

'This article may not exactly replicate the final version published in the APA journal. It is not the copy of record.'

Difference or disorder? Cultural issues in understanding neurodevelopmental disorders

Developmental Psychology, 2013, Vol. 49, No. 1, 45–58, DOI: 10.1037/a0027446  
© 2012 American Psychological Association

Courtenay Frazier Norbury<sup>1</sup> and Alison Sparks<sup>2</sup>

1 Royal Holloway, University of London

2 Amherst College

### Acknowledgements

This paper arose from a workshop entitled: “Communicative development: a cross-linguistic, cross-cultural perspective”, held at the University of Costa Rica, January 2011.

We are grateful to the organizers, Dr Danielle Matthews and Dr Ana Carmiol for their kind invitation to participate in this workshop, and to the British Academy for their generous funding. We are also grateful to the editors and two anonymous reviewers for their thoughtful comments on an earlier version of this paper.

Address for correspondence:

Dr Courtenay Frazier Norbury

Department of Psychology

Royal Holloway,

University of London

Egham

Surrey

TW20 0EX

Tel: +44 (0)1784 276 139

Email: courtenay.norbury@rhul.ac.uk

### **Abstract**

Developmental disorders such as autism spectrum disorder (ASD) and specific language impairment (SLI) are biologically based disorders which currently rely on behaviorally defined criteria for diagnosis and treatment. Specific behaviors that are included in diagnostic frameworks and the point at which individual differences in behavior constitute abnormality are largely arbitrary decisions. Such decisions are therefore likely to be strongly influenced by cultural values and expectations. This is evident in the dramatically different prevalence rates of ASD across countries and across different ethnic groups within the same country. In this article, we will critically evaluate our understanding of developmental disorders from a cultural perspective. We will specifically consider the challenges of applying diagnostic methods across cultural contexts, the influence of cultural values and expectations on the identification and treatment of children with suspected disorders, and how cross-cultural studies can help us to refine cognitive theories of disorder that have been derived exclusively from Western North American and European investigations. Our review will synthesize clinical, cultural and theoretical work in this area, highlighting potential 'universals' of disorder and concluding with recommendations for future research and practice.

**Key words:** autism, culture, treatment, prevalence, specific language impairment

## **Difference or disorder? Cultural issues in understanding neurodevelopmental disorders**

### **Introduction**

Language delay is an extremely common childhood concern, and in Western societies, language delay is often the first reason parents seek professional advice about their child's development (De Giacomo & Fombonne, 1998). For many families, the first referral will be to a speech and language therapist (SLT); the clinician will be responsible for establishing whether there is a clinically significant problem, and whether there are any other developmental concerns that would warrant further assessment and perhaps referral to a multi-disciplinary team. The clinician will also be responsible for developing and delivering treatments designed to increase language capability and communication skill, often in collaboration with other professionals and with the child's family.

In this paper, we focus specifically on two common neurodevelopmental disorders, autism spectrum disorders (ASD) and specific language impairment (SLI). Our rationale is that clinicians are often tasked with providing a differential diagnosis between these two conditions, and there is considerable theoretical interest in the degree to which they overlap at biological, cognitive and behavioral levels (Tager-Flusberg & Joseph, 2003; Tomblin, 2011). Both SLI and ASD are known to have a biological basis, and are heavily influenced by multiple genetic risk factors that affect brain development in ways that are non-optimal for language and communication development (Bishop, 2009). However, presently there are no biological markers or tests for these disorders; instead, diagnosis is based solely on observed behavior and parental report. As with most behaviorally defined disorders, the point at which normal variation converges on disorder is largely an arbitrary decision and is highly likely to be influenced by cultural values and expectations. Culture shapes our behavior and standards of what is and is not acceptable behavior are culturally determined (Bruner, 1990). In addition, the measures we use to sample behaviors of interest and the

evidence base on which we make our diagnostic decisions are also subject to cultural biases.

What are the implications of these challenges for understanding developmental disorders?

At a practical level, the challenges are considerable. For instance, in the United Kingdom and the United States, the SLT profession is dominated by white, middle-class, English-speaking women (e.g. approximately 97% of qualified SLTs in the UK report belonging to this social demographic and only 5.3% of ASHA members identify themselves as bilingual; Royal College of Speech and Language Therapists, 2002; American Speech Language Hearing Association, 2011). Yet the populations they serve are often very different; in the London Borough of Hackney, for example, only 65% of the population are monolingual speakers of English, with approximately 100 different language communities in residence. The Borough is the second most economically deprived region in England, with 67% of school-aged children living in 'low-income' families. For many communities living in Hackney, traditional male/female roles are strictly observed, with women largely responsible for maintaining the home and caring for the children while men more typically work outside the home. When these families present at SLT clinics, cultural issues come to the fore. Some examples from our own clinical practice include:

1. Of the 100 different languages spoken in Hackney, standardized tests of language and communication in languages other than English are almost non-existent.
2. Bilingual co-workers (interpreters) are often hard to find: most are women, few have professional qualifications or extensive knowledge of typical language development in that particular language community and they are often known to the clients, raising issues of confidentiality.
3. Families have reported that assessments involving play with dolls and plastic toys are unusual because they do not have experience with such toys at home.
4. Families may feel that it is important for the child to learn English so s/he can succeed at

school. This sometimes means families try not to speak to the child in their home languages, and focus on “educational” English, such as learning numbers and colors, rather than natural conversational discourse.

5. Families may reject intervention programs that involve following the child’s lead in play, talking about what the child was doing, or engaging in pretend play, either because it is culturally unusual for adults to play with children, or because the family circumstances are not conducive to free play time (cf. Mbise & Kysela, 1990).
6. Some families have opted out of therapy activities because of their cultural/religious beliefs (e.g. males forbidden from hearing women sing).

Perhaps Hackney is an extreme example, but these experiences raise interesting questions for both research and practice: how do we determine whether or not a child with a very different developmental experience has a disorder? Are the diagnostic categories and treatment expectations derived from white, middle-class, Western societies appropriate for other cultural communities? What can the cultural experiences of children from other backgrounds tell us about our assumptions about the causal pathways of disorder in our own communities?

These are highly relevant issues for at least two reasons. First, ASD in particular is increasingly recognized as a ‘global challenge’ and more and more research is directed at identifying ASD in countries throughout the world. At the same time, there is growing recognition in mainstream psychology that much of what is published about human perception, cognition and behavior is derived from research studies conducted in Western societies and that these cohorts reflect a tiny minority of the world’s population that is often not representative of the majority (Henrich, Heine, & Norenzayan, 2010). Thus, the conclusions that we draw about ‘typical’ human development may be limited to a rather narrow subsample of privileged individuals (i.e. educated, democratic, high socioeconomic

status). A similar concern may be raised about research investigating developmental disorders, the vast majority of which comes from Western, English-speaking countries (Dyches, Wilder, Sudweeks, Obiakor, & Algozzine, 2004). Application of diagnostic standards, assessment methods and treatment approaches from these societies to culturally diverse populations is fraught with difficulties, which will be detailed below.

Second, there is growing discussion about how we conceptualize children with neurodevelopmental disorders: do the communication profiles of these children reflect natural variation in language and communication competence or do they signify a qualitatively different and ‘abnormal’ developmental trajectory? Should we persist with a very Western medical model of disability, in which the problems faced by the individual are part and parcel of their ‘disease’, or should we adopt a more social model of disability, which focuses on society’s ability to adapt to the variable language and communication needs of the population as a whole? In recent years the Neurodiversity movement has been influential in bringing these issues to public attention, advocating that ASD in particular is natural human variation and should be viewed as a separate minority culture (rather like the Deaf culture) as opposed to a disorder. The degree to which this view is applicable across the entire autism spectrum is a matter of great debate (Jaarsma & Welin, 2011; Pellicano & Stears, 2011), but does force consideration of what constitutes “normal” social communication behavior. The dimensional perspective of language delay and SLI (Rescorla, 2009) is similar in viewing language deficits as the lower end of a spectrum of linguistic skill, rather than a qualitatively distinct and aberrant language profile. This perspective leads to discussion of how best to measure optimal outcome in adolescents and young adults, and whether this should be in relation to scores on standardized tests of language or on the individual’s ability to function within society (Tomblin, 2008). Tomblin (2006) considers both of these alternatives with reference to philosophical notions of ‘neutralism’ and ‘normativism’. A neutralist

perspective identifies disorder as a deviation from the population mean on some observable characteristic. A normative perspective views deviation from the statistical average as a difference that may only attract clinical status if that difference is disvalued by the individual's society. Both standards require consideration of cultural perspectives: for the neutralist, what aspects of language and communication are to be measured and how can this be achieved in a standardized way, when both most naturally occur in a dyadic milieu? Within a normativist framework, what are the cultural expectations regarding education, employment and social relationships and how might a difference in linguistic or social-cognitive ability negatively impact on these expectations?

With these issues and debates in mind, we structure our review as follows: first, we consider the practical challenges to the assessment and diagnosis of children from different linguistic and cultural communities. Here the limitations of a neutralist perspective are most apparent. Second, we consider the potential of a normativist perspective that focuses on the impact of individual differences in linguistic or social-cognitive ability on a child's cultural acceptance and social well-being. Finally, we will explore how cross-cultural research can inform cognitive theories of disorder. How we attend to and perceive the social world is culturally specific (Nisbett & Masuda, 2003); thus the impact of the social context on language and communication development will vary across cultures (Ochs & Schieffelin, 1986). Examining these differences may be particularly informative in helping us to refine our theories about the cognitive origins of developmental language disorders. We end with a consideration of how researchers and practitioners might proceed in resolving the question of difference or disorder.

### **Developmental Difference or Developmental Disorder?**

In Western society, our conceptualizations of SLI and ASD derive largely from a medical model, in which diagnosis reflects a psychobiological dysfunction within an

individual that results in an atypical pattern of behavior or psychological function and confers adverse consequences for everyday functioning (Stein et al., 2010). This may also be considered a deficit model; for instance the proposed criteria for ASD in the Diagnostic and Statistical Manual of Mental Disorders (DSM-V, APA, 2011), include (a) persistent deficits in social communication and social interaction across contexts and (b) restricted, repetitive patterns of behavior, interests and activities. Similarly, SLI may be diagnosed when “language abilities are below age expectations in one or more language domains” (DSM-V: APA, 2011). Proposed criteria for SLI stipulate that regional, social or dialectal variations in language should not be considered disorder; similar cultural variations in social communication and social interaction are not explicitly provided in ASD criteria.

Another assumption of the medical model, inherent in a neutralist perspective of developmental disorder (cf. Tomblin, 2006), is that these deficits represent a biologically based deviation from the typical developmental trajectory. There is certainly overwhelming evidence that many, if not all, complex neurodevelopmental disorders arise from multiple genetic (and environmental) influences that alter neurobiological development (Bishop, 2009). Although in a minority of cases these biological influences are qualitatively different (i.e. a genetic mutation that yields physical and cognitive differences), the majority reflect a confluence of normal genetic variants that together increase risk for developmental delay (Constantino, 2011). In addition, the relationship between biology, environment, and behavior is complex and not well understood at present (Fisher, 2006), meaning that even if biological risk factors could be identified precisely, it would not necessarily be helpful in predicting an individual child’s cognitive and behavioral profile.

Thus the challenge for clinicians and researchers is to determine whether or not a child’s behavior deviates significantly from that of peers. In the West, diagnosis for language and communication disorders is largely based on performance on standardized



measures, in which normative data is provided and it is possible to calculate the extent to which an individual score deviates from the range of scores expected from other individuals of the same age. Application of standardized assessment in our increasingly multi-cultural societies is fraught with challenges. Carter et al. (2005) identified five broad categories for consideration in cross-cultural assessment: cultural influences on test performance, familiarity with being tested, effects of formal education, test content and use of pictures in test materials. We condense these five categories into two major considerations: assessment context and assessment content. Assessment context may include influences on performance, familiarity with testing situations and educational experience, but may also include family perceptions of what is a problem, beliefs about the causes of disorders and the stigma attached to them, family resources and experiences, and the availability of services once a 'disorder' has been identified. These contextual factors may influence both the extent to which families seek or comply with assessment, and how we interpret a child's performance on any given test. For instance, families who live in extreme poverty where disease, housing, adequate nutrition and/or family safety are of primary concern may not view communication difficulties as a high priority, or have the resources to participate in assessment and treatment. In other cultural settings, children with developmental disorders may be viewed as representing parental or family misdeeds, or the outcome of witchcraft (Cappiello & Gahagan, 2009; Dyches et al. 2004). Such families may be reluctant to seek professional services because of the resulting stigma which may affect employment or marital prospects for family members.

Once families get to the clinic, we must be mindful that the testing situation, in which children are asked to complete unusual tasks or to answer numerous questions posed by an unfamiliar adult who almost certainly knows the answers to these questions, may not be a situation experienced by many children outside mainstream Western cultures (Carter et

al., 2005). For instance, Carter and colleagues (2005) reported their experiences of testing language competence of children in rural Kenya as part of an investigation into the effects of cerebral malaria on language and cognitive development. They discovered that it was highly unusual for Kenyan children to sit and talk with adults, particularly unfamiliar adults, for extended periods of time. Instead, these children were much more likely to spend their time in polyadic situations with siblings and peers, thus making the testing situation culturally unusual from the most basic assumptions about communication. Similarly, seminal work by Saxe (1988) demonstrated that Brazilian street children demonstrated exceptional computational and problem solving abilities in their daily market selling activities, yet performed poorly on standard classroom measures of mathematical reasoning. Differences in the amount of formal schooling and literacy a child has may also profoundly affect his or her ability to comply with assessment requirements or his or her motivation to respond quickly, accurately and logically (Carter et al. 2005).

Once these hurdles have been addressed, we need to consider the assessment content, and the degree to which what we are asking is appropriate in different cultural contexts. Here a number of different challenges arise. The first is that some aspects of language and communication are easier to measure and thus a considerable bank of normative data exists for developmental milestones. For example, the age at which first words and phrases are acquired is well documented and is remarkably consistent across countries and cultures, though a large range of normal variation exists (Caselli et al., 1995). Similarly, vocabulary can be readily measured and though variable, identification of children with limited vocabularies for age is reasonably straightforward. Nevertheless, even for speakers of the same language, cultural variations in vocabulary may prove problematic. For example, administration of vocabulary tests published in the US to UK children (who ostensibly speak the same language) usually requires substitution of items such as 'flashlight' 'soccer' and

'vacation'. Most US children may have similar difficulties defining 'torch' 'football' and 'holiday' in relevant UK terms. Picture materials further complicate matters: US items for 'flag' (the Stars and Stripes) and 'country' (an outline of the continental US) are less familiar to children outside of America. Carter et al. (2005) describe more fundamental problems with picture recognition for children from rural Kenya who did not attend school and did not have access to photographs or drawings that represented known objects. These children may confuse visually similar items, or may be better able to provide a definition, rather than a label, for a familiar object that they have never seen in a picture before. Even when pictures are familiar objects, differences in expected responses can be biased against children who respond with answers that are culturally appropriate, but are not the expected response on a standardized test. For example, in clinical practice we have observed Puerto Rican children in the United States consistently provide descriptive phrases instead of labels during picture vocabulary assessments; for instance when looking at a picture of a knife the child may reply, "for cutting". This may reflect a cultural preference for describing an object rather than labeling it (Pena & Quinn, 1997), but the response would nevertheless be marked incorrect on a standardized test.

Other aspects of language show less variation within a population, but are more language/culture specific. For example, in English, children typically acquire adult levels of tense marking (for example, past tense -ed and 3<sup>rd</sup> person singular -s) by the age of 5; children who fail to acquire these markers by this age would likely be diagnosed with SLI. However, in non-English speaking communities, verb morphology would not necessarily be such a good marker of impaired language development and measures of English vocabulary would reveal only a portion of their lexical skills (Leonard, 2009). Dialectal differences in spoken language can also blur the lines between diverse expression and disorder. Omission of the article 'the' as in 'he went to hospital' would be very unusual in mainstream American

English, but would be perfectly typical in mainstream British English. Similarly, ‘he were angry’ may cause concern in the US, but is an acceptable form in some dialects of British English.

It has become increasingly clear that there are few standardized assessments that are valid and reliable measures of linguistic structure for children outside of white, Western, middle-class, populations (Hirsh-Pasek, Kochanoff, Newcombe, & de Villiers, 2005). In recent years, considerable efforts have been made to distinguish cultural difference from disorder in varying dialects of American English. For example, a recently developed and innovative test battery was specifically designed to identify children at risk for a developmental language disorder in a population whose native language shared some linguistic features of children with a diagnosis of SLI. The Diagnostic Evaluation of Language Variation (DELV) (Seymour, Roeper, & de Villiers, 2005) identifies children whose speech and language differ from mainstream American English, such as native speakers of African American English (AAE), and it determines whether their language differences are indicative of a potential language disorder or are in line with the typically observed features of the AAE dialect they have learned to speak at home. A pioneering component of the test design, and one of the crucial elements behind the success of the test instrument, was found in identifying language features in which mainstream American English and AAE were similar (noncontrastive) and those in which they differed (contrastive features) (Seymour, 2004). In order to do this, extensive research was undertaken to chart language acquisition across the early elementary years with the goal of documenting contrastive vs. noncontrastive features in all domains of language—syntax, morphosyntax, semantics, pragmatics, and phonology for speakers of these two varieties of English. This allowed Seymour and colleagues to create an assessment instrument in which responses to test items given by children who speak AAE (and do not speak mainstream

American English) could be identified as typical or deviating from the linguistic patterns observed in their home language, rather than using contrasting features of mainstream English to make normative judgments (Pearson, 2004). In fact, the diagnostic procedures that emerged from the research were so effective that in pilot testing the DELV the researchers found that it was also a valid assessment for speakers of other dialects, including Cajun-English and Appalachian-English (Seymour, 2004), as well as mainstream American English. Assessments using a similar philosophy are being developed for children in the US from Spanish-speaking backgrounds, but standardized assessments that use geographically local normative data are lacking for many world languages.

If there are problems developing culturally sensitive measures of children's linguistic structure, it is even more of a challenge for measures of pragmatic language and social communication skills, yet deficits in pragmatics and social communication may be equally detrimental to social and academic success. This was dramatically demonstrated in one study of 242 seven-year-old children attending specialist language units and schools for SLI in England, in which their teachers and SLTs independently reported whether children displayed deficits in articulation; phonology; syntax/morphology; or semantics and pragmatics. For a substantial minority of students (~30%), teacher/SLT report was the only indication that the child had a communication impairment severe enough to warrant a specialist educational placement. These children had significant pragmatic language deficits that were not identified by standardized tests of language competence (Botting, Conti-Ramsden, & Crutchley, 1997), highlighting the limitations of extant assessment instruments for measuring children's pragmatic language competence. This is no small problem given that pragmatics is the one pervasive dysfunction which is observed in all children with a diagnosis of ASD (Tager-Flusberg, Paul & Lord, 2005; Rollins & Snow, 1998).

Pragmatic aspects of language are notoriously difficult to measure in standardized

ways because they are a set of contextually dependent human behaviors that occur in dyadic exchanges; the formal structure of a standardized testing procedure makes it difficult to capture pragmatic problems that may arise in everyday situations where the rules of engagement are less explicit and highly dynamic (Adams, 2002; Norbury, Nash, Baird, & Bishop, 2004). Pragmatic language abilities are also highly susceptible to cultural variation: discourse rules such as turn-taking, interrupting, appropriate topic choices, use of eye-contact and other non-verbal strategies for maintaining interaction, the use of humor, the ability to question and challenge communication partners are largely determined by cultural rules and the child's relationship with his or her interlocutor (Carter et al., 2005). There are also far fewer hard and fast typical 'norms' for such behaviors. This is particularly true for social interactive behaviors; for example, the Autism Diagnostic Observation Schedule (ADOS: Lord, Rutter, DiLavore, & Risi, 1999) weights appropriate eye contact heavily in its diagnostic algorithm yet there are few established norms for how much eye contact we can/should expect between children and unfamiliar adults. There may also be considerable variation within the typical population and within an individual depending on the task or topic of conversation. For instance, Norbury, Brock, Cragg, Einav and Nation (2009) recorded eye-movements of adolescents as they watched dynamic scenes of social interaction. As expected, there were many adolescents with ASD who spent little viewing time fixating the eye-region of the protagonists, but that was also true of typical peers, with viewing times to the eyes ranging from zero to 70% in both groups. Similarly, Nadig, Lee, Singh, Bosshart, and Ozonoff, (2010) reported that both individuals with ASD and their TD peers increased eye gaze to a conversational partner when discussing a topic of interest, rather than a generic topic proposed by the examiners. Thus, although the combination of behaviors included in the ADOS algorithm robustly distinguishes children with ASD from peers, normative developmental data regarding the individual behaviors that make up the

algorithm are required.

To overcome some of these challenges, parents or teachers are often asked to provide ratings of pragmatic or social communication/interaction behaviors, often with parents and teachers providing different outcomes for the same child (Norbury, et al., 2004; Redmond & Rice, 2002). These discrepancies very clearly illustrate the influence of the cultural standards with which children are compared. For example, when asked to rate friendships, parents of children with ASD may often remark, “well, he has friends, but probably not the same kind of friendships that you or I would have.” Similarly, one parent’s report of a child who recites well-known animated cartoon scenes may fit well within the diagnostic category of restricted repetitive and stereotyped behavior, while another parent may take pride in their child’s ability to perform these sequences. This suggests that a sense of what constitutes stereotyped patterns of interest or inflexible adherence to routines may also vary by family or by culture.

Despite these limitations, the few social-pragmatic assessments that exist are being adopted in quite diverse cultural contexts, increasing the need to consider the cultural implications for task performance. For example, there are currently efforts underway to translate the Children’s Communication Checklist-2 (Bishop, 2003) into 30 different language and/or cultural contexts (D. Bishop, personal communication), though it was standardized on the communication profiles of British schoolchildren. While great care is taken to translate test items into the relevant language, empirical investigations of the clinical utility of the instrument in different communities are rare (Geurts et al., 2004; Helland, Biringier, Helland & Heimann, 2009; Ketelaars, Cuperus, van Daal, Jansonius, & Verhoeven, 2009). The need to understand cultural values in interpreting pragmatic language abilities is evident in the different cultural expectations of successful narrative discourse, a skill highly valued in the West, and crucial for early literacy learning (de

Villiers, 2004). In Western, English speaking cultures we tend to value narratives that are semantically and grammatically complex, with a clear temporal and causal structure. In Hispanic culture, narrators appear to be less concerned with the temporal organization of a story and place much more emphasis on evaluative devices within the narrative, stressing the emotional importance of events and making the story interesting for the listener (Silva & McCabe, 1996; Sparks, 2008). Ensuring that our pragmatic assessments tap a range of skills for which there are appropriate, culturally specific norms is necessary for discriminating children with pragmatic differences from those children who would be regarded by members of their own cultural community as having pragmatic deficits. The DELV is an example of a measure that does just that, with normative data on the narrative and broader pragmatic skills of AAE speakers (de Villiers, 2004).

Similar cultural challenges exist for the ADOS; there are now at least 17 translations of the ADOS underway, though the effect of potential cultural confounds on the validity and reliability of the instrument has not been thoroughly examined (Bernier, Mao, & Yen, 2010). This is surprising given clear differences in cultural expectations surrounding social-communication behavior. For instance, two behaviors, eye contact with adults and pointing with the index finger, were deemed to be inappropriate for children from a Chinese cultural background (Zhang, Wheeler, & Richey, 2006), though these behaviors are heavily weighted in the published diagnostic algorithm of the ADOS (Lord et al., 1999). For Chinese children then, lack of eye contact with adults or using the index finger to point would be a sign of difference from Western social expectations, not a deficit. There may be further cultural issues surrounding the extent to which adults engage in pretend play with children, comfort children with public displays of emotion or discuss emotional states and events openly, or the extent to which children (and particularly boys) are familiar with or likely to play with miniature toy dolls (particularly ones with moving eyes that have



positively frightened a few of our clients). In addition, Ametepee and Chitiyo (2009) noted that although only a few studies on autism have come from African countries, two of them reported that certain stereotypical behaviors (e.g., hand flapping or rocking) observed in children with an ASD diagnosis in Western countries were uncommon in children with the same diagnosis in Africa. Thus, an important avenue for future research is to start with the indigenous community to develop a measure that is sensitive to individual differences for a given set of communication behaviors within that community.

However, even if we ensure that children and families are familiar with the assessment context and that the content of the assessment is culturally appropriate for the population we are hoping to serve, we still have a major challenge in determining how deviant scores on standardized measures need to be in order to warrant a diagnosis. There is little clinical or research consensus on this issue, for instance, research studies may include as ‘impaired’ anyone falling below the 25<sup>th</sup> percentile to only those individuals scoring more than two standard deviations below the normative mean (bottom 3%). There is also little consensus on what pattern of behavioral impairment is the most clinically significant. For instance, a diagnosis of SLI may include deficits in language domains such as phonology, vocabulary, syntax, and social use of language. However, a child with a circumscribed “impairment” in phonology will have very different needs from a child with impaired development across multiple domains. Likewise, a number of social communication behaviors are included under the umbrella of ASD, but often outcome is determined by associated factors such as language and cognitive profile, rather than severity of social-communication impairment.

**Taking a normativist perspective: what is the impact of individual differences in language and social-communication behavior?**

Increasingly, diagnostic frameworks stress the importance of evaluating the impact of

disorder on every day well-being, although standard methods of assessing this impact are not well-developed in the area of children's language and social communication. One method for systematically considering impact is offered by the International Classification of Functioning, Disability and Health (World Health Organization, 2001). This framework considers the biological difference experienced by the individual (e.g. the genetic and neuroanatomical risks that are associated with difficulties learning grammatical rules) and how this difference (which results in expressive language scores significantly below age expectations) interferes with the individual's activity and participation in daily events. It also advocates consideration of contextual factors such as social attitudes and beliefs about impairment and practical obstacles to well-being. Contextual factors, particularly those related to local beliefs about child development, may be highly influential in determining which children attract clinical attention, or how disorders are viewed in different societies. Tomblin (2006, 2008) considers impact from a normativist perspective. Here, individual differences in behavior and cognition may only assume clinical importance if the impact of that difference is disvalued by the individual's culture. The degree to which an outcome is disvalued by a culture may be gauged by the extent to which caregivers feel compelled to intervene and assist a child in developing a particular skill. For instance, literacy is highly valued by Western, industrialized cultures; thus children with limited reading abilities are at high risk of negative outcomes, realized by reduced academic attainments and poor employment prospects (cf. Tomblin, 2008). Children in these cultures with a biological difference that confers risk for literacy difficulty are therefore likely to be diagnosed with a reading disorder and labeled 'dyslexic' or 'poor comprehender' in order to receive remedial services. Children with the same biological risk living in cultures in which literacy is not highly valued or where a lack of literacy is not a barrier to social or economic success would not be labeled as having a disorder.

An illustration of the importance of considering the impact of individual differences and the cultural values attached to those differences may be illustrated by the variable prevalence rates of ASD across the globe. Table 1 recounts current rates of ASD (per 10,000) in different countries around the world. The reasons for different prevalence rates have been discussed extensively (Fombonne, 2003) and may include sample size, ascertainment methods (i.e. medical records review versus direct assessment), case definition, age at diagnosis, and availability of autism services (Kogan et al., 2009), though biological factors and adverse environmental exposure cannot be ruled out. While methodological factors almost certainly explain a large amount of the variance in prevalence rates between Western societies and developing countries, some differences are not so easy to reconcile. For instance, both the UK and Denmark are wealthy, democratic, Western European societies, and yet a child in the UK is 1.7-9.6 times more likely to be diagnosed with ASD than a child in Denmark. There are also often discrepancies in prevalence rates within the same country; for instance, in the US, prevalence rates across the states range from 42 – 121 per 10,000, though this may be linked with availability of autism related services (Autism and Developmental Disabilities Monitoring Network, 2009). Sharp differences are also reported for different ethnic groups within the same country (Dyches, et al., 2004; Lord & Bishop, 2010). While this may be confounded by factors such as socioeconomic status, this doesn't appear to be the whole story. For instance, prevalence rates for ASD diagnosis in Hispanic communities are significantly lower than those reported for non-Hispanic communities, even when rates are adjusted for socioeconomic factors (Palmer, Walker, Mandell, Bayles, & Miller, 2010). The picture for African American children is more mixed. Earlier studies reported that African American children were 40% more likely than White peers to be receiving special education services for ASD (Dyches et al. 2004). On the other hand, Kogan, et al., (2009) reported that the odds of having an ASD diagnosis were

57% lower for African American children than for White children. The discrepancy could reflect methodological differences in case ascertainment, but may also be indicative of the fact that African American children are diagnosed on average 18 months later than White peers (Mandell, Listerud, Levy, & Pinto-Martin, 2002), and are more likely to have changing diagnoses (Mandell, Ittenbach, Levy, & Pinto-Martin, 2007).

When low rates are reported, there is an implicit assumption that these rates must somehow be erroneous and that improved access to medical and educational resources, in combination with more robust diagnostic procedures would increase consistency in identification rates across countries. For instance, a press release from Autism Speaks reporting on recently published prevalence research conducted in South Korea asserts:

if researchers look carefully, especially in previously understudied, non-clinical populations, they may find more children with ASD. In addition to the South Korean study, Autism Speaks is supporting similar epidemiological research efforts in India, South Africa, Mexico, and Taiwan, including the translation and adaptation of the gold-standard diagnostic instruments into languages spoken by more than 1.7 billion people worldwide. ([http://www.eurekalert.org/pub\\_releases/2011-05/as-nsr050611.php](http://www.eurekalert.org/pub_releases/2011-05/as-nsr050611.php)).

Alternative explanations may be that differences in prevalence rates reflect protective factors that exist within that community (Palmer et al. 2010), or that in some communities, the symptoms of ASD do not interfere with everyday life. Some communities and cultures appear to be more accepting or better able to accommodate individuals with language, cognitive or social-communication impairments, with diagnostic labels largely absent from these communities (Dyches et al. 2004). Dyches and colleagues discuss certain cultural values, for instance, emphasis upon family co-operation and a common concern for the well-being of all individuals within the family, found in Latino, African American, and Native American communities that may inspire a positive appraisal of children with disabilities. It has also been suggested that cultures that define human worth based on holistic or spiritual

values rather than physical or cognitive ability, or those that depend on family productivity rather than individual success for economic security may view developmental differences as less problematic (Cappiello & Gahagan, 2009). Within Hispanic communities, religious beliefs and extended family networks could reduce the impact of developmental differences, though future research is needed to uncover whether differences in genetic vulnerability or environmental exposure may be responsible for higher diagnostic rates in non-Hispanic White compared to Hispanic communities (Palmer et al. 2010).

Inspection of Table 1 indicates that some cultures appear to have higher than expected prevalence rates, with the highest reported in East Asian communities such as China, Japan (Sun & Allison, 2010) and more recently South Korea (Kim et al., 2011). This is somewhat surprising given that the stigma surrounding diagnosis of psychiatric disorder in these cultures (Lauber & Rossler, 2007) could be expected to reduce prevalence estimates. On the other hand, these cultures are renowned for their complex social hierarchies and prescribed social role relations, and an appreciation of contextual factors is paramount to effective functioning (Nisbett & Masuda, 2003). Thus, children who are unable to interpret the mental states of others, insensitive to social rules and fail to observe or integrate contextual information may be more likely to attract attention and have difficulties succeeding in social and educational environments.

The recent investigation by Kim, et al. (2011) speaks to these possibilities. At the time of writing, this study reports the highest known prevalence rates of ASD in a total population sample of school children living in South Korea: 260 per 10,000 or 1 in 38 children. The investigators used a rigorous sampling and assessment protocol that included the 'gold standard' instruments for research diagnosis of ASD in Western North American and European societies, the ADOS and the Autism Diagnostic Interview-Revised (Rutter, LeCouteur, & Lord, 2003). These instruments had been translated and adapted for use in

South Korea (though the changes made are not reported in the published paper) and diagnosis was based on best clinical estimate using clinicians trained in both North America and South Korea in an effort to reduce ‘potential cultural biases in case identification’ (p. 2). The sample included both a high-probability group of children on the disability register or receiving special educational supports, and a general population sample of children in mainstream schools. An intriguing result of this study was that 60% of children who screened positive and were sampled from the mainstream setting, for whom there was no reported history of educational concern or referral for psychological assessment, met diagnostic criteria for ASD. The conclusion is that there are large numbers of undiagnosed children with ASD in the general population, with consequent implications for improving identification and service provision.

However, this particular finding raises some important questions about difference and disorder and the need to incorporate impact into our diagnostic frameworks. If these children are succeeding in mainstream schools and are not causing concern, should we diagnose them with a disorder? What would the advantages and disadvantages be of labeling more children with ASD?

Before we can answer that question, we need to consider whether a cultural variable hinders identification, even if this may not be in the child’s best interest. For example, stigma surrounding identification of disorder may prevent some parents from actively seeking assessment even though they may be concerned about their child’s development. This does not seem to explain the Kim et al. findings; it is likely that families who actively wished to avoid diagnosis would not consent to take part in the study. Indeed, only 13.4% of the families with children who screened positive for an ASD in mainstream settings were seen for in-depth evaluation, either because families withheld consent or did not attend further assessment. An alternative explanation is that rather than having a disorder, these

children represent the tail end of the normal variation in social communication behavior within this culture, but that they are displaying traits that are regarded as symptoms of ASD on the ADOS. For example, making eye contact with an unfamiliar adult may be socially inappropriate in South Korea (cf. Blais et al. 2008), but observed low levels of eye contact could tip the balance on the ADOS algorithm toward a diagnosis of ASD. The research team did rigorously attempt to account for potential cultural differences, by interviewing parents and teachers to identify local beliefs and knowledge about ASDs that could influence the way parents report symptoms or consent to participate in the study and complemented rigorous translations with consistent behavioral coding across examiners from both North America and South Korea. Nevertheless we must acknowledge that such studies are starting from a Western cultural perspective on ASD symptomology, and there is no independent assessment of the sensitivity and specificity of a modified ADOS for distinguishing children with ASDs from other populations in South Korea.

Interestingly, the children identified in mainstream settings had milder symptom profiles and higher IQs than those identified from the disability registrar and appeared to be succeeding in the mainstream school setting. The authors note that the school system in South Korea is highly structured and emphasizes behavioral regulation and academic success more than social activity (Kim, et al. 2011). Thus, able children with mild social-communicative differences may be able to meet societal expectations of behavior and academic attainment. Should a diagnosis of disorder be restricted to those children with multiple developmental concerns who are unable to fully participate in school and home environments? Or does this finding suggest that we in the West learn from the experiences of the South Koreans about how to include children with diverse social-communication abilities/styles in mainstream settings? Future research will need to address the question of whether the exportation of diagnosis and treatment models for neurodevelopmental

disorders from Western countries is helping children and families from other cultural backgrounds or whether we are at risk of pathologizing people who may be well adjusted within their own communities.

A similar argument could be made for identification of children with SLI. The most commonly cited prevalence statistic for SLI comes from a population study of children starting school in Iowa (Tomblin et al. 1997). In this study, SLI was assessed using a battery of tests that tapped three language domains (vocabulary, grammar and narrative) in two modalities (production and comprehension), yielding five composite scores. SLI was diagnosed if at least two of the five composite scores was more than 1.25SD below the normative mean (bottom 10<sup>th</sup> centile), yielding a prevalence estimate of 7.4%. An intriguing finding from this study was that only 29% of children who met these research criteria for SLI had been identified by parents or practitioners as having language difficulties. If more stringent severity criteria were employed to include only those children with composite language scores of -2SD or greater, the overall prevalence rate was reduced, but the percentage of children clinically referred for language difficulties only rose to 39% (Zhang & Tomblin, 2000). This suggests that the features that lead to identification of SLI in everyday circumstances may be different from those identified by standardized tests (Bishop & Hayiou-Thomas, 2008). Specifically, children with poor speech articulation and limited verbal output are more likely to be referred to clinical services (Bishop & Hayiou-Thomas, 2008; Tomblin & Zhang, 2000). Perhaps these deficits are more easily observed by adults because they blatantly interfere with the child's ability to be understood and participate fully in social interactions and educational activities.

These studies suggest that screening without taking account of impact has the potential to over identify children that are otherwise fine. If the benefits of identifying unsuspecting families with clinical disorders outweighed the costs of potentially



misdiagnosing as impaired an otherwise healthy child, we might conclude that this was acceptable. However, it is notable that population screening of the kind reported above has not been recommended for either disorder (Al-Qabandi, Gorter & Rosenbaum, 2011; Nelson, Nygren, Walker & Panoscha, 2006). The primary reasons are that even in Western societies, we do not have the capacity to treat all children identified on screening measures as ‘at-risk’, nor is there a sufficient evidence base with which to recommend effective treatments that will improve outcomes for children with ASD or SLI. This is even more likely to be the case in countries outside of North America, Western Europe and Australasia in which clinical and educational services are in their infancy. Thus the cost of diagnosis could be increased family concern and distress with little support from clinical or educational services. Others have argued that while it is important to measure impact, this should not be taken into account in the diagnostic process (Rutter, 2011), the reason being that in other areas of medicine it is useful to know that an individual has a condition even if it has little impact at the present time (i.e. high blood pressure or diabetes). This assertion highlights the fact that impact is not static, but changes with developmental time. Tomblin (2008) noted that although many kindergartners with low language scores did not attract clinical attention at school entry, they were more likely to experience later difficulties with reading comprehension and these difficulties did impact on their educational outcomes. He therefore argued that it is important to identify and monitor early vulnerabilities in order to circumvent later adverse outcomes. Longitudinal studies charting the developmental outcomes of school-aged children with social-communicative vulnerabilities are lacking but studies of infant siblings at risk of ASD show remarkably varied developmental outcomes in early childhood (cf. Elsabbagh & Johnson, 2010). It may be that the children identified by Kim et al. (2011) succeed in a highly structured educational setting, but that they experience more adverse impacts when they leave school at must find employment or fulfilling social

relationships. Longitudinal studies following these population cohorts are urgently needed in order to inform our decisions about difference or disorder.

In sum, developmental disorders of language and communication bring issues surrounding diversity into sharp focus. Although we know that these disorders have a biological basis, the impact of these biological differences on the individual's ability to participate fully in society is largely culturally determined. Prevalence rates for disorder vary dramatically across country and cultural boundaries. This is no doubt due in large part to differences in sampling procedures, diagnostic definitions, assessment and availability of resources. However, we should not discount the possibility that cultural values may in some circumstances magnify behavioral differences and increase the impression of 'disorder.' Shifting from a neutralist model to a more normativist model of disability (as suggested by Tomblin, 2006) may encourage us to think of ways that biological differences in language and social-communication behavior may be more readily accommodated in mainstream society.

### **Why are cross-cultural comparisons crucial to informing theories about the cognitive origins of developmental language disorders?**

Despite these challenges, cross-cultural studies are vital in allowing us to identify 'universal' features of disorder and to refine our hypotheses about the cognitive bases of developmental disorders. Two examples are illustrative of this point and are discussed below in relation to SLI and ASD.

**Cognitive theories of SLI.** SLI has often been seen as a test case for the notion that language development is supported by specific, innate neural architectures and that SLI arises from selective impairment to this language module (van der Lely, 2005). The very label 'specific' language impairment denotes that language may be selectively impaired in

the face of otherwise normal cognitive development. In English, this is a very appealing hypothesis; obligatory morphosyntactic structures such as 3<sup>rd</sup> person singular –s are omitted from expressive language long after it is developmentally appropriate to do so, and these grammatical errors are not related to vocabulary or non-verbal reasoning (Rice, Tomblin, Hoffman, Richman, & Marquis, 2004). Even more puzzling is that phonologically identical suffixes such as plural –s, which do not mark grammatical relationships, do not challenge English speaking children with SLI (Oetting & Rice, 1993; Rice & Oetting, 1993). A parsimonious explanation is that children with SLI experience a delayed maturation of the grammatical system that supports tense marking (Rice, Wexler, & Hershberger, 1998). However, cross-cultural studies have queried this assumption. Most notably, Italian and Spanish speaking children with SLI do not omit affixes marking tense and agreement in their spontaneous speech at greater rates than MLU-matched peers (Bedore & Leonard, 2005; Bortolini, Caselli, & Leonard, 1997). In these languages, tense and agreement inflections are syllabic and appear in stressed or word final positions, increasing their perceptual salience. In contrast, corresponding inflections in English are not syllabic, tend to be unstressed and unvoiced, and are therefore not perceptually salient. These observations led to development of the Surface Hypothesis (Leonard, 1998) which postulated that children with SLI had a limited capacity for cognitive processing in combination with perceptual weaknesses. This domain-general impairment could be particularly deleterious for learning morphosyntactic forms in English because of the phonological properties of these verb inflections in connected English speech:

If inflected words were typically heard in one-word sentences separated by pauses, there would be no problem. However, fast on the heels of the inflected word is the next word in the utterance that must be held in working memory and processed, and so on. Thus, processing is pressed from two directions; processing of a first item must be completed before the item fades from memory, and it must be processed in time for the next item. Given the reduced speed of processing assumed for children with SLI, sufficient processing of one item can't be completed before the next item appears. Consequently, some material is processed incompletely or not at all. In a language

like English, it is reasonable to expect that if an inflected word is incompletely processed, only the bare stem will be retained. (Leonard, 1998, p. 251)

Further delineation of the SLI phenotype across cultures and across different developmental disorders (e.g. moderate sensori-neural hearing loss) has led to refinement of the Surface Hypothesis (Leonard, 2009), and has begun to suggest some universals in SLI that occur across languages. These may include protracted rates of acquisition of first words and phrases, deficits in implicitly learning and/or remembering novel motor or phonological sequences and complex rules (Ullman & Pierpont, 2005). Assessment of these underlying cognitive skills has the advantage of not requiring explicit linguistic content, which heralds the possibility of an instrument that may be more universally applied (Campbell, Dollaghan, Needleman & Janowsky, 1997).

**Cognitive theories of ASD.** Over the last 30 years there has been considerable research effort to specify the aspects of autistic cognition that could fully explain the behavioral phenotype. Many investigators have focused on the core social deficit and have attempted to explain how atypical social interactions may adversely affect development of social cognition (Baron-Cohen, 1995; Klin, Jones, Schultz, & Volkmar, 2003). There are varying manifestations of this theory, but substantial credence has been given to the importance of attending to the eye region of faces. Specifically it has been suggested that individuals with ASD fail to orient to relevant social cues, particularly the eyes. Empirical research supports this observation; numerous eye-tracking studies of Western North American and European individuals with ASD have demonstrated reduced fixation time to the eyes, with some reporting a corresponding increase in fixation time to the mouth, relative to neurotypical peers (Klin, Jones, Schultz, Volkmar, & Cohen, 2002). If eyes are hypothesized to be important conveyors of mental and emotional states of others, a failure to engage in prolonged eye contact will result in reduced opportunities to learn about the

internal states of others, and a protracted rate or qualitatively different development of a theory of mind. Reduced attention to the eyes may further contribute to abnormalities in social interaction, social learning and social knowledge.

However, cross-cultural investigations suggest that how we look at faces is shaped by our cultural experiences. Comparison of Western Caucasian and East Asian children (Kelly et al., 2011) and adults (Blais, Jack, Scheepers, Fiset, & Caldara, 2008) has demonstrated that individuals from Asian cultures do not preferentially fixate the eye region of the face, instead directing fixations centrally to the nose. This likely reflects cultural expectations that direct eye contact is considered rude in many Asian cultures. On the other hand, one could argue that these findings are irrelevant for a social deficit hypothesis of ASD; regardless of face scanning patterns of older children and adults, it is possible that infants universally demonstrate a preference for fixating the eye regions of caregiver faces and that this is a developmental prerequisite for social cognitive development. Cross-cultural data to support this hypothesis are lacking, but there are data demonstrating that the preference for central (nose) fixations is evident in 9-month-old Asian infants (Liu et al., 2011) and that Western infants demonstrate considerable variation in fixation patterns, with fixation to eyes in infancy not generally predicting diagnostic status or social competence in toddlerhood (Young, Merin, Rogers, & Ozonoff, 2009).

We do not wish to suggest that eye contact and visual scanning of faces is irrelevant to social development, or that differences in face scanning won't help us to understand the developing cognitive phenotype of ASD. However, we would suggest that these cross-cultural findings of typically developing individuals indicate that reduced visual fixation to the eye region of human faces is not necessarily maladaptive, nor need it lead to disrupted social understanding. Instead, there may be different routes to deriving social information from people and situations (Akhtar & Gernsbacher, 2008); these may

be accentuated by cultural differences, but may also reflect typical variation within a culture, rather than disordered development.

Cross-cultural comparisons of neurotypical individuals have also been key in unraveling the causal connections between observed behavior and autistic cognition in another influential theory, the weak central coherence (WCC) theory (Frith, 2003). Again, there are different manifestations of this theory, but it essentially argues that individuals with ASD lack the 'typical' drive to integrate information holistically at a global level and instead preferentially focus on local details, resulting in a fragmented perceptual and cognitive experience of the world (Happé & Frith, 2006). Cross-cultural investigations, however, have demonstrated that strong local biases do not necessarily go hand in hand with disrupted global percepts. Davidoff and colleagues (Davidoff, Fonteneau, & Fagot, 2008) studied local and global biases in the remote Himba culture of northern Namibia. Adult members of the tribe showed exceptionally strong local biases when making similarity matches to the Navon hierarchical images, in which a shape (large circle made up of small xs) can be matched to another shape at either a global level (large circle made up of small circles) or a local level (large square made up of small xs). The Himba had stronger local preferences than other typical adult populations and in line with results reported for Western individuals with ASD (Happé, 1999). Yet these same individuals displayed similar patterns of global processing on measures of face recognition, arguing against a direct causal relationship between local processing biases and the behavioral manifestations of ASD.

Unfortunately, we know of no studies that directly compare the cognitive phenotype of children with ASD from different cultural backgrounds. Such studies could be particularly informative; for example, none of the eye-tracking studies of Western individuals with ASD

has explicitly calculated fixation time to nose regions, nor do we know if East Asian individuals with ASD would show face scanning patterns more 'typical' of peers with the same cultural identity. Such findings would further elucidate the importance of direct eye gaze for understanding the social deficits that characterize ASD, particularly if data were obtained in longitudinal studies that delineated the developmental trajectories of gaze patterns, social behavior and social cognition.

Cross-cultural studies could also be hugely informative in identifying potential protective factors and their influence on the developmental course of the disorder. For instance, as noted above, cultures differ in their preferences for attending to local detail or global context. In contrast to the extreme local biases in Himba culture, East Asian cultures may be at the opposite extreme; they are characterized as holistic cultures, in which attention to the surrounding context is emphasized over attention to focal objects within the context (Nisbett & Masuda, 2003). It would be beneficial to discover if a child with ASD raised in a more holistic culture would show the same local biases reported for Western children with ASD, and/or whether, like the Himba, global processing would be indistinguishable from peers due to the pervasive and explicit focus on contextual factors. In a similar vein, many Asian languages explicitly mark the speaker's certainty about belief statements, which may facilitate performance on false-belief tasks for young, typically developing children (D. Liu, Wellman, Tardif, & Sabbagh, 2008; Matsui, Rakoczy, Miura, & Tomasello, 2009). It would therefore be theoretically interesting to discover if these salient linguistic markers support development of theory of mind in Asian children with ASD, just as salient linguistic structures in languages such as Italian and Spanish support production of those structures for children with SLI growing up in that linguistic culture. Thus, cross-cultural studies can not only help us to delineate universal features of disorder as well as culturally specific phenotypes, but can also help us to refine our cognitive

theories and identify environmental supports for cognitive development.

### **Implications for Practice and Research**

We began this review with a stark illustration of the challenges faced by clinicians and researchers working in an increasingly global and multi-cultural society, which prompted us to question whether what we see is a difference or a disorder. There is little doubt that conditions such as SLI and ASD are universal, biologically influenced and cross country and cultural boundaries. However, we have argued in this paper that there is far less consensus on where the boundary between difference and disorder lies. We have also argued that decisions about where to draw the line, and the materials we use to inform those decisions are heavily influenced by our cultural experiences and expectations. How we intervene and support children with developmental disorders and the conclusions we come to about the cognitive underpinnings of disorder are also subject to cultural biases.

In clinical practice, this means that we must be mindful of the cultural environment of individual children and their families. The need for SLTs and psychologists from diverse cultural backgrounds is great, as is the need for more culturally appropriate assessment practices (cf. Carter et al. 2005). In developing our clinical practice, it would be wise to put to one side (at least temporarily) our culturally specific notions of what constitutes SLI and ASD. Instead, we need to start from the family's point of view and try to discover what, if anything, they are worried about and what they value and disvalue about child language, behavior and education. In our view, consideration of the impact of language and social communication differences on the child's every day experiences is paramount. Key questions a clinician will need to ask is how does this child's difference impact on family well-being, educational attainment, and/or employment prospects? Does the impact change over developmental time? An appreciation of cultural values can also influence decisions about treatment and suggests that we need to ensure a balance between defining and



understanding a child's 'deficits' and adapting the environment to accommodate a child's differences. The goals of intervention may reflect our perspectives on the child: a neutralist may focus on increasing skill to a level commensurate with age peers. A normativist, on the other hand, may be more interested in developing skills that will protect the child from later adverse outcomes. Either way, we must recognize that interventions that show promising results in the West may not fit well with communication practices in other cultural groups (van Kleeck, 1994) and may be entirely inappropriate for treating disorders in other contexts.

We have also argued throughout this paper that cross-cultural research is important not only for delineating disorder across the globe, but for the potential it brings in helping us to refine our understanding of disorders that are familiar to us in our own communities. There can be no doubt that cross-cultural research is challenging: application of assessment tools and theoretical perspectives derived in the West to other cultural communities is not appropriate. Yet developing new materials for diverse cultural experiences is a labor intensive process (cf. Carter et al. 2005; Seymour & Pearson, 2004) and also raises interesting questions about how far we can change the content and materials of a test before we are essentially testing for something completely different. In other words, if the diagnostic criteria for ASD differ significantly from country to country (i.e. sometimes includes poor eye contact and sometimes does not), how do we know that we are comparing like with like? Again, a focus on impact might be informative; if ASD, however defined, confers similar risks to a socially defined outcome, we may be confident that the differences in behavior are clinically significant. This has proven effective in cross-cultural research on SLI; although the specific linguistic manifestations of disorder necessarily differ across language communities, the impact of SLI for language learning may have more universal or similar consequences for children's lives across cultural contexts. Longitudinal studies of

SLI have also demonstrated how early language differences may in fact represent vulnerabilities that over time lead to adverse outcome. Longitudinal studies of children identified as meeting diagnostic criteria for ASD but who are not presently disadvantaged by their social-communication are essential in helping us to determine which differences require careful monitoring and which simply reflect the rich diversity of human behavior. New experimental techniques such as eye-tracking, which focus on the how of language and social-communication processing rather than just the what, will facilitate cross-cultural research in this area. Cross-cultural comparisons embedded in a truly developmental framework, in which individual differences in language, social behavior and cognition are charted over time will be particularly powerful in enabling us to look at how cultural context may shape developmental trajectories from early childhood into later life. This will in turn provide new insights into the cognitive basis of developmental disorders and promote clinical decision making from a more global perspective.

### References

- Adams, C. (2002). Practitioner review: the assessment of language pragmatics. *Journal of Child Psychology and Psychiatry*, 438, 973-987. DOI: 10.1111/1469-7610.00226
- Akhtar, N., & Gernsbacher, M.A. (2008). On privileging the role of gaze in infant social cognition. *Child Development Perspectives*, 2, 59-65. doi: 10.1111/j.1750-8606.2008.00044.x
- Al-Farsi YM, Al-Sharbati MM, Al-Farsi OA, Al-Shafae MS, Brooks DR, Waly MI. (2011). Brief report: Prevalence of autistic spectrum disorders in the Sultanate of Oman. *Journal of Autism and Developmental Disorders*, 41(6), 821-825. DOI: 10.1007/s10803-010-1094-8
- Al-Qabandi, M., Gorter, J.W., & Rosenbaum, P. (2011). Early autism detection: are we ready for routine screening? *Pediatrics*, published online June 13, 2011; DOI: 1p.1542/peds.2010-1881.
- American Psychiatric Association (2011). DSM-V Development.  
<http://www.dsm5.org/proposedrevision/Pages/NeurodevelopmentalDisorders.aspx>  
Retrieved 26 September 2011.
- American Speech Language and Hearing Association (ASHA) (2011). Demographic profile of ASHA members providing bilingual and Spanish-language services. ASHA Web  
Retrieved from <http://www.asha.org/Demographic-Profile-Bilingual-Spanish-Service->
- Ametepee, L., & Chitiyo, M. (2009). What we know about autism in Africa: A brief research synthesis. *Journal of the International Association of Special Education*, 10, 11–13.  
<http://web.ebscohost.com.libproxy.txstate.edu/ehost/pdfviewer/pdfviewer?sid=03730002-8334-4613-b6c6-49e0d90794c3%40sessionmgr115&vid=2&hid=126>
- Autism and Developmental Disabilities Monitoring Network Surveillance Year (ADDM)

- (2009). Prevalence of autism spectrum disorders-Autism and Developmental Disabilities Monitoring Network MMWR Surveillance Summary, 2006. 14, Sites, United States: Centers for Disease Control and Prevention.
- Baron-Cohen, S. (1995). *Mindblindness: An essay on Autism and Theory of Mind*. Cambridge: MIT Press.
- Bedore, L., & Leonard, L. (2005). Verb inflections and noun phrase morphology in the spontaneous speech of Spanish-speaking children with specific language impairment. *Applied Psycholinguistics*, 26, 196-225. DOI: 10.1017/S0142716405050149
- Bernier, R., Mao, A., & Yen, J. (2010). Psychopathology, families and culture: autism. *Child and Adolescent Psychiatric Clinics of North America*, 19, 855-867. doi:10.1016/j.chc.2010.07.005
- Bishop, D. V. M. (2003). *Children's Communication Checklist-2*. London: Psychological Corporation.
- Bishop, D. V. (2009). Genes, cognition, and communication: insights from neurodevelopmental disorders. *Annals of the New York Academy of Science*, 1156, 1-18. DOI: 10.1111/j.1749-6632.2009.04419.x
- Bishop, D. V., & Hayiou-Thomas, M. E. (2008). Heritability of specific language impairment depends on diagnostic criteria. *Genes Brain and Behavior*, 7, 365-372. DOI: 10.1111/j.1601-183X.2007.00360.x
- Blais, C., Jack, R. E., Scheepers, C., Fiset, D., & Caldara, R. (2008). Culture shapes how we look at faces. *PLoS One*, 3(8), 1-8. doi:10.1371/journal.pone.0003022
- Bortolini, U., Caselli, M. C., & Leonard, L. (1997). Grammatical deficits in Italian-speaking children with specific language impairments. *Journal of Speech, Language, and Hearing Research*, 40, 809-820.
- Botting, N., Conti-Ramsden, G., & Crutchley, A. (1997). Concordance between

- teacher/therapist opinion and formal language assessment scores in children with language impairment. *European Journal of Disorders of Communication*, 32, 317-327.
- Bruner, J. (1990). Culture and human development: A new look. *Human Development*, 33, 344-355.
- Campbell, T, Dollaghan, C, Needleman, H, & Janosky J. (1997). Reducing bias in language assessment: processing-dependent measures. *Journal of Speech Language and Hearing Research*, 40, 519-525.
- Cappiello, M.M. & Gahagan, S. (2009). Early child development and developmental delay in indigenous communities. *Pediatric Clinics of North America*, 56, 1501-1517.  
doi:10.1016/j.pcl.2009.09.017
- Carter, J. A., Lees, J. A., Muria, G. M., Gona, J., Neville, B. G. R., & Newton, C. R. J. C. (2005). Issues in the development of cross-cultural assessments of speech and language for children. *International Journal of Language and Communication Disorders*, 40, 385-401. DOI: 10.1080/13682820500057301
- Caselli, M. C., Bates, E., Casadio, P., Fenson, J., Fenson, L., Sander, L., & Weir, J. (1995). A cross-linguistic study of early lexical development. *Cognitive Development*, 10, 159-199.
- Constantino, J.N. (2011). The quantitative nature of autistic social impairment. *Pediatric Research*, 69, 55R-62R. DOI: 10.1203/PDR.0b013e318212ec6e
- Davidoff, J., Fonteneau, E., & Fagot, J. (2008). Local and global processing: observations from a remote culture. *Cognition*, 108, 702-709.  
[doi:10.1016/j.cognition.2008.06.004](https://doi.org/10.1016/j.cognition.2008.06.004)
- De Giacomo, A., & Fombonne, E. (1998). Parental recognition of developmental

- abnormalities in autism. *European Journal of Child Adolescent Psychiatry*, 7, 131- 136. DOI: 10.1007/s007870050058
- De Villiers, P. (2004). Assessing pragmatic skills in elicited production. *Seminars in Speech and Language*, 25, 57-71. DOI: 10.1055/s-2004-824826
- Dyches, T. T., Wilder, L. K., Sudweeks, R. R., Obiakor, F. E., & Algozzine, B. (2004). Multicultural issues in autism. *Journal of Autism and Developmental Disorders*, 34, 211-222. DOI: 10.1023/B:JADD.0000022611.80478.73
- Elsabbagh, M. & Johnson, M. (2010). Getting answers from babies about autism. *Trends in Cognitive Science*, 14, 81-87. [doi:10.1016/j.tics.2009.12.005](https://doi.org/10.1016/j.tics.2009.12.005)
- Fisher, S. E. (2006). Tangled webs: tracing the connections between genes and cognition. *Cognition*, 101, 270-297. [doi:10.1016/j.cognition.2006.04.004](https://doi.org/10.1016/j.cognition.2006.04.004)
- Fombonne, E. (2003). Epidemiological surveys of autism and other pervasive developmental disorders: an update. *Journal of Autism and Developmental Disorders*, 33, 365-382. DOI: 10.1023/A:1025054610557
- Fombonne E, Du Mazaubrun C, Cans C, Grandjean H. (1997). Autism and associated medical disorders in a French epidemiological survey. *Journal of the American Academy of Child and Adolescent Psychiatry*. 36(11), 1561-1569. [doi:10.1016/S0890-8567\(09\)66566-7](https://doi.org/10.1016/S0890-8567(09)66566-7)
- Fombonne E, Zakarian R, Bennett A, Meng L, McLean-Heywood D. (2006). Pervasive developmental disorders in Montreal, Quebec, Canada: prevalence and links with immunizations. *Pediatrics*, 118(1), e139-150. doi: 10.1542/peds.2005-2993
- Frith, U. (2003). *Autism: Explaining the Enigma*. Oxford: Blackwell Publishing.
- Geurts HM, Verté S, Oosterlaan J, Roeyers H, Hartman CA, Mulder EJ, Berckelaer-Onnes IA, Sergeant JA. (2004). Can the Children's Communication Checklist differentiate between children with autism, children with ADHD, and normal controls? *Journal of*

- Child Psychology and Psychiatry*, 45, 1437-1453. DOI: 10.1111/j.1469-7610.2004.00326.x
- Gillberg C, Cederlund M, Lamberg K, Zeijlon L. (2006). Brief report: "the autism epidemic". The registered prevalence of autism in a Swedish urban area. *Journal of Autism and Developmental Disorders*, 36(3):429-435. DOI: 10.1007/s10803-006-0081-6
- Happé, F. (1999). Autism: cognitive deficit or cognitive style? *Trends in Cognitive Science*, 3, 216-222. [doi:10.1016/S1364-6613\(99\)01318-2](https://doi.org/10.1016/S1364-6613(99)01318-2)
- Happé, F., & Frith, U. (2006). The weak coherence account: detail-focused cognitive style in autism spectrum disorders. *Journal Autism and Developmental Disorders*, 36, 5-25. [doi:10.1016/S1364-6613\(99\)01318-2](https://doi.org/10.1016/S1364-6613(99)01318-2)
- Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences*, 1-75. DOI: 10.1017/S0140525X0999152X
- Helland WA, Biringer E, Helland T, Heimann M. (2009). The usability of a Norwegian adaptation of the Children's Communication Checklist Second Edition (CCC-2) in differentiating between language impaired and non-language impaired 6- to 12-year-olds. *Scandinavian Journal of Psychology*, 50, 287-292. DOI: 10.1111/j.1467-9450.2009.00718.x
- Hirsh-Pasek, K., Kochanoff, A., Newcombe, N., & deVilliers, J. (2005) Using scientific knowledge to inform preschoolers: Making the case for –Empirical validity. Social Policy Report, XIX. *Society for Research in Child Development*.
- Jaarsma, P., & Welin, S. (2011). Autism as a Natural Human Variation: Reflections on the Claims of the Neurodiversity Movement. *Health Care Anal.* doi: 10.1007/s10728-011-0169-9. DOI: 10.1111/j.1467-9450.2009.00718.x
- Kawamura Y, Takahashi O, Ishii T. (2008). Reevaluating the incidence of pervasive developmental disorders: impact of elevated rates of detection through

- implementation of an integrated system of screening in Toyota, Japan. *Psychiatry Clinical Neuroscience*, 62(2), 152-159. DOI: 10.1111/j.1440-1819.2008.01748.x
- Kelly, D. J., Liu, S., Rodger, H., Miellet, S., Ge, L., & Caldara, R. (2011). Developing cultural differences in face processing. *Developmental Science*, 14, 1176-1184. DOI: 10.1111/j.1467-7687.2011.01067.x
- Ketelaars, M. P., Cuperus, J. M., van Daal, J., Jansonius, K., & Verhoeven, L. (2009). Screening for pragmatic language impairment: the potential of the children's communication checklist. *Research in Developmental Disabilities*, 30, 952-960. [doi:10.1016/j.ridd.2009.01.006](https://doi.org/10.1016/j.ridd.2009.01.006)
- Kim, Y. S., Leventhal, B. L., Koh, Y.-J., Fombonne, E., Laska, E., Lim, E.-C., et al. (2011). Prevalence of autism spectrum disorders in a total population sample. *American Journal of Psychiatry in Advance*. DOI: 10.1176/appi.ajp.2011.10101532
- Klin, A., Jones, W., Schultz, R., & Volkmar, F. (2003). The enactive mind, or from actions to cognition: lessons from autism. *Philosophical Transactions of the Royal Society of London B Biological Sciences*, 358(1430), 345-360. doi: [10.1098/rstb.2002.1202](https://doi.org/10.1098/rstb.2002.1202)
- Klin, A., Jones, W., Schultz, R., Volkmar, F., & Cohen, D. (2002). Visual fixation patterns during viewing of naturalistic social situations as predictors of social competence in individuals with autism. *Archives of General Psychiatry*, 59, 809-816. <http://archpsyc.ama-assn.org/cgi/reprint/59/9/809>
- Kogan, M. D., Blumberg, S. J., Schieve, L. A., Boyle, C. A., Perrin, J. M., Ghandour, R. M., et al. (2009). Prevalence of parent-reported diagnosis of autism spectrum disorder among children in the US, 2007. *Pediatrics*, 125, 1395-1403. doi: 10.1542/peds.2009-1522
- Lauber, C. & Rossler, W. (2007). Stigma toward people with mental illness in developing countries in Asia. *International Review of Psychiatry*, 19, 157-178.



doi:10.1080/09540260701278903

- Leonard, L. (1998). *Children with Specific Language Impairment*. Boston: MIT Press.
- Leonard, L. (2009). Cross-linguistic studies of child language disorders. In R. Schwartz (Ed.), *Handbook of Child Language Disorders* (pp. 308-324). New York: Psychology Press.
- Liu, D., Wellman, H. M., Tardif, T., & Sabbagh, M. A. (2008). Theory of mind development in Chinese children: A meta-analysis of false-belief understanding across cultures and languages. *Developmental Psychology, 44*, 523-531. doi: [10.1037/0012-1649.44.2.523](https://doi.org/10.1037/0012-1649.44.2.523)
- Liu, S., Quinn, P. C., Wheeler, A., Xiao, N., Ge, L., & Lee, K. (2011). Similarity and difference in the processing of same- and other-race faces as revealed by eye tracking in 4- to 9-month-olds. *Journal of Experimental Child Psychology, 108*, 180-189. doi:10.1016/j.jecp.2010.06.008
- Lord, C. & Bishop, S. (2010). Autism spectrum disorders: Diagnosis, prevalence, and services For children and families. *SRCD Policy Report, 24*, 1-21.
- Lord, C., Rutter, M., DiLavore, P. C., & Risi, S. (1999). *Autism Diagnostic Observation Schedule*. Los Angeles, CA: Western Psychological Services.
- Madsen KM, Hviid A, Vestergaard M, Schendel D, Wohlfahrt J, Thorsen P, Olsen J, Melbye M. (2002). A population-based study of measles, mumps, and rubella vaccination and autism. *New England Journal of Medicine, 347*(19), 1477-1482.
- Magnússon P, Saemundsen E. (2001). Prevalence of autism in Iceland. *Journal of Autism Developmental Disorders, 31*(2), 153-163. DOI: 10.1023/A:1010795014548
- Mandell, D. S., Ittenbach, R. F., Levy, S. E., & Pinto-Martin, J. A. (2007). Disparities in diagnoses received prior to a diagnosis of autism spectrum disorder. *Journal of Autism*

*and Developmental Disorders*, 37, 1795-1802. [doi:10.1097/00004583-200212000-00016](https://doi.org/10.1097/00004583-200212000-00016)

Mandell, D. S., Listerud, J., Levy, S. E., & Pinto-Martin, J. A. (2002). Race differences in the age at diagnosis among Medicaid-eligible children with autism. *Journal of American Academy of Child and Adolescent Psychiatry*, 41, 1447-1453. [doi:10.1097/00004583-200212000-00016](https://doi.org/10.1097/00004583-200212000-00016)

Matsui, T., Rakoczy, H., Miura, Y., & Tomasello, M. (2009). Understanding of speaker certainty and false-belief reasoning: a comparison of Japanese and German preschoolers. *Developmental Science*, 12, 602-613. DOI: 10.1111/j.1467-7687.2008.00812.x

Mbise, A. S., & Kysela, G. M. (1990). Developing appropriate screening and assessment instruments: the case of Tanzania. In M. J. Thorburn & K. Marfo (Eds.), *Practical approaches to childhood disability in developing countries: insights from experience and research* (pp. 225-244). St. John's, Canada: Project SEREDEC, Memorial University of Newfoundland.

Nadig, A., Lee, I., Singh, L., Bosshart, K., & Ozonoff, S. (2010). How does the topic of conversation affect verbal exchange and eye gaze? A comparison between typical development and high-functioning autism. *Neuropsychologia*, 48, 2730-2739. DOI:10.1016/j.neuropsychologia.2010.05.020

Nelson, H., Nygren, P., Walker, M. & Panoscha, R. (2006). Systematic Evidence Review for the US Preventive Services Task Force: Screening for Speech and Language Delay in Preschool Children, *Pediatrics*, 117;e298-e319.

Nisbett, R. E., & Masuda, T. (2003). Culture and point of view. *Proceedings of the National Academy of Sciences*, 100, 11163-11170. . doi: 10.1073/pnas.1934527100

Norbury, C. F., Brock, J., Cragg, L., Einav, S., Griffiths, H., & Nation, K. (2009). Eye-

movement patterns are associated with communicative competence in autistic spectrum disorders. *Journal of Child Psychology and Psychiatry*, 50, 834-842. doi:10.1111/j.1469-7610.2009.02073.

Norbury, C. F., Nash, M., Baird, G., & Bishop, D. (2004). Using a parental checklist to identify diagnostic groups in children with communication impairment: A validation of the Children's Communication Checklist--2. *International Journal of Language and Communication Disorders*, 39, 345-364.  
DOI: 10.1080/13682820410001654883

Ochs, E. & Schieffelin, B. B. (1986). Language socialization. *Annual Review of Anthropology*, 15, 163-191.

Oetting, J. & Rice, M. (1993). Plural acquisition in children with specific language impairment. *Journal of Speech and Hearing Research*, 36, 1236-1248.

Parner ET, Thorsen P, Dixon G, de Klerk N, Leonard H, Nassar N, Bourke J, Bower C, Glasson EJ. (2011). A comparison of autism prevalence trends in Denmark and Western Australia. *Journal of Autism Developmental Disorders*, 41(12), 1601-1608.  
DOI: 10.1007/s10803-011-1186-0.

Palmer, R. F., Walker, T., Mandell, D., Bayles, B., & Miller, C. S. (2010). Explaining low rates of autism among Hispanic schoolchildren in Texas. *American Journal of Public Health*, 100, 270-272. DOI: 10.2105/AJPH.2008.150565

Paula CS, Ribeiro SH, Fombonne E, Mercadante MT. (2011). Brief report: prevalence of pervasive developmental disorder in Brazil: a pilot study. *Journal of Autism and Developmental Disorders*, 41(12), 1738-1742. DOI: 10.1007/s10803-011-1200-6

- Pearson, B. Z., (2004). Theoretical and empirical bases for dialect-neutral language assessment: Contributions from theoretical and applied linguistics to communication disorders. *Seminars in Speech and Language*, 25, 13-25. DOI: 10.1055/s-2004-824822
- Pellicano, E. & Stears, M. (2011). Bridging autism, science and society: moving toward an ethically informed approach to autism research. *Autism Research*, 4, 271-282. DOI: 10.1002/aur.201
- Pena, E. (2007). Lost in translations: Methodological considerations in cross-cultural research. *Child Development*, 78, 1255-1264. DOI: 10.1111/j.1467-8624.2007.01064.x
- Pena, E. D., & Quinn, R. (1997). Task familiarity: Effects on the test of performance of Puerto Rican and African American children. *Language, Speech, and Hearing Services in Schools*, 28, 323-332.
- Redmond, S. M., & Rice, M. L. (2002). Stability of behavioral ratings of children with SLI. *Journal of Speech, Language, and Hearing Research*, 45, 190-201. doi:10.1044/1092-4388(2002/014
- Rescorla, L. (2009). Language and reading outcomes in late-talking toddlers: Support for a Dimensional perspective on language delay. *Journal of Speech, Language, and Hearing Research*, 52, 16-30. doi:10.1044/1092-4388(2008/07-0171)
- Rice, M. & Oetting, J. (1993). Morphological deficits of children with SLI: Evaluation of number marking and agreement. *Journal of Speech and Hearing Research*, 36, 1249-1257.
- Rice, M. L., Tomblin, J. B., Hoffman, L., Richman, W. A., & Marquis, J. (2004). Grammatical tense deficits in children with SLI and nonspecific language impairment: Relationships with nonverbal IQ over time. *Journal of Speech, Language, and Hearing Research*, 47, 816-834. doi:10.1044/1092-4388(2004/061)

- Rice, M. L., Wexler, K., & Hershberger, S. (1998). Tense over time: The longitudinal course of tense acquisition in children with specific language impairment. *Journal of Speech Language, and Hearing Research, 41*, 1412-1431.
- Rollins, P. R., & Snow, C. E. (1998). Shared attention and grammatical skills in typical children and children with autism. *Journal of Child Language, 25*, 653-674.
- Royal College of Speech and Language Therapists. (2002). *Developing a diversity strategy*. London: RCSLT. Retrieved from [http://www.rcslt.org/docs/freepub/RCSLT\\_Developing\\_a\\_diversity\\_strategy\\_final.pdf](http://www.rcslt.org/docs/freepub/RCSLT_Developing_a_diversity_strategy_final.pdf).
- Rutter, M. (2011). Child psychiatric diagnosis and classification: concepts, findings, challenges and potential. *Journal of Child Psychology and Psychiatry, 52*, 647-660. DOI: 10.1111/j.1469-7610.2011.02367.x
- Rutter, M., LeCouteur, A., & Lord, C. (2003). *Autism Diagnostic Interview, Revised*. Los Angeles, CA: Western Psychological Services.
- Saxe, (1998). Candy selling and math learning. *Educational Researcher, 17*, 14-21.
- Seymour, H. N. (2004). The challenge of language assessment for African-American English-speaking children: A historical perspective. *Seminars in Speech and Language, 25*, 3-12. DOI: 10.1055/s-2004-824821
- Seymour, H., Roeper, T., & de Villiers, J. (2005). *Diagnostic Evaluation of Language Variation*. San Antonio, TX: Psychological Corporation.
- Seymour, H. N. & Pearson, B. (2004). Steps in designing and implementing an innovative assessment instrument. *Seminars in Speech and Language, 25*, 27-40. DOI: 10.1055/s-2004-824823
- Silva, M.J. & McCabe, A. (1996). Vignettes of the continuous and family ties: Some Latin American traditions. In A. McCabe. *Chameleon readers: Teaching children to appreciate all kinds of good stories*. New York: McGraw-Hill.

- Sparks, A. (2008). Latino preschoolers talk about the past: Implications for language and literacy. In A. McCabe, A. Bailey, & G. Melzi (Eds.). *Spanish-Language Narration and Literacy: Culture, Cognition, and Emotion*. New York: Cambridge University Press.
- Stein, D. J., Phillips, K. A., Bolton, D., Fulford, K. W. M., Sadler, J. Z., & Kendler, K. S. (2010). What is a mental/psychiatric disorder? From DSM-IV to DSM-V. *Psychological Medicine*, *40*, 1759-1765. doi:10.1017/S0033291709992261
- Steinhausen, H-C, Gobel, D., Breinlinger, M., Wohlleben, B. (1986). A community sample of infantile autism. *Journal of the American Academy of Child Psychiatry*, *25*, 186-189. doi:10.1016/S0002-7138(09)60225-9
- Sun, X., & Allison, C. (2010). A review of the prevalence of autism spectrum disorder in Asia. *Research in Autism Spectrum Disorders*, *4*, 156-167. doi:10.1016/j.rasd.2009.10.003
- Tager-Flusberg, H. & Joseph, R.M. (2003). Identifying neuro-cognitive phenotypes in autism. *Philosophical Transactions of the Royal Society London: B Biological Sciences*, *358*(1430):303-14. doi: [10.1098/rstb.2002.1198](https://doi.org/10.1098/rstb.2002.1198)
- Tager-Flusberg, H., Paul, R., & Lord, C. (2005). Language and communication in autism. In F. Volkmar, R. Paul, A. Klin and D. Cohen (Eds.), *Handbook of Autism and Pervasive Developmental Disorders – 3rd Ed.* (pp. 335 – 364). NY: Wiley.
- Tomblin, J.B. (2006). A normativist account of language-based learning disability. *Learning Disabilities Research and Practice*, *21*, 8-18. DOI: 10.1111/j.1540-5826.2006.00203.x
- Tomblin, J. B. (2008). Validating diagnostic standards for specific language impairment using adolescent outcomes. In C. F. Norbury, J. B. Tomblin & D. V. M. Bishop (Eds.), *Understanding Developmental Language Disorders: from theory to*

*practice* (pp. 93-114). Hove: Psychology Press.

Tomblin, J.B. (2011). Co-morbidity of autism and SLI: kinds, kin and complexity.

*International Journal of Language and Communication Disorders*, 46, 127-137.

DOI: 10.1111/j.1460-6984.2011.00017.x

Tomblin JB, Records NL, Buckwalter P, Zhang X, Smith E, O'Brien M. (1997). Prevalence of specific language impairment in kindergarten children. *Journal of Speech*

*Language and Hearing Research*, 40(6), 1245-1260.

Ullman, M. & Pierpont, E. (2005) Specific language impairment is not specific to language:

the procedural deficit hypothesis. *Cortex*, 41, 399-433. [doi:10.1016/S0010-](https://doi.org/10.1016/S0010-9452(08)70276-4)

[9452\(08\)70276-4](https://doi.org/10.1016/S0010-9452(08)70276-4)

van der Lely, H. (2005). Domain-specific cognitive systems: insight from Grammatical-SLI.

*Trends in Cognitive Sciences*, 9(2), 53-59. [doi:10.1016/j.tics.2004.12.002](https://doi.org/10.1016/j.tics.2004.12.002)

van Kleeck, A. (1994). Potential cultural bias in training parents as conversational

partners with their children who have delays in language development. *American*

*Journal of Speech Language Pathology*, 67-78.

World Health Organization (2001). *International Classification of Functioning,*

*Disability and Health.*

<http://www.who.int/classifications/icf/training/icfbeginnersguide.pdf>).

Young, E.C., Diehl, J. J., Morris, D., Hyman, S. L., & Bennetto, L. (2005). Pragmatic

language disorders in children with autism: The use of two formal tests to distinguish affected children from controls. *Language, Speech, and Hearing in the Schools*, 36,

62-72. doi:10.1044/0161-1461(2005/006)

Young, G. S., Merin, N., Rogers, S. J., & Ozonoff, S. (2009). Gaze behavior and affect at 6

months: predicting clinical outcomes and language development in typically developing infants and infants at risk for autism. *Developmental Science*, 12, 798-814. DOI: 10.1111/j.1467-7687.2009.00833.x

Zhang, X., & Tomblin, J. B. (2000). The association of intervention receipt with speech-language profiles and social-demographic variables. *American Journal of Speech-Language Pathology*, 9, 345-357.

Zhang, J., Wheeler, J. J., & Richley, D. (2006). Cultural validity in assessment instruments for children with autism from a Chinese cultural perspective. *International Journal of Special Education*, 21, 109-113.

Table 1. Prevalence rates of ASD around the globe

Country	Prevalence (per 10,000)	Reference
Brazil	27.2	de Paula et al. (2011)
Canada	60	Fombonne et al. (2006)
China	0.32-17.9	Sun & Allison (2010)
Denmark	7.2	Madsen et al. (2002)
Denmark	68.5	Parner et al. (2011)
France	16.3	Fombonne et al. (1997)
Germany	1.9	Steinhausen et al. (1986)
Iceland	13.2	Magnusson & Saemundsen (2001)
Indonesia	11.7	Sun & Allison (2010)



Israel	10	Davidovich, Holtzman, Tirosh (2001)
Japan	1.1-21.1	Sun & Allison (2010)
Japan	181	Kawamura, Takahashi, Ishii (2008)
Oman	1.4	Al Farsi et al. (2010)
South Korea	260	Kim et al. (2011)
Sweden	32.9	Gillberg et al. (2006)
UK	116	Baird et al. (2006)
USA	42-121	ADDM (2009)
Western Australia	51	Parner et al. (2011)