventions.
- Carrying out the ESB helps clinicians:
 - Explain to parents/carers and early years staff what sociocognition is and why it is important.
 - Provide reassurance where children show sociocognitive strengths.
 - Illustrate children’s difficulties without using clinical diagnostic labels when parents may not be ready for these.
 - Explain decisions on next steps and recommended support and intervention.

The nature and importance of sociocognitive skills

It has long been recognised that language development depends on interest in and understanding of others’ intentions. Logically, if children are to discover the meanings of the words they hear, they must appreciate that the speaker is using words to convey a meaning intention, and must identify the speaker’s focus of attention to determine that meaning intention (Baldwin, 1995; Chiat, 2001; Tomasello, 1995). Without this sociocognitive understanding, even if children are able to acquire words, they would struggle to access the shared meanings of those words and might use them inappropriately.

As processes taking place in the child’s mind, the sociocognitive prerequisites for language cannot be directly observed; they can only be inferred from behaviours that stem from children’s interest in and understanding of other people. They are evident in the first months of life, when infants show particular attention to human faces and voices, particularly when facial and vocal expressions are exaggerated (Hoffman, 2000; Trevarthen & Aitken, 2001). This early engagement with people evolves over their first year as infants follow people’s actions and movements; follow their gaze and pointing gestures to see what they are attending to, and themselves show and point in order to share their own interest with others. They start to understand and produce socially shared symbols, where a symbol is ‘an entity that someone intends to stand for something other than itself’ (DeLoache, 2000, p.329). They develop representations evidenced by, for example, their use of gestures (Capone & McGregor, 2015; Iverson & Goldin-Meadow, 2005), from clapping and waving to shaking and nodding their head. This first use of symbolic representations is accompanied by the emergence of pretend play, using gestures or pretend objects to ‘stand for’ real objects, as when they put their fist or a spoon to their ear as if speaking on the phone (Lewis et al, 2000; McCune, 1995). Language, as a system of representations for conveying meaning, rests on this link between symbol and meaning intention. The turning point for language development is when, towards the end of their first year, children make the

connection between word forms and meaning intentions that have until this point developed on relatively independent tracks (Chiat, 2001; O'Neill & Chiat, 2015; Werker & Curtin, 2005).

The role of early sociocognitive processes in the early understanding and use of words has been substantiated by extensive research findings on relations between sociocognitive skills and language in both typical and atypical development. Stronger sociocognitive skills are associated with more rapid growth of vocabulary in typically developing children, and also in children with autistic spectrum disorders which are characterised by deficits in sociocognitive skills (Bottema-Beutel, 2016; Brooks & Meltzoff, 2008; Toth et al, 2006).

The theoretical case for the role of sociocognitive skills for language development together with the empirical evidence supporting this were the springboard for the 'sociocognitive hypothesis': the hypothesis that language delay may in some cases arise from sociocognitive difficulties. The ESB was developed to evaluate this hypothesis.

The ESB as a measure of sociocognitive skills: the evidence base

The sociocognitive precursors of language occur with varying and unpredictable frequency in everyday life situations, and a single clinical observation session may yield limited if any examples. However, it is possible to provide effective 'triggers' for some sociocognitive behaviours, enabling systematic evaluation of children's response to these. The three subtests that make up the ESB target a range of behaviours that can be triggered most effectively, from very early-emerging demonstration of responsiveness to another person's expression of feelings, through sharing of interest in objects with another person, to 'getting the message' that others express. By presenting children with a succession of fun activities that elicit these behaviours, the ESB yields quantitative evidence of key sociocognitive skills in a short space of time, taking about 15 minutes with typically developing children.

A substantial body of research (Chiat & Roy, 2008; 2013; Roy & Chiat, 2014; 2019) has demonstrated the strengths of the ESB as an assessment for children with delayed language and communication.

- **The ESB is predictive of social communication and autistic spectrum disorders**

It is well established that many children referred with concerns about language at age 2-3 catch up with their peers within one to two years, and when problems do persist, these vary in nature. Some children will struggle with receptive and expressive language, some with social communication, and some with both. Some will go on to receive a diagnosis of ASD. Early measures of language are not good predictors of these different outcomes. In contrast, performance on the ESB has been found to be a strong predictor of social communication outcomes seven years later.

In a longitudinal study of children referred to speech and language therapy services with concerns about language at 2-3 years, none of whom had a diagnosis of social communication disorder or ASD, we found that almost 20% were reported to have such a diagnosis by 9-11 years. Of these children, 89% (16/18) had had low scores on the ESB when they were first assessed, indicating early difficulties with sociocognitive skills (Chiat & Roy, 2013; Roy & Chiat, 2019). This demonstrates the ESB's high level of *sensitivity* to longer term social communication and autistic spectrum disorder in children who first present with language delay. While half of these children also had longer term language disorder, half had gone on to develop adequate or even high-level language skills. Turning to the roughly 80% of the sample who did not have a diagnosis of social communication or ASD at 9-11 years, 75% of these children had scored in the 'normal' range on the ESB.

Overall, then, the ESB also achieved a high level of *specificity*. Furthermore, almost half of the children who had low ESB scores when first assessed but no diagnosis of social communication difficulties or ASD (children who were ‘false positives’) nonetheless had problems according to parental report of social communication on the Social Responsiveness Scale (Constantino & Gruber, 2005), scoring in the moderate or severe range.

- **Non-compliance is informative**

Presenting children with a succession of new objects and actions designed to elicit nonverbal responses, the ESB is ideally suited to engage preschool children and most become engrossed in the activities. In a longitudinal study, just five children (2.5% of the sample) did not respond at all and were scored zero. At 9-11 years follow-up, four of these five children had a clinical diagnosis of ASD according to parent report (Roy & Chiat, 2019). While non-compliance and non-responses pose a significant challenge for most systematic assessment of very young children because they are ambiguous between inability and unwillingness/reticence (‘can’t or ‘won’t’), engagement is a key target of the ESB and, as the findings confirm, non-compliance is informative.

- **The ESB is appropriate for use in diverse communities**

Though administration of the ESB includes some use of language on the part of the assessor, children can respond appropriately based largely on nonverbal cues, and no verbal responses are required. This makes it suitable for use with children who have very limited verbal comprehension, including those who have limited experience of the language of testing. In contrast to most standardised language assessments, we have found that performance is unaffected by language and cultural background (Roy & Chiat, 2019; Alkadhi, 2015). The ESB and ESB standard scores are therefore valid for use with children regardless of cultural or language background.

What is unique about the ESB?

The ESB is one of many clinical tools addressing sociocognitive skills. Some serve to screen for or diagnose ASD. Others provide a broad profile of social and emotional behaviours or a detailed profile of sociocognitive behaviours based on parent report and/or direct observation. The ESB, on the other hand, is specifically designed for young children whose language and communication are not developing as expected and targets a comprehensive range of sociocognitive skills that are known to be important for language and communication. Its key purposes are to identify children who have sociocognitive difficulties and are at high risk of longer-term social communication disorder and to profile their performance across three subtests assessing different sociocognitive skills. As such, the ESB contributes to the diagnostic process and care pathway for the child and guidance for clinicians, parents, carers, and early years staff.

The ESB achieves these goals through a sequence of fun activities that provide ‘triggers’ for three sets of sociocognitive behaviours:

- **Social Responsiveness:** The assessor expresses a feeling or emotion and checks if the child looks at his/her facial expression.
- **Joint Attention:** The assessor brings out objects of interest and checks if the child shares interest by switching gaze between object and assessor and follows the assessor’s gaze or finger-point toward another object.
- **Symbolic Comprehension:** The assessor invites the child to select an object in response to three types of symbolic representation – a gesture associated with the object (e.g. using hand as if combing hair); a

miniature version (e.g. a doll’s shoe for a child’s trainer); and a pretend use of an object (e.g. banana used as a telephone).

Responding to these ‘triggers’ requires minimal verbal comprehension on the part of the child, and the responses they invite are nonverbal.

These subtests combine into a structured assessment that is quick to administer and yields scores that can be compared with norms. It is supported by a unique evidence base showing it to be:

- psychometrically robust;
- applicable regardless of children’s cultural and language background;
- related to receptive and expressive language;
- predictive of long-term risk for social communication problems and/or ASD.

Based on research, total ESB scores below -2 SD (i.e. in the lowest 2.3% of the population) are indicative of sociocognitive disorder with longer-term implications, and this cut-off is used to define overall performance in the ‘Low’ category (Roy & Chiat, 2019). Subtest scores below -1.5 SD (i.e. in the lowest 7% of the population) are indicative of difficulty with the sociocognitive skills targeted. A child’s performance may be consistent across the subtests, or it may be spikey as exemplified in the figure below, indicating areas of strength and need (Roy, Chiat, & Warwick, 2019; Taylor et al, 2020).

PROFILES

Deviation from the mean	Scaled score	Subscale Scores			Total ESB Score	
		Social Responsiveness	Joint Attention	Symbolic Comprehension	Standard score	Total ESB score
+3 SD	20	.	.	.	150	.
	19	.	.	.	145	.
	18	.	.	.	140	.
	17	.	.	.	135	.
+2 SD	16	.	.	.	130	.
	15	.	.	.	125	.
	14	.	.	X	120	.
+1 SD	13	.	.	.	115	.
	12	.	.	.	110	.
	11	.	.	.	105	.
Mean	10	.	.	.	100	.
-1 SD	9	.	.	.	95	.
	8	.	.	.	90	.
	7	.	.	.	85	.
-2 SD	6	.	.	.	80	.
	5	.	.	.	75	.
	4	X	.	.	70	X
-3 SD	3	.	.	.	65	.
	2	.	.	.	60	.
	1	.	.	.	55	.
	0	.	X	.	50	.



Clinical applications and implications

Given the role of sociocognitive skills in language and communication development and disorders, the ESB provides a strong evidence-based tool for early clinical identification, decision-making, understanding and intervention.

Early identification

Used as a screening tool for children referred with delay in language or communication, the ESB enables early identification of sociocognitive difficulties in children who might have a lengthy wait for referral to a multidisciplinary team and eventual diagnosis.

Decision-making

- Children scoring in the low range are at risk of longer-term social communication disorder or ASD with or without language disorder. The ESB therefore serves as a guide to onward referral, for example, to multidisciplinary teams or specialist children's centres, for a full assessment of language and social communication and potential diagnosis of ASD.
- If children show no problems on the ESB, language delay is likely to stem from other difficulties that may become apparent through assessment of language processing skills, and/or from limited exposure to the language.

A guide for clinical and parent support

As well as enabling early identification, the ESB provides a profile of children's strengths and difficulties.

- Where children's performance on a subtest is age-appropriate, this indicates skills that may be marshalled in interventions that target their receptive and expressive language.
- Where children have difficulties, the child's profile of performance on the different subtests indicates skills that need to be targeted in intervention.

Intervention

The child's overall score and profile of difficulties provide a guide to interventions that have been shown to promote sociocognitive skills and language development.

Understanding the child's experience

Early identification leads to better understanding of children's difficulties and more in-depth assessment of challenges that are frequently associated with sociocognitive deficits and ASD. Parents and professionals report that watching their child participate in the ESB helps them to recognise sociocognitive behaviours that they may not have noticed or seen as relevant, and to understand the rationale for interventions to promote these. Better understanding helps parents, carers and professionals adapt the physical and communication environment to best meet the child's needs, support the child in coping with their difficulties, and maximise their potential for social relationships and communication.

Three FAQs about the ESB

(1) Who can the ESB be used with?

The ESB is primarily for assessment of children aged 2;0–4;11 referred with concerns about delay in language and communication. It can also be used with:

- Young children referred with concerns about social engagement, for whom standard scores and profiles will be informative.
- Older children already diagnosed with ASD for whom the ESB profile will indicate sociocognitive strengths and difficulties related to receptive and expressive language (see Taylor et al, 2020).

(2) Who can administer the ESB?

Speech and language therapists, clinical and educational psychologists, paediatricians, and early years professionals who meet the following requirements:

- Certified training and experience in a relevant discipline.
- Membership of a professional organisation appropriate to the focus of the test.
- Evidence of competence in the use of relevant psychometric tests.

Completion of the face-to-face or online ESB training programme is highly recommended.

(3) What adaptations can be made in using the ESB with older children and children with different clinical diagnoses?

- The Social Responsiveness subtest can be adapted by presenting the items without the lead-in designed for younger children which may be less appropriate for older children or may cause overload for children with severe ASD or complex needs.
- Likewise, the chute used to motivate younger children in the symbolic comprehension subtest does not have to be used if this is judged less appropriate for older children or an unhelpful distraction for children with severe ASD or complex needs.
- The ESB can be adapted for children with motor difficulties by using the child's eye-pointing to score responses on the symbolic comprehension task, and ensuring that items in all tasks are within the child's visual field and that the tester is in a position to determine whether the child's gaze or eye-point is directed at the target item.

Four clinical illustrations

*I have used it with **A** because I was having a hard time working out what was going on with his social communication skills and whether I should be concerned and going for a referral to paediatricians. He scored quite low on the assessment so again I could use the recording to talk to mum and some of the very subtle things that were going on and she agreed to a referral to the paediatrician.*

***B** had an 8-year-old elder brother with a diagnosis of ASD. [He] presented as a late talker and his parents were worried that he might also be showing signs of ASD. He had been seen by a paediatrician who did not share parental concerns. [His] ESB performance was consistently in the Normal range with all scores at or just above the mean, confirming his strengths in this area. The ESB helped the therapist to explain these skills to his parents, reassure them, and enabled them to focus on interventions needed to target his language delay.*

C was referred to SLT at her two-year check by the health visitor following concerns regarding lack of eye contact and pointing. [C]’s parents had spent a lot of time using flash cards with her and had taught her many single words which she repeated but did not use functionally. [Her] total ESB performance and subtest scores consistently placed her in the Low category. Completion of the ESB and subsequent discussion with the therapist enabled C’s parents to consider her profile of strengths and needs. This resulted in a referral to the ASD assessment service, and a therapy approach and parental focus on targeting joint and shared attention as opposed to the previous focus solely on expressive language.

D’s expressive and receptive language skills were age appropriate. Staff working with D would have liked him to extend his ability to make comments and respond to other people in a typical way rather than just talking about his interests and offering facts around his favourite subjects. D’s parents had consented to an SLT referral but not yet a referral to the wider multi-disciplinary team. D’s total ESB performance fell in the Low category as did his scores for Social Responsiveness and Joint Attention while his score for Symbolic Comprehension fell in the Normal range, resulting in the uneven profile. D’s higher score for Symbolic Comprehension was in line with his age-appropriate language skills, and at odds with the limitations in his basic sociocognitive skills which confirmed the school’s concerns about his communication. D’s representational and language skills could be used to support intervention addressing his social communication difficulties. This clinical example along with other similar cases led to the service manager reviewing the discharge criteria around age-appropriate language skills.

‘I...use (the ESB) as a guideline for targets and a way to explain to parents where the child is struggling: the test is superb at actually showing the parents where the difficulties lie. Abstract explanations are often incomprehensible and unacceptable to parents; this test makes it concrete.’
(Matt Cruse, Senior Speech & Language Therapist, Roscommon Early Intervention Service)

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