

## Chapter 2

# Pragmatic Disorders Across the Life Span

### 2.1 Introduction

Pragmatic disorders display no preference for the individuals they afflict. People of different ethnicities, socioeconomic classes, and ages can develop pragmatic disorders. Men and women appear to be equally predisposed to pragmatic disorders.<sup>1</sup> Pragmatic disorders are not confined to people living in certain geographical regions, and are no more commonly found in urban over rural dwellers (or vice versa). No lifestyle, culture or type of education places an individual at an increased risk of developing a pragmatic disorder. In view of this lack of discrimination, pragmatic disorders are best examined within a life span perspective. This perspective adopts a chronological approach in which pragmatic disorders are examined in their order of occurrence throughout the life span.

The chapter begins by examining pragmatic disorders which have their onset in the developmental period. These disorders are found in children and adults with autism spectrum disorder and a range of genetic syndromes, amongst other conditions. Beyond the developmental period, older children and adolescents can sustain injuries and develop illnesses that compromise their pragmatic language skills. This age group is challenging for clinicians in that while many pragmatic skills have been acquired, these children do not have adult-like pragmatic competence. In adulthood, events such as cerebrovascular accidents (strokes) and head injuries can disrupt previously intact pragmatic skills. In later life, neurodegenerative diseases such as the dementias can cause significant, progressive loss of pragmatic skills. Each of these life stages raises a unique set of issues that affect the characterization, assessment and treatment of pragmatic disorders. This chapter and book will address many of these issues in its discussion of pragmatic disorders.

Before embarking on this life span survey of pragmatic disorders, it is important to be clear on the structure and extent of this survey. Pragmatic disorders will be examined according to the life stage in which they have their onset. These stages are (1) the developmental period (0–7 years), (2) older childhood

and adolescence (8–17 years), (3) early to late adulthood (18–65 years) and (4) advanced adulthood (66–85 years).

The age range for each life stage is, of course, controversial. Any demarcation of the developmental period is particularly difficult as language and cognitive skills develop and mature at different times in the same individual and also across individuals. Children do not master complex grammar such as raising until 8 or 9 years of age (Perovic and Wexler 2007). Many pragmatic aspects of language are even later to develop than complex grammatical constructions. Levorato and Cacciari (2002) examined the development of figurative language across four age groups: children aged 9.6 and 11.3 years, adolescents aged 18.5 years and adults. These investigators found that the ability to use figurative language required ‘a long developmental time span’. In fact, the metalinguistic ability that was needed to make innovative figurative expressions communicatively appropriate and conceptually sensible was found to continue developing up to adulthood. An extended developmental period is the basis of definitions of developmental disabilities, many of which cause significant pragmatic disorders. In the US, the Centers for Disease Control and Prevention (2012a) state that a developmental disability can have its onset at any time during development up to 22 years of age. One developmental disability—intellectual developmental disorder (formerly ‘mental retardation’)—can have its onset at any point up to the age of 18 years (American Psychiatric Association 2013).

Aside from the developmental period, the distinctions instituted in adulthood are also likely to be problematic. Although 18 years of age is the beginning of adulthood, this is a legal definition which has no bearing on the language and cognitive skills that an individual may be presumed to have at this point in his or her life. As people live to increasingly advanced ages, it is doubtful that 65 years should be viewed as late adulthood or that 66 years should be viewed as the beginning of advanced adulthood. Typically, this transition in adulthood has been taken to reflect the standard (male) retirement age in most Organization for Economic Co-operation and Development (OECD) countries. It is also the age at which many diseases associated with older age become more common. These diseases, which include dementia and cerebrovascular accidents or strokes, often have significant detrimental effects on the pragmatic language skills of those who experience them.

However, in the same way that retirement ages are an administrative convenience that could be otherwise (the retirement age in a number of OECD countries is *not* 65 years, for example), it is important to note that the distinction between adults younger and older than 65 years is not intended to reveal any significant distinction in the pragmatic language skills of these individuals. So, although most people who acquire pragmatic disorders as a result of dementia or a stroke are over 65 years (and will be discussed in this age category for this reason), there are still significant numbers of younger people who also develop pragmatic disorders as a result of these conditions. The demarcation in adulthood used in this chapter is also a matter of convenience, and should be recognised by the reader as such. Notwithstanding these various difficulties, the life stages outlined above provide a convenient chronological framework in which to discuss pragmatic disorders.

## 2.2 Pragmatic Disorders in the Developmental Period

For a significant number of children and adults, pragmatic language skills are not normally acquired in the developmental period. For children with specific language impairment (SLI), who experience marked difficulties with structural language (e.g. syntax and semantics), pragmatic language skills may also not develop along normal lines. For a subset of children with SLI, pragmatic skills may be disproportionately impaired in relation to structural language skills. Autism spectrum disorder (ASD) is a neurodevelopmental disorder which can have particularly severe implications for a child's communication skills. In those cases where language is acquired, pragmatics is often severely compromised with even high-functioning children and adults with ASD experiencing significant, life-long problems with the pragmatics of language. Although they have been somewhat neglected to date by researchers in communication disorders, the emotional and behavioural disorders (EBDs) are beginning to receive systematic examination of their pragmatic difficulties. A significant number of children are born with genetic syndromes (e.g. Down's syndrome) or are exposed during their prenatal development to various teratogens (e.g. alcohol, cocaine, lead) which have an adverse effect on their intellectual and pragmatic development. The pragmatic impairments which attend these various conditions will be examined in the following section.

### 2.2.1 *Specific Language Impairment*

For a significant number of children, language acquisition does not proceed along normal lines. These children form a clinically heterogeneous group with developmental language disorder (DLD). In most cases of DLD, problems with language development can be related to organic and cognitive factors. For example, the child who has hearing loss, a craniofacial anomaly or intellectual disability may be slow to acquire language or, in severe cases, not acquire language at all. However, for a significant subset of children with DLD, language fails to develop normally in the absence of a clear underlying aetiology.<sup>2</sup> The diagnostic label 'specific language impairment' (SLI) is applied to these children. This label reflects the fact that the developmental disorder is *specific* to language, with performance in other domains (e.g. motor development) falling within the normal range. (Contrast SLI with pervasive developmental disorder in which development is compromised across a number of domains.) The term 'specific language impairment' replaces a large number of earlier diagnostic labels including 'childhood aphasia' and 'developmental dysphasia'. SLI is now in widespread use among clinical language researchers.

The true extent of SLI has been difficult to establish with epidemiological studies obtaining quite different prevalence rates for the disorder. Tomblin et

al. (1997) obtained an estimated overall prevalence rate of SLI in monolingual English-speaking kindergarten children of 7.4 %. On the basis of this prevalence rate, and using information from the 1990 US Census, it was estimated that 273,025 of the 3,689,533 five-year-old children in the US present with SLI. This disorder, Tomblin et al. (1997, p. 1258) concluded, is a 'common condition among kindergarten-age children when compared with the prevalence of many developmental disorders'. More recently, Hannus et al. (2009) obtained a prevalence rate for SLI of 0.6 % for children aged 0–15 years in the Finnish town of Vantaa. This rate is equal to the lowest prevalence rates of other international studies. Where epidemiological studies do not differ is on the greater prevalence of SLI in boys than in girls. Hannus et al. (2009) obtained boy: girl ratios between 2.3 and 3.5:1 in the Finnish town of Vantaa over an 11-year period between 1989 and 1999. These sex ratios are consistent with those obtained in other epidemiological investigations.

Expressive and receptive subtypes of SLI are recognised in the tenth edition of the International Classification of Diseases (ICD-10; World Health Organization 1993). In the expressive subtype (F80.1, ICD-10), expressive language is markedly below the appropriate level for a child's mental age, but language comprehension is within normal limits. In the receptive subtype (F80.2, ICD-10), understanding of language is below the appropriate level for the child's mental age with expressive language markedly affected in nearly all cases also. The structural language impairments of children with SLI have been extensively documented and are increasingly being linked to cognitive deficits (see Sect. 4.4 in Cummings (2008) for a detailed discussion). In a study of 97 Dutch preschool children with SLI, Van Daal et al. (2009) identified four stable language factors that contributed to the language development problems of these children over a 2-year period. These factors were phonology, lexical-semantics, syntax and speech production. Short-term auditory memory showed strong relations with syntax and medium relations with the other language factors, while intellectual capacity showed weak to medium relations with phonology, lexical-semantics and syntax. Language problems in SLI are associated with literacy difficulties and persist well into adulthood (Whitehouse et al. 2009a).

When we turn to pragmatic disorders in SLI, a somewhat complicated clinical picture emerges. The SLI population does contain children who have significant pragmatic disorders. Moreover, not all these disorders can be accounted for by deficits in structural language. These children are diagnosed as having pragmatic language impairment (PLI), which is a successor to the earlier term 'semantic-pragmatic disorder'. Ketelaars et al. (2010, p. 205) state that 'the term 'pragmatic language impairment' is used to describe children who have relatively intact phonology, syntax and verbal fluency, but who do exhibit communicative problems related to understanding and conveying intentions, the ability to adhere to the needs of a conversational partner, and discourse management skills'.

Because these pragmatic deficits are similar to those found in individuals with autism spectrum disorder, there has been considerable debate about whether the PLI label reflects a distinct clinical entity or is more appropriately construed as

being part of the autism spectrum (Bishop 2000). There is evidence that while some children with PLI do meet criteria for autism disorder, other children with PLI do not warrant a diagnosis of either autism or pervasive developmental disorder, not otherwise specified (Bishop and Norbury 2002). These latter children tend to use stereotyped language with abnormal intonation/prosody, but yet they are sociable and communicative and have normal non-verbal communication skills. The term 'social communication disorder' in DSM-5 includes children with PLI (American Psychiatric Association 2013). Social communication disorder specifically excludes ASD. It can occur as a primary impairment or can co-exist with other disorders (e.g. intellectual disorders).

Questions of nosology aside, there is now a well-developed literature on the pragmatic impairments of children and adults with PLI and SLI. These impairments are not only found in conversation but also in other forms of discourse (e.g. narrative). Laws and Bishop (2004) found evidence of pragmatic impairments in a significant subgroup of children with SLI examined in their study. Some 41 % of these children scored below the cut-off point for pragmatic impairment on the pragmatic composite of the Children's Communication Checklist (Bishop 1998). Stereotyped conversation was particularly evident in these children compared to controls. In a study of the conversational responsiveness of children with SLI, Bishop et al. (2000) found that a subset of children with PLI were more likely than control children to give no response to adult soliciting utterances. They also made very little use of non-verbal responses such as nodding. Non-verbal responding was not only closely related to the quality of children's responses, but its absence indicated a relatively high level of pragmatically inappropriate responses that could not be accounted for in terms of limited grammar and vocabulary. Ketelaars et al. (2012) examined the narrative competence of 77 children with PLI. Compared to typically developing children, children with PLI demonstrated poorer narrative competence, as indicated on measures of narrative productivity, organization of content and cohesion. Only some narrative problems in these children could be attributed to language impairments. The rest were pragmatic deficits.

Clinical studies of SLI and PLI have also examined the use and understanding of pragmatic features such as implicatures and maxims. Katsos et al. (2011) assessed the comprehension of statements containing quantifiers such as 'some' in Spanish-speaking children with SLI. These expressions have both a logical meaning and a pragmatic meaning, the latter derived by means of the maxim of informativeness.<sup>3</sup> Katsos et al. found that children with SLI performed more poorly than a group of age-matched typically developing peers, but similarly to younger language-matched children. Children with SLI were disproportionately challenged compared to age-matched peers by the pragmatic meaning of the quantified statements. Ryder et al. (2008) posed questions of increasing pragmatic complexity in different contexts to children with SLI and PLI. Children with PLI performed significantly more poorly than children with SLI on questions targeting implicature. Scores on implicature questions accurately identified children with PLI from those with SLI with sensitivity of 89 %. Children with SLI were only able to infer

referents and semantic meaning and generate implicatures when they had the support of pictorial (not verbal) context. Several clinical pragmatic studies have examined the use of discourse features such as referential cohesion by children with SLI. Relative to typically developing children, Polite et al. (2011) found that children with SLI made less use of definite articles to refer to a previously established referent in discourse.

All utterance interpretation proceeds on the basis of inferences that are drawn by speakers and hearers. Several studies have shown that the ability to draw inferences is compromised in children with PLI. In a study of 11-year-olds with SLI and primary pragmatic difficulties, Botting and Adams (2005) reported significant problems during an inferential comprehension task that required participants to make logical (text connecting) inferences, bridging (gap filling) inferences and elaborative inferences. The performance of both clinical groups of children was similar to that of younger children aged 7 and 9 years. Moreover, the clinical groups performed similarly to each other on this inferential task.

Holck et al. (2010) examined inferential ability in children with PLI, cerebral palsy and spina bifida with hydrocephalus. Children with PLI performed significantly worse than children with cerebral palsy on questions that required inferential comprehension. Moreover, the PLI group was the only one in which problems with inferential questions exceeded problems with literal questions. Adams et al. (2009) found that children with PLI scored significantly less on an inference comprehension task than control subjects matched for age and sentence comprehension ability. Although there was no evidence for a unique pattern of inference errors in children with PLI, there was a trend for these children to perform more poorly on developmentally more complex inference items. There is also evidence that the ability to produce and comprehend pragmatic inferences about given or presupposed knowledge in mental state verbs is impaired in children with PLI (Spanoudis et al. 2007).

### ***2.2.2 Autism Spectrum Disorder***

For a significant number of children, problems with language development occur alongside deficits in other areas of development. To the extent that development in several domains is compromised, these children are described as having a pervasive developmental disorder (as opposed to a *specific* developmental disorder such as SLI, in which only language development is compromised). The construct of a spectrum has clinical utility in representing the wide range of impairments in this heterogeneous population and is the basis of the diagnostic label ‘autism spectrum disorder’ (ASD).

In DSM-5 (American Psychiatric Association 2013), ASD is diagnosed on the basis of persistent deficits in social communication and social interaction across multiple contexts and by restricted, repetitive patterns of behaviour, interests or activities. Impairments in the social communication domain include deficits

in social-emotional reciprocity, non-verbal communicative behaviours and in developing and maintaining relationships. Stereotyped or repetitive behaviours, excessive adherence to routines, highly restricted, fixated interests and hyper- or hypo-reactivity to sensory input are also core symptoms of ASD. These symptoms must be present in the early developmental period, although they may not be fully manifest until social demands exceed limited capacities. They must also impair everyday functioning.

The epidemiology of ASD continues to be extensively investigated. Findings of large-scale epidemiological studies reveal that ASD is a common neurodevelopmental disorder. Moreover, the prevalence of this disorder is increasing over time. The Autism and Developmental Disabilities Monitoring Network (ADDNM) investigates the epidemiology of ASD in 14 sites in the United States. For the 2008 surveillance year, the ADDNM reported that the overall estimated prevalence of ASD was 11.3 per 1,000 (1 in 88) children aged 8 years (Centers for Disease Control and Prevention 2012b). This figure represents an increase in estimated ASD prevalence of 23 % on 2006 surveillance data and 78 % on 2002 data. A consistent finding of epidemiological studies is the greater prevalence of ASD in boys than in girls. According to the ADDNM, one in 54 boys and one in 252 girls were identified as having ASD in 2008. There is now widespread medical consensus that ASD has a strong genetic basis. Genetic research in recent years has identified several vulnerability loci and cytogenetic abnormalities or single-base mutations which are implicated in the causation of autism (Caglayan 2010).

Approximately 50 % of individuals with autistic disorder do not develop functional speech (O'Brien and Pearson 2004). For those individuals who do become verbal communicators, early vocal anomalies as well as prosodic impairments have been identified. Toddlers with ASD have been shown to produce significantly more atypical nonspeech vocalizations than age- and language-matched controls (Schoen et al. 2011). Peppé et al. (2007) reported that children with high-functioning autism performed significantly less well than typically developing children and normal adult controls on receptive and expressive prosody tasks. Deficits in phonology have been noted in several clinical studies. For example, Cleland et al. (2010) identified developmental phonological processes (e.g. cluster reduction) and non-developmental errors (e.g. phoneme specific nasal emission) in the speech of 69 children with ASD. Non-developmental distortions occurred relatively frequently in the speech of these children.

Studies of syntax in ASD reveal a complicated clinical picture. Certainly, there is evidence of syntactic impairments in individuals with ASD. Riches et al. (2010) found that overall error rates on a sentence repetition task did not vary significantly between adolescents with SLI and adolescents with ASD plus language impairment. The repetition task examined relative clauses that varied in syntactic complexity. However, children with ASD have also been found to align their use of syntactic structure (e.g. passive) to that of a conversational partner (Allen et al. 2011) and to map verbs onto causative actions (i.e. engage in syntactic bootstrapping) (Naigles et al. 2011). In terms of lexical semantics,



Norbury et al. (2010) found that word learning in children with ASD was compromised on account of their reduced sensitivity to the social informativeness of gaze cues. Studies have revealed interactions between the lexicon and syntax in ASD. McGregor et al. (2012) found that only children with ASD who were free of syntactic deficits demonstrated age-appropriate word knowledge. Also, the conceptual salience of entities (specifically, their salience) has been found to influence word order choices in individuals with ASD (Lake et al. 2010). For a review of structural language impairments in ASD, the reader is referred to Boucher (2012).

In clinical studies, structural language impairments have been somewhat eclipsed by often severe deficits in the pragmatics of language in ASD. These deficits are typically in excess of those found in other developmental disorders. Philofsky et al. (2007) reported that children with ASD have poorer pragmatic skills, as measured on the Children's Communication Checklist (Bishop 2003), than children with Williams syndrome. MacKay and Shaw (2004) found that children with ASD performed more poorly than controls with no ASD on a test of the understanding, and intentionality behind, figurative utterances. Lewis et al. (2008) found that adults with a diagnosis of ASD performed significantly less well than adults with no disability on two pragmatic subtests of the Right Hemisphere Language battery (RHLB; Bryan 1989). These tests examined the comprehension of inferred meaning and the appreciation of humour. Dennis et al. (2001a) examined a range of inferences in high-functioning children with autism. These children failed to make inferences about what mental state verbs implied in context. They also failed to make inferences about social scripts and to draw the inferences needed to understand metaphor and produce speech acts. For a recent review of the literature on pragmatic inferences in ASD, the reader is referred to Loukusa and Moilanen (2009).

Discourse deficits have also been identified in children and adults with ASD. Asberg (2010) reported significantly lower abilities in narrative discourse comprehension in school-aged children with ASD compared to younger, typically developing children. Structural language impairments could not account for this finding, as there were no significant differences between the groups in either oral receptive vocabulary or reception of grammar. Colle et al. (2008) found that adults with Asperger's syndrome used fewer personal pronouns, temporal expressions and referential expressions than matched controls and adults with high-functioning autism during a story-telling task. Solomon (2004) reported that high-functioning children with ASD were able to engage in introduction sequences during fictional narratives. However, their problems lay in narrative co-telling, which was often not globally organized over an extended course of propositions. In a study of 57 children with autism, Hale and Tager-Flusberg (2005) found a significant relationship between the tendency to respond in conversation in a noncontingent (off-topic) manner and autistic symptomatology. Children with autism or Asperger's syndrome have also been found to have impairments in inferring and building causal relationships within and across story episodes in narrative contexts (Losh and Capps 2003).



Not all aspects of pragmatics are impaired in ASD. Scalar inferences appear to be intact in individuals with ASD, at least on the basis of a small number of studies conducted to date. Chevallier et al. (2010) found that participants with ASD produced as many pragmatic enrichments of 'or' as matched controls (e.g. *John or Mary will come* generates a scalar implicature that not both of them will come). Pijnacker et al. (2009) found that subjects with ASD were as likely as controls to derive scalar implicatures from utterances such as *Some sparrows are birds* (i.e. not all sparrows are birds). Other studies have identified intact pragmatic skills alongside pragmatic impairments in individuals with ASD. As well as problems with the comprehension of inferred meaning and the appreciation of humour, Lewis et al. (2008) found no significant difference between adults with ASD and adults with no disability on the written and pictorial metaphor subtests of the RHLB. The presence of intact pragmatic skills alongside impairments is similar to the pattern observed at other language levels (e.g. syntax) and most likely reflects the broad range of competencies which underlie the pragmatics of language.

### 2.2.3 Emotional and Behavioural Disorders

In some children and adults, language and communication impairments occur in the presence of significant emotional problems and behavioural disturbances which have their onset in the early years. Although this clinical population is variously defined by educational bodies and health agencies, emotional and behavioural disorders (EBDs) will be taken in this chapter to include the following conditions: attention deficit hyperactivity disorder (ADHD), conduct disorder, and selective mutism.<sup>4</sup> While children with each of these disorders can present with significant communication problems, these problems are most prominently acknowledged in the diagnostic criteria for ADHD. In this way, DSM-5 states that the individual with ADHD who has symptoms of inattention 'often does not seem to listen when spoken to directly' (American Psychiatric Association 2013). A child or adult with symptoms of hyperactivity and impulsivity 'often talks excessively', 'often blurts out an answer before a question has been completed (e.g. completes people's sentences; cannot wait for turn in conversation)' and 'butts into conversations'. With these various conversational anomalies on display, it is not surprising that this population of individuals is beginning to attract the attention of clinical pragmatists.

The prevalence of emotional and behavioural disorders has tended to vary with each epidemiological study. However, one reasonably consistent finding is that ADHD is the most common of these disorders. Using data from the 2010 National Health Interview Survey in the US, Bloom et al. (2011) reported that an estimated 8 % of children under 18 years of age had ADHD. In a study of all 4-year-olds born in 2003 or 2004 in the Norwegian city of Trondheim, Wichstrøm et al. (2012) reported estimated population rates for the following disorders: ADHD (1.9 %), oppositional defiant disorder (1.8 %), conduct disorder (0.7 %) and anxiety

disorders (1.5 %). The authors acknowledged a lower prevalence of these disorders among pre-schoolers than has been found in previous studies from the US. Research into the aetiology of emotional and behavioural disorders continues apace. In a review of literature on the aetiology of ADHD, Millichap (2008, p. e363) states that '[a] genetic cause linked to dopamine deficit is frequent and primary, but various environmental factors, including viral infection, maternal smoking during pregnancy, prematurity, cerebral hypoxic ischemia, alcohol exposure, and nutritional and endocrine disorders may contribute as secondary causes'.

Expressive and receptive language disorders are increasingly being identified in children with emotional and behavioural disorders. In a study of 84 public school children with EBDs, Benner (2005) obtained prevalence rates of total, expressive and receptive language disorders of 54, 55 and 42 %, respectively. Mackie and Law (2010) found that 7- to 11-year-old children with emotional/behavioural difficulties were significantly more likely to have structural language and word decoding difficulties than age- and sex-matched controls. Manassis et al. (2007) examined the language skills of 6- to 11-year-old children with selective mutism. These children scored significantly lower on standardized language measures than children with anxiety and normal controls. Kim and Kaiser (2000) reported that children with ADHD performed worse than typically developing children on the sentence imitation (grammar) and word articulation (phonology) subtests of the Test of Language development—Primary (Newcomer and Hammill 1991). Boys and girls with ADHD are at an increased risk of written language disorder and reading disability (Yoshimasu et al. 2010, 2011). For a review of literature on language impairments in ADHD, conduct disorder and other emotional and behavioural disorders, the reader is referred to Sundheim and Voeller (2004) and Bellani et al. (2011).

Pragmatic deficits have been commonly reported in children with EBDs. Donno et al. (2010) reported significantly poorer pragmatic language skills in a group of persistently disruptive school children than in a comparison group. Gilmour et al. (2004) found that two thirds of their sample of 55 children with conduct disorder had pragmatic language impairments as measured on the Children's Communication Checklist (Bishop 1998). The pragmatic impairments of these children were similar in nature and degree to those of children with autism. Kim and Kaiser (2000) found that children with ADHD produced more inappropriate pragmatic behaviours in conversational interactions than typically developing children, despite having similar pragmatic knowledge, as measured by the Test of Pragmatic Language (Phelps-Terasaki and Phelps-Gunn 1992). Mathers (2006) reported that children with ADHD used more tangential and unrelated information during spoken texts than control children. In a study of 76 children diagnosed with ADHD, Bruce et al. (2006) found that almost half displayed moderate to severe language comprehension problems, most often occurring together with communication problems. The comprehension and communication subdomains of language were assessed in this study by means of pragmatic items in a parent-completed questionnaire (e.g. 'tends to misinterpret what is said', 'difficulty carrying on a conversation').

Discourse deficits are also widely reported in children with EBDs, particularly during narrative production and comprehension. Rumpf et al. (2012) examined the organization of narratives in children with ADHD. Only one of 9 children with ADHD (11 %) was able to verbalize the core aspects of the story adequately. This contrasted with 27 % of children with Asperger's syndrome and 82 % of healthy controls. This difference in frequencies was significant and pointed to limited coherence in the narratives of children with ADHD (and Asperger's syndrome also). Berthiaume et al. (2010) found that boys with ADHD were less able than comparison peers to draw inferences, particularly explanatory inferences, which link events in a story. They were also less able than peers to monitor their ongoing comprehension of texts. McInnes et al. (2004) found that children with selective mutism used fewer story elements (viz., settings, initiating events, internal responses) during their production of narratives than children with social phobia. In terms of narrative comprehension, McInnes et al. (2003) reported that children with ADHD, who did not have co-occurring language impairment, comprehended factual information in spoken passages, but were poorer at comprehending inferences. Not all studies have found a relationship between emotional and behavioural disorders and pragmatic and discourse deficits. Cohen et al. (2000) found no support for their hypothesis that ADHD would be associated with narrative discourse and pragmatics.

### ***2.2.4 Intellectual Disability***

Language development is often severely delayed and deviant in the presence of cognitive or intellectual disability. Pragmatic language skills are no exception in this regard with many experiencing the same developmental disruption as language in general. In DSM-5, the term 'intellectual developmental disorder' replaces the earlier (and now unacceptable) diagnostic label of mental retardation. Intellectual developmental disorder (IDD) is defined as a disorder that includes both a current intellectual deficit (e.g. in reasoning and problem-solving) and a deficit in adaptive functioning with onset during the developmental period. Adaptive functioning captures how well an individual meets standards of personal independence and social responsibility in daily life activities such as social participation or functioning at school or at work. A diagnosis of IDD is equivalent to performance on standardized tests of intellectual function which is approximately 2 standard deviations below the population mean. This level of performance equates to an Intelligence Quotient (IQ) score of 70 or below. In recent years, diagnosing clinicians have attempted to supplement IQ test scores with performance on a range of social and adaptive criteria. This can be seen in the definitions of severity levels of IDD in DSM-5, which focus on adaptive functioning rather than on IQ test scores.

Recent epidemiological investigations have reported the prevalence of intellectual disability to be less than 1 %. The prevalence of intellectual disability in

China in 2006 was 0.75 % (Kwok et al. 2011). Boyle et al. (2011) estimated the prevalence of intellectual disability between 1997 and 2008 in US children aged 3–17 years to be 0.71 %. The prevalence was higher in boys than in girls (0.78 and 0.63 %, respectively). Prevalence rates were higher in children aged 11–17 years than 3–10 years (0.84 and 0.59 %, respectively), and varied with the race and ethnicity of children—intellectual disability was most prevalent in non-Hispanic Black children (1.06 %) and least prevalent in non-Hispanic white children (0.62 %). In terms of aetiology, a large range of organic conditions is associated with intellectual disability. These conditions include genetic syndromes (e.g. Down's syndrome, fragile X syndrome), prenatal exposure to teratogens (e.g. alcohol, cocaine), cerebral and other infections (e.g. meningitis, rubella), metabolic disorders (e.g. phenylketonuria, congenital hypothyroidism) and birth anoxia. Despite extensive evaluation, the aetiology of intellectual disability cannot be determined in 30–50 % of cases (Daily et al. 2000).

Given the clinical and aetiological heterogeneity of children and adults with intellectual disability, investigators have tended to describe the speech, and expressive and receptive language problems of this population in relation to specific syndromes. Down's syndrome is the most common genetic cause of mild to moderate intellectual disability (National Institutes of Health 2008). In 2002, the prevalence of this syndrome in 10 regions in the US among children and adolescents aged 0–19 years was 10.3 per 10,000 (Shin et al. 2009). Articulation skills in children and adults with Down's syndrome are often poor on account of the presence of flaccid dysarthria. Receptive language is typically superior to expressive language with difficulties particularly evident in phonology and syntax (Martin et al. 2009). Children with Down's syndrome are slow to acquire the phonological system of language and a productive vocabulary (Stoel-Gammon 2001). Vocabulary knowledge and, to a lesser extent, phoneme awareness are strong predictors of reading skills in children with Down's syndrome (Hulme et al. 2012). Syntactic deficits are common in children and adults with this syndrome. During conversation, children with Down's syndrome have been found to produce shorter, less complex utterances overall and less complex noun phrases, verb phrases, questions and negations than typically developing children (Price et al. 2008).

The language features of other, less common syndromes have also been examined. In a study of 32 individuals with Prader-Willi syndrome, Van Borsel et al. (2007) identified problems with expressive language, morphosyntax and vocabulary, while phonology is relatively intact. In verbal individuals with cri du chat syndrome, there are receptive and expressive language delays, although receptive language is generally superior to expressive language (Kristoffersen 2008). Phonological problems are present and include frequent substitutions, omissions and distortions. Consonant inventories are small, syllable shapes are restricted and vowels are variable. In terms of morphosyntax, individuals with cri du chat syndrome can inflect words from all the major word classes. Little is still known about syntactic skills in this syndrome (Kristoffersen 2008). Syndrome-specific characterisations of language enable investigators to address theoretically significant questions. For example, there is little evidence that syntax, morphology,

phonology or pragmatics in children and adults with Williams syndrome exceed non-verbal abilities (Brock 2007). This lack of dissociation between verbal and non-verbal abilities provides support for neuroconstructivist accounts of language development. For further discussion of this issue, the reader is referred to Stojanovik (2014).

Pragmatic language skills in individuals with intellectual disability have attracted considerable attention from investigators. This is particularly the case in Williams syndrome, where significant weaknesses in pragmatic language skills and relational/conceptual language occur alongside relative strengths in concrete vocabulary and verbal short-term memory and grammatical abilities which are consistent with general intellectual ability (Mervis and John 2010). Philofsky et al. (2007) reported that school-age children with Williams syndrome have pragmatic language difficulties, as measured on the Children's Communication Checklist-2 (CCC-2; Bishop 2003). The performance of these children on most subscales of the CCC-2 was similar to that of children with ASD. These findings reinforce earlier results obtained by Laws and Bishop (2004). During a referential communication task, children with Williams syndrome have been found to verbalize the inadequacy of messages on less than half the occasions when this was necessary (John et al. 2009).

Several studies have examined figurative language in Williams syndrome. These studies have revealed the contribution of lexical semantic knowledge to the production and comprehension of figurative language. Thomas et al. (2010) reported that individuals with Williams syndrome may access different, less abstract knowledge during the completion of figurative utterances than typically developing individuals. Naylor and van Herwegen (2012) found that synonymy knowledge was the best predictor of figurative language production scores in Williams syndrome. Preschoolers with Williams syndrome can use gestures, particularly pointing, to infer the communicative intent of a speaker. However, significantly more preschoolers with Down's syndrome than with Williams syndrome were able to use communicative gestures for this purpose (John and Mervis 2010). Other pragmatic findings in Williams syndrome include problems with idiom comprehension and failure to interpret ironic jokes (the latter interpreted as lies) (Sullivan et al. 2003; Lacroix et al. 2010).

Pragmatic and discourse deficits have also been documented in a number of other syndromes associated with intellectual disability. A subject with Down's syndrome investigated by Papagno and Vallar (2001) exhibited impaired comprehension of metaphors and idioms in the presence of largely preserved phonological, syntactic and lexical-semantic skills. Adolescents with Prader-Willi syndrome and nonspecific mental retardation have been found to classify ironic jokes incorrectly as lies, because they do not correspond to reality (Sullivan et al. 2003). Estigarribia et al. (2011) obtained evidence of narrative impairment affecting macrostructural story grammar elements in boys with fragile X syndrome. During conversations, individuals with fragile X syndrome have been found to produce more tangential language than clinical control groups, especially within unsolicited comments (Sudhalter and Belser 2001). Comblain and Elbouz (2002) reported that

boys with fragile X syndrome were less efficient than typically developing children matched for lexical age in organizing new and old information during referential communication tasks. Thorne et al. (2007) found that the rate of ambiguous nominal reference during picture-elicited narratives was highly accurate in classifying children with a foetal alcohol spectrum disorder. These findings indicate that pragmatic deficits must be considered by clinicians who are working with clients with intellectual disability regardless of aetiology.

## **2.3 Pragmatic Disorders in Older Childhood and Adolescence**

The acquisition of language and pragmatic skills may be developmentally appropriate up to a certain stage. However, even as certain language skills are in place, and other language skills are yet to be acquired, a child may sustain injury or develop disease. For example, the 8-year-old child may develop one of a range of different brain tumours. The growth of these tumours may damage brain tissue and not simply in the areas immediately next to the tumours. The treatment of brain tumours involves a combination of neurosurgery, cranial irradiation and chemotherapy. Each of these interventions can compromise language and cognitive skills, in some cases for many years after the point of treatment. Although there has been little systematic examination of pragmatic skills in children with brain tumours, the neuropsychological profile of these children provides grounds for believing that pragmatics may not emerge unscathed in this group of clients.

Also, children who have already undergone substantial language acquisition may sustain a traumatic brain injury (TBI). So-called childhood TBI is now known to result in marked difficulties with pragmatics and discourse. These children present with a complex clinical picture in that some previously acquired language skills are impaired and the acquisition of later language skills is compromised. Additionally, the neural plasticity of the maturing brain enables it to respond in remarkable and unpredictable ways to traumatic injuries. This range of factors means that the pragmatic and discourse skills of these children are likely to be subject to considerable change in the weeks and months following a traumatic brain injury. This section will examine what is known about the pragmatic disorders of these two clinical populations.

### ***2.3.1 Childhood Brain Tumours***

As used in this section, the term ‘brain tumour’ refers to a mixed group of neoplasms which originate from intracranial tissues and the meninges with degrees of malignancy that range from benign to aggressive. The term specifically does *not* include spinal cord tumours, metastatic tumours (these arise outside the central nervous



system) and primary brain lymphomas, which are essentially haematological malignancies (McKinney 2004). Brain tumours are the most common category of solid tumours in childhood (Pollack 2011). In an annual report to the nation on the status of cancer, Kohler et al. (2011) reported astrocytomas to be the most common childhood (0–19 years) brain tumour in the US. Depending on type, the median age of astrocytomas in children is 9.0 and 10.0 years. After astrocytomas, two other significant brain tumours in childhood are malignant gliomas (median age 6.0 years) and medulloblastomas (median age 5.0 years). Kohler et al. also reported that one third of all childhood brain tumours are non-malignant. This is a much lower rate of non-malignancy than in adulthood, where two thirds of brain tumours are non-malignant.

In the 1970s and 1980s, management of malignant brain tumours in children involved a combination of surgery, radiation therapy and chemotherapy, while benign tumours were treated almost exclusively by surgery with radiation treatment as a salvage modality (Pollack 2011). It is now widely acknowledged that these treatments are associated with long-term neurocognitive and other sequelae in a large proportion of treated patients (Aarsen et al. 2004; Maddrey et al. 2005). In a study of 61 long-term survivors of childhood brain tumours, Macedoni-Lukšič et al. (2003) found that 38 patients (62 %) experienced at least one impairment as a result of treatment. Some 16 patients (30 %) had an IQ score of less than 80. Among the risk factors and clinical variables associated with IQ decline in children treated for brain tumours are younger age at time of treatment, longer time since treatment, use of radiotherapy and radiotherapy dose, hydrocephalus,<sup>5</sup> and the volume of brain that received treatment (Kieffer-Renaux et al. 2000; Mulhern et al. 2004). Current treatment strategies focus on reducing treatment-related sequelae for children with therapy-responsive tumours and on improving outcome for children with tumours that have historically been resistant to therapy (Pollack 2011).

There is a high incidence of speech, language and hearing symptoms in children and adolescents with brain tumours. Gonçalves et al. (2008) found speech, language and hearing symptoms in 42 % of a sample of 190 children and adolescents with brain tumours. Dysarthria and dysphagia are widely recognised and studied sequelae in children with brain tumours (Cornwell et al. 2003; Morgan et al. 2008). The incidence of dysarthria and dysphagia following surgery for posterior fossa tumour in children is known to be relatively high, affecting around one in three cases (Mei and Morgan 2011). However, alongside speech and swallowing problems there are often long-term language deficits in children with brain tumours. Ribi et al. (2005) reported language deficits in 56 % of their sample of 26 survivors of paediatric medulloblastoma. Some of these language deficits have been documented in patients prior to surgery.<sup>6</sup> However, many more language problems have been reported in children who have undergone surgical interventions for brain tumours.

In a study of five children who received surgical resection of left thalamic tumours, Nass et al. (2000) reported Broca's aphasia in three children, and mixed transcortical aphasia and conduction aphasia in one child each. De Smet et al. (2009) found language deficits, including agrammatism, anomia, impaired verbal fluency and comprehension deficits, in five children following posterior fossa tumour resection. Riva and Giorgi (2000) reported that children with right cerebellar hemisphere



astrocytomas showed a slight but non-significant decline in verbal performance following surgery which was most pronounced in relation to receptive syntax and the formulation of sentences (as measured by MLU). Only lexical components of language (naming and comprehension) were impaired in children after surgery for left cerebellar hemisphere astrocytomas. Two children with cerebellar vermis medulloblastomas developed a post-surgical mutism which evolved into a severe language disturbance with similar features to agrammatic aphasia. These children displayed a lack of language spontaneity and spoke very little even when encouraged to do so. Frank et al. (2008) found mild signs of language disturbance in subjects with right-sided lesions following tumour surgery in the cerebellum.<sup>7</sup>

There has been little systematic investigation of pragmatic and discourse skills in children with brain tumours. One of the few studies to assess these skills has revealed significant disruption of pragmatics in the context of intact structural language. Lewis and Murdoch (2010) examined a female patient aged 14.1 years who had received risk-adapted cranial radiation therapy for medulloblastoma 4 years prior to testing. Although this subject's performance on tests of general language skill was within normal limits (one exception was recalling sentences), her high-level language skills were impaired. Several of these skills were pragmatic in nature, e.g. resolving ambiguity, understanding inferential, metaphoric and figurative language, and producing language within the pragmatic constraints of a given situation.

Docking et al. (2005) reported the case of a boy of 6.7 years who received radiotherapy and chemotherapy for treatment of a brainstem glioma diagnosed at 1.8 years. Although this boy performed within normal limits on measures of receptive language, expressive language and phonological awareness skills, his high-level language skills displayed some weaknesses. These weaknesses were evident on subtests which examined the expression of intents and the interpretation of ambiguous sentences. In a later study, Docking et al. (2007) recorded deficits in linguistic problem solving in two patients with ependymoma and juvenile pilocytic astrocytoma of the right and left cerebellar hemispheres, respectively. Both patients displayed intact general language abilities according to normative data.

Hydrocephalus is commonly associated with childhood brain tumours such as gliomas (Roujeau et al. 2011), astrocytomas and medulloblastomas (Di Rocco et al. 2010). Several clinical studies have revealed significant pragmatic and discourse deficits in children with hydrocephalus of diverse aetiologies. Children aged 6–15 years with early-onset hydrocephalus have been found to perform more poorly than normally developing controls on oral discourse tasks that required them to establish alternate meanings for ambiguous sentences, understand figurative expressions, make bridging inferences and produce speech acts (Dennis and Barnes 1993). Barnes and Dennis (1998) reported that children with early-onset hydrocephalus had difficulty using context to derive meaning. Specifically, these children had difficulty drawing inferences during a narrative comprehension task. Their problems interpreting novel figurative expressions contrasted with their ability to understand idiomatic figurative expressions. Moreover, although they produced the same quantity of story content as controls during retellings of fairy tales, children with hydrocephalus produced less of the core semantic content than

controls. Difficulties suppressing contextually irrelevant meanings have also been reported in children with hydrocephalus (Barnes et al. 2004). Pragmatic impairments have been identified in young children with myelomeningocele and shunted hydrocephalus (Vachha and Adams 2003).

### ***2.3.2 Childhood Traumatic Brain Injury***

Many children successfully acquire language skills only to have them disrupted by a traumatic brain injury (TBI) in older childhood and adolescence. These injuries can be sustained through falls, road traffic accidents (RTAs), sports injuries and assaults, the latter as a result of child abuse or violence between (particularly male) adolescents. There are two main types of TBI. In an open head injury, the brain is damaged by an external missile which also fractures the skull. In a closed head injury, the skull remains intact while the brain is damaged within it. This may be as a result of shearing forces which are sustained during a RTA and which drive the brain against bony protuberances on the inside of the skull. Both focal pathologies (contusion, haematoma formation) and diffuse pathologies (diffuse axonal injury, diffuse microvascular damage) occur in TBI along with more generalized abnormalities involving widespread neuroexcitation and metabolic changes (Povlishock and Katz 2005). Most TBIs—as many 97 % on some estimates (Koepsell et al. 2011)—are mild in severity. TBI can result in adverse neurocognitive and neurobehavioural outcomes including problems with memory, psychomotor processing speed and language in children with mild TBI (Babikian et al. 2011) and executive functions and social competence in children with severe TBI (Ganesalingam et al. 2011). There is also a high incidence of dysarthria and dysphagia in children with severe TBI (Morgan et al. 2010).

Language deficits are commonly found in the paediatric TBI population. As one might expect, these deficits have been found to vary in nature and severity with the child's developmental level at the time of injury. Ewing-Cobbs and Barnes (2002) reported that linguistic deficits at lexical and discourse levels are more often found in young children who sustain severe TBI, while higher-order discourse functions are more commonly disrupted in older children with TBI. Hanten et al. (2009) found that children who were younger when they sustained a TBI achieved poorer overall performance on measures of oral reading and expressive language skills than children who were older when injured. Anderson et al. (2004) obtained reduced expressive and receptive language scores in children with severe TBI. Moreover, while improvements in expressive language skills occurred in the 30 months post-injury, minimal improvements in receptive language were evident during the same time. Moran and Gillon (2004) found that adolescents who had sustained a TBI before 11 years of age performed more poorly than age-matched peers on measures of receptive vocabulary and grammar. At discourse level, literal text comprehension deficits have been reported in children with severe closed head injury (Dennis and Barnes 2001).

While significant structural language skills are often found in paediatric clients with TBI, by far the most pronounced deficits occur in pragmatic and discourse skills. The adolescents with TBI studied by Moran and Gillon (2004) performed more poorly than age-matched peers on tasks requiring the understanding of metaphors and idioms and the comprehension of (causal) inferences. Adolescents also performed more poorly than peers during discourse comprehension, where questions targeted the understanding of details, main idea, prediction, inference and sequence in spoken texts. The inferential comprehension difficulties of these adolescent subjects were greatest when the working memory demands of tasks were high (Moran and Gillon 2005).<sup>8</sup> The comprehension of inferential language was also significantly impaired in the children with severe closed head injury studied by Dennis and Barnes (2001). Furthermore, these children displayed significant problems understanding the mental states and intentions that are the basis of pragmatic processes such as irony appreciation. Related to these children's difficulties with intentionality, Dennis et al. (2001b) found that 6- to 15-year old children with severe closed head injury displayed poor mastery of a task in which they were required to interpret scenarios involving literal truth, ironic criticism and deceptive praise.

Studies of narrative discourse have revealed high-level difficulties with the thematic organization, event sequencing and informational content of narratives produced by children with TBI. Many of these narrative discourse problems are related to executive function deficits in these children. Chapman et al. (2004) examined the ability of children with severe TBI to interpret and summarize information presented in narratives. Compared to typically developing peers, children with TBI—particularly those who sustained early injuries—produced significantly less transformed information during their summaries. Summarization ability was shown to be related to problem solving skills in these children, but not to their lexical or sentence-level language skills. Similar results were obtained by Chapman et al. (2006). These investigators found that the quality of narratives (measured by means of cohesion and coherence) and quantity of narratives (measured by means of the number of words used) were poorer in children with severe TBI than in typically developing children. The ability to recall explicit and implicit discourse content was also poorer in children with TBI than in control children. Once again, discourse performance was poorer in young children with TBI than in older children. Working memory was shown to be significantly correlated with summarization ability in children with TBI.

Brookshire et al. (2000) examined narrative retelling by children who sustained severe or mild closed head injuries. Narratives were assessed on the basis of information and language variables. Children with severe TBI were found to produce narratives which had reduced content and information, impaired organization, and used fewer words and less complex sentences than narratives produced by children with mild TBI. Discourse production was shown to correlate with general verbal ability as well as executive function measures of problem solving and working memory. Other forms of discourse (e.g. expository discourse) are also problematic for children with TBI. Hay and Moran (2005) investigated narrative and expository discourse retelling abilities in nine children with closed head injury. Discourses were examined according to language variables (number of words

and T-units, sentential complexity) and information variables (number of propositions, episodic structure elements and global structure elements). In narrative and expository retellings, children with closed head injury performed significantly more poorly than age-matched peers, with performance on narrative tasks superior to performance on expository tasks. In both types of discourse, children with closed head injury differed significantly from age-matched peers in their ability to formulate a moral or aim of the discourse. Many deficits observed in the spoken discourse of children with TBI have also been reported to occur in the written discourse of these children (Wilson and Proctor 2002).

## **2.4 Pragmatic Disorders in Early to Late Adulthood**

Even when language and pragmatic skills are fully acquired, illness, injury and disease in adulthood can result in their breakdown. The onset of mental illnesses in adulthood can have severe, detrimental effects on the pragmatics of language. The most extensively investigated mental illness by clinical language researchers is schizophrenia, although the communication features of other mental illnesses (e.g. bipolar disorder) are increasingly being examined (see chap. 6 in Cummings (2014a) for discussion). Often, pragmatic impairments are more pronounced in individuals with mental illnesses than any deficits in structural language. Like children, adults can sustain traumatic brain injuries. However, unlike children, these injuries occur against a backdrop of much reduced neural plasticity and fully acquired pragmatic skills. The effects of these injuries on language and pragmatic skills are thus likely to differ from those seen in children. Also, recovery of pragmatic skills is also likely to differ from that witnessed in children. It is for these reasons that adults with traumatic brain injury will be discussed as a distinct clinical population in this section.

In middle to late adulthood, several neurodegenerative conditions are beginning to be diagnosed with increasing frequency. These conditions include multiple sclerosis, motor neurone disease and Parkinson's disease (and the less frequently occurring Huntington's disease). Adults with these conditions are at risk of pragmatic disorders often as a result of the significant cognitive deficits that attend these neurodegenerative diseases. However, only in one of these conditions—Parkinson's disease—has there been any systematic examination of pragmatic language skills. This section will examine what is known about pragmatics in these neurodegenerative disorders alongside other disorders which have their onset in early to late adulthood.

### ***2.4.1 Schizophrenia***

Schizophrenia is a serious mental illness which has adverse implications for an individual's social, occupational and academic functioning. According to DSM-5, the disorder is diagnosed when two or more of the following symptoms are

present: (1) delusions, (2) hallucinations, (3) disorganized speech, (4) grossly abnormal psychomotor behaviour (including catatonia), and (5) negative symptoms (e.g. diminished emotional expression or avolition). The incidence and prevalence of schizophrenia vary with different epidemiological studies. In an overview of three related systematic reviews, McGrath et al. (2008) calculated the median incidence of schizophrenia to be 15.2/100,000 persons, while the median lifetime prevalence was 4.0 per 1,000 persons. The disorder was found to occur more commonly in males than in females in a ratio of 1.4:1. The onset of symptoms in schizophrenia occurs earlier in males than in females. Schürhoff et al. (2004) identified two subgroups of schizophrenic patients according to age of onset. The group with a mean age of onset of 19.91 years consisted predominantly of males, while the group with a mean age of onset of 33.48 years consisted predominantly of females. Antipsychotic medications are the mainstay in the pharmacological treatment of schizophrenia. Notwithstanding these medications and other interventions, the prognosis in schizophrenia is generally poorer than in other types of psychotic and nonpsychotic disorders (Harrow et al. 2005).

Language impairments in clients with schizophrenia affect the phonology, syntax and semantics of language. Deficits in phonological processing (e.g. phonological awareness) have been identified in adults with schizophrenia and are related to reading impairments in these clients (Arnott et al. 2011; Birkett et al. 2011). Receptive and expressive syntax or grammar is impaired in clients with schizophrenia. Semkovska (2010) reported the case of a schizophrenic patient with formal thought disorder in whom syntactic and morphological components of expressive grammar were equally impaired. Condray et al. (2002) reported deficits in receptive syntax, as measured by accuracy of responses to 'who' questions, in male subjects with schizophrenia. Semantic deficits have been reported extensively in this clinical population. Adults with schizophrenia have been found to make significantly more semantic errors on naming tasks, to produce fewer meanings for homophones and to produce fewer items in semantic fluency tasks than healthy control subjects (Vogel et al. 2009). While some authors attribute semantic deficits in this population to problems in lexical-semantic retrieval (Vogel et al. 2009), other authors point to a storage deficit of semantic memory as the cause of semantic impairments (Rossell and David 2006). For a review of language impairments in schizophrenia, the reader is referred to Covington et al. (2005).

By far the most marked linguistic deficits in schizophrenia occur in pragmatics and discourse. Pragmatic impairments are known to compromise the comprehension and recognition of speech acts, maxims and implicatures (Tényi et al. 2002; Mazza et al. 2008). The understanding of non-literal language, including metaphors, irony, proverbs, idioms and humour, is also impaired in adults with schizophrenia (Langdon et al. 2002; Tavano et al. 2008; Thoma et al. 2009; Polimeni et al. 2010). Alongside these receptive pragmatic deficits are a number of expressive deficits in the pragmatics of language. Typically, these are characterized in story-telling contexts. Perlini et al. (2012) reported deficits in local and global coherence during a story-telling task in 30 Italian-speaking patients with schizophrenia. During story retellings, patients with schizophrenia have been found to

produce irrelevant information and engage in derailments (Marini et al. 2008). Consistent with this finding of derailments in expressive language, Meilijson et al. (2004) reported that topic was a pragmatic parameter on which their subjects with schizophrenia exhibited a high degree of inappropriate abilities. Clients with schizophrenia also display reduced context processing (Schenkel et al. 2005), are impaired in recognizing and repairing communicative failures (Bosco et al. 2012a) and have problems with referential communication (Champagne-Lavau et al. 2009).

A range of cognitive problems, including theory of mind impairments and executive function deficits, are believed to underlie the pragmatic and discourse impairments of adults with schizophrenia (see Sect. 3.4 in Cummings (2009) and [Chap. 3](#) in this volume for further discussion). One cognitive problem in particular, an impairment of inference and reasoning in schizophrenia (Kruck et al. 2011), is likely to compromise pragmatics more than other cognitive deficits. This is because utterance interpretation is an inferential activity through and through.<sup>9</sup> There is much empirical evidence in support of the claim that inference and reasoning is compromised in schizophrenia. Clients with schizophrenia display impaired probabilistic inference (Averback et al. 2011), transitive inference (Titone et al. 2004), associative inference (Armstrong 2012), analogical reasoning (Simpson and Done 2004), inductive reasoning (Corcoran 2003) and deductive reasoning (Mirian et al. 2011). Moreover, some types of inference and reasoning have been shown to be linked to pragmatic language skills in individuals with schizophrenia. For example, Corcoran (2003) found a substantial correlation between the performance of clients with schizophrenia on an inductive reasoning task and a hinting task. The latter task is a measure of pragmatic language which requires subjects to infer a speaker's intention.

### ***2.4.2 Adult Traumatic Brain Injury***

It is important to consider the pragmatic impairments of children and adults who sustain TBI separately. This is because children and adults who sustain TBI have different states of learning and knowledge in place at the time of injury. Disruption of full, adult linguistic competence has a very different clinical manifestation from disruption of the partial linguistic competence of the developing child. This is a point that is frequently attested to in the literature, but is then overlooked as investigators proceed to base interventions for and clinical models of language impairment in childhood TBI on the language impairments of adult clients with TBI. Also, the mature, adult brain which is damaged by a traumatic event is likely to mount a different neural response from that which occurs in the developing brain of a child. Certainly, differences in the neural plasticity of the child and adult brain are commonly acknowledged. This neural response will have implications for the recovery of language in general, and pragmatics in particular, alongside a number of other cognitive functions. It is with these considerations in mind that we discuss



adult TBI apart from childhood TBI, notwithstanding certain similarities that will be apparent to the reader between these discussions.

Depending on the clinical criteria used to diagnose TBI, the incidence of TBI in adults has been found to vary substantially. Based on a population in South East Finland, Numminen (2011) reported an annual incidence rate of 221 per 100,000. The majority of patients (71 %) had mild TBI. When cases were excluded which did not exhibit a lack of consciousness or post-traumatic amnesia, the incidence rate was reduced to 137 per 100,000. The incidence of severe TBI is lower still with a rate of 4.1 per 100,000 reported by Andelic et al. (2012) for the adult population of Norway in 2010. Typically, more adult males than females sustain a TBI. In 2010, Andelic et al. (2012) reported the annual incidence of severe TBI for males to be 5.6 per 100,000 while for females the incidence was 2.0 per 100,000. The mean age of adults with severe TBI was 46.7 years. The most common cause of injury was falls (50 %) followed by transport accidents (40 %), assaults (5 %) and other causes (5 %). The median age of patients with TBI hospitalizations caused by transport accidents and assaults was 29 years and 35 years, respectively.

Structural language impairments are relatively common in adults who sustain TBI. The frequency of aphasia following TBI is reported to vary between 11 % and 30 % (Demir et al. 2006). The most common form of aphasia among the 51 subjects studied by Demir et al. was Broca's aphasia (26.5 %) followed by anomic aphasia (19.6 %) and transcortical motor aphasia (15.7 %). Deficits can be found in the reception and production of language across different modalities (e.g. spoken and written language) and language levels (e.g. syntax and semantics). Ellis and Peach (2009) found evidence of language production problems in individuals with TBI during a task that required subjects to produce sentences which varied in syntactic complexity. Subjects with TBI have been found to produce less semantic information during verbal definitions of objects (living and non-living), a deficit which is attributed to difficulty accessing semantic information despite intact organization of semantic knowledge (McWilliams and Schmitter-Edgecombe 2008). Adults with severe TBI also exhibit impaired reading performance (Mathias et al. 2007). In the acute care setting, impairments of language comprehension and expression in patients with TBI are predicted by education and TBI severity as measured on the Glasgow Coma Scale (Leblanc et al. 2006).

Adults with TBI form one of the few clinical populations in which pragmatic and discourse deficits have been more extensively investigated than impairments of structural language. In terms of pragmatics, adults with TBI have been found to exhibit difficulties in the Gricean domains of quantity, relation and manner (Douglas 2010a). During casual conversations with friends, adults with severe TBI have been observed to produce tangential language (Bogart et al. 2012). (Tangential language violates the Gricean maxim of relation.) Moreover, these adults were also found to have difficulty identifying communication breakdown, asking questions (a type of speech act) and engaging in conversational joking (jokes and humour in general make extensive use of non-literal language). Rousseaux et al. (2010a) examined pragmatic skills in dyadic interaction in 18 patients with severe TBI during rehabilitation (2–12 months post-injury) and at the chronic phase in recovery (2 years



post-injury). Patients displayed impaired greeting behaviour. They also exhibited difficulty in responding to open questions, presenting new information and introducing new themes, organizing discourse and adapting to interlocutor knowledge.

Dardier et al. (2011) reported pragmatic strengths and weaknesses in 11 French-speaking adults with severe TBI. Adults with TBI were able to comprehend a range of requests (direct, conventional indirect, unconventional indirect) as well as controls. Moreover, no single request type was more difficult than any other for these adults (but see Angelieri et al. below). However, adults with TBI displayed poorer metapragmatic knowledge than controls in that they were less able to give a relevant explanation of their comprehension of requests. They also produced fewer topic-maintaining speaking turns and more speaking turns containing a digression than controls. In fact, compared to controls, adults with TBI adhered to the topic of conversation four times less often and digressed more than 10 times more often. Problems with topic management in TBI—specifically topic repetitiveness—have also been reported by Body and Parker (2005). Angelieri et al. (2008) demonstrated a trend of increasing difficulty in understanding and producing different pragmatic phenomena in patients with TBI. Standard communication acts were easier for these patients than deceptions which, in turn, were easier than ironies. This trend was observed in both linguistic and extralinguistic modalities.

A range of discourse deficits has been reported in the adult TBI population. More often than not, narrative discourse is the context in which these deficits are investigated. Carlomagno et al. (2011) examined narrative discourse in 10 non-aphasic adults with TBI. Although the information content of narratives produced by these adults did not differ from those produced by healthy controls (but see below), adults with TBI were found to produce more errors of cohesion, local coherence and global coherence in their narratives than control subjects. Narrative discourse deficits have also been found to occur in adults with TBI who have intact language skills. Marini et al. (2011) examined the narratives of 14 non-aphasic adults with severe TBI. Although the lexical and grammatical skills of these adults were normal, their narratives contained errors of cohesion and coherence. These errors were on account of frequent (self-) interruption of ongoing utterances, derailments and extraneous utterances. The narratives of these adults contained a normal amount of thematic units, but this information was not correctly organized. Investigators have used a range of propositional measures (e.g. propositional complexity index) to account for the reduced informativeness of discourse in adults with TBI. These measures typically indicate that adults with TBI produce significantly fewer propositions per T-unit than controls (Coelho et al. 2005a).

### ***2.4.3 Neurodegenerative Disorders***

Several neurodegenerative disorders become increasingly common as people proceed through adulthood. These disorders include, but are by no means limited to, Parkinson's disease (PD), Huntington's disease (HD), multiple sclerosis (MS)

and motor neurone disease (MND; also known as amyotrophic lateral sclerosis or ALS). Until recently, it was thought that these disorders only had implications for speech production (and swallowing) with interventions by speech and language therapists aimed almost exclusively at the management of dysarthria (and dysphagia). However, it is becoming increasingly clear that language skills in general, and pragmatic skills in particular, are disrupted in clients with neurodegenerative disorders. These linguistic impairments are often related to the significant cognitive problems that attend these disorders, particularly in relation to executive function skills (see [Chap. 3](#), this volume). Clinical speech and language literature is beginning to reflect this growing appreciation of the pragmatic impairments of clients with neurodegenerative disorders. However, published studies to date are still quite limited in number and have mostly been undertaken in clients with Parkinson's disease. This section will examine what is currently known about the pragmatic skills of these clients and individuals with other neurodegenerative disorders.

Before embarking on an examination of pragmatic deficits in this population, something must be said about the epidemiology and neuropathology of the neurodegenerative diseases which will be examined in this section. Parkinson's disease results from a depletion of dopamine-producing cells in the substantia nigra of the brain. The disease has an incidence rate of 13.4 per 100,000 person-years (Van Den Eeden et al. 2003). This increases rapidly over the age of 60 years, with only 4 % of cases in people under the age of 50 years. In multiple sclerosis, the protective myelin sheath, which covers the axons of neurones in the central nervous system, is degraded in a neuropathological process called demyelination. MS has a lower incidence than Parkinson's disease—7.5 per 100,000 person-years on one estimate (Mayr et al. 2003). The median age at onset varies with different forms of MS. In relapsing-remitting MS, the most common form, the median age at onset is 28.7 years (Confavreux and Vukusic 2006).

In motor neurone disease, a progressive deterioration of upper and lower motor neurones results in reduced innervation to, and consequent atrophy of, muscles that are responsible for a range of motor functions (speech, walking, breathing, etc.). MND is a low incident disorder. Hoppitt et al. (2011) calculated the incidence to be 1.06–2.4 per 100,000 person-years. The peak age of onset of MND for both sexes is 60–64 years (Fong et al. 2005). Huntington's disease is an autosomal dominant neurodegenerative disorder that affects the basal ganglia, leading to affective, cognitive, behavioural and motor decline (Reiner et al. 2011). The disease has an incidence of 0.44–0.78 per 100,000 person-years (Hoppitt et al. 2010). In one study of 680 patients with Huntington's disease, the mean age at onset (as determined by neurologists) was 44.0 years (Tsai et al. 2012).

In addition to significant difficulties with speech, voice and swallowing, clients with neurodegenerative disorders also exhibit language problems. This is the case even when there is no cognitive impairment or dementia in these clients. Adults with Parkinson's disease have been found to have problems with intonational marking of syntactic boundaries (MacPherson et al. 2011), lexical-semantic

processing (Arnott et al. 2010) and receptive syntax (Walsh and Smith 2011). Klugman and Ross (2002) found that 63.3 % of their sample of 30 patients with MS reported language difficulties. Aphasia, alexia and agraphia have been reported rarely in MS individuals (Lacour et al. 2004; Mao-Draayer and Panitch 2004; Varley et al. 2005). Other language impairments in MS include lexical access problems, as indicated by naming deficits (Sepulcre et al. 2011), and difficulties with linguistic expression (Mackenzie and Green 2009). Language impairments, which are not a consequence of dementia or aphasia, have been reported in adults with MND. These impairments include syntactic comprehension problems and agraphic writing errors (Bak and Hodges 2004; Ichikawa et al. 2008). Language impairments are found in early and late Huntington's disease. Teichmann et al. (2005) found that patients in the early stage of HD were impaired in rule application in the domains of morphology and syntax. Saldert and Hartelius (2011) described a woman with advanced HD who had word retrieval problems, reduced comprehension and whose speech was characterized by echolalia.

Pragmatic disorders have been most extensively investigated in adults with Parkinson's disease. These adults present with marked pragmatic impairments, even in the absence of dementia. These impairments include problems with the comprehension of speech acts (Holtgraves and McNamara 2010a), irony (Monetta et al. 2009) and metaphor (Monetta and Pell 2007; McKinlay et al. 2009). McNamara et al. (2010) reported that patients with PD are less likely than control subjects to automatically activate indirect meanings of implicatures. They are also overly confident in their interpretations and unaware of errors of interpretation. McNamara and Durso (2003) reported significant impairments of pragmatic communication abilities in 22 patients with PD, particularly in the areas of conversational appropriateness, turn-taking, prosodics and proxemics. Less research has been conducted into expressive aspects of pragmatics in adults with PD. Holtgraves and McNamara (2010b) found that patients with PD used less polite strategies than control subjects and had difficulty varying the politeness of requests in relation to features of social context such as the power of the recipient. Pragmatic impairments have been shown to correlate with the duration and severity of Parkinson's disease (Hall et al. 2011). They also appear to be linked to cognitive deficits (particularly of working memory) related to frontostriatal dysfunction (Monetta and Pell 2007).

Pragmatic and discourse deficits in adults with other neurodegenerative disorders are increasingly being investigated. Saldert et al. (2010) studied pragmatic and discourse skills in a group of 18 patients with Huntington's disease. These subjects were significantly less able than pair-matched controls to comprehend metaphors, explain lexical ambiguities in sentences and respond to questions about the (explicit and implicit) content of narrative discourse. Notwithstanding similar performance on primary language tasks, patients with HD have been found to be significantly impaired relative to controls on tasks that require the interpretation of ambiguous, figurative and inferential meaning (Chenery et al. 2002). Murray (2000) reported that patients with HD produced the same amount of verbal output as control subjects during a picture description task. However, this output was less informative than that produced by controls. In a study of picture description abilities in six

patients with HD, Jensen et al. (2006) reported that patients used significantly fewer action information units than a non-neurologically impaired control group.

Patients with multiple sclerosis have also been found to produce the same quantity of information as controls during narrative discourse (Arnott et al. 1997). However, the narratives of these patients contained less essential story information, and more incorrect and ambiguous information, than the narratives produced by controls. Laakso et al. (2000) reported that a group of patients with MS and self-reported language problems had lower mean scores than healthy control subjects and patients with MS and no reported language problems on tests that required them to comprehend ambiguous sentences and sentences with metaphorical expressions, as well as make inferences and understand implied relationships in the script of a text. None of the language difficulties of these patients were detected by a standard aphasia test. Roberts-South et al. (2012) also found language difficulties in patients with ALS which were not apparent on standardized language tests. Sixteen patients with ALS without dementia, who did not differ from control subjects on any standardized language test, displayed discourse production difficulties during a picture description task. These difficulties were most apparent in discourse content which was more impaired than discourse productivity.

## **2.5 Pragmatic Disorders in Advanced Adulthood**

The post-retirement years are coincident with an increase in cerebrovascular disease and a number of neurodegenerative pathologies. Cerebrovascular accidents or strokes can compromise neuroanatomical areas in the left and right cerebral hemispheres as well as sub-cortical structures. When the language centres in the brain's left hemisphere are damaged, aphasia of various types are the result. Traditionally, clinicians have subscribed to the view that while structural language is impaired in the aphasia, pragmatics is relatively intact. It has become increasingly apparent that this is not the case with many studies of clients with aphasia revealing significant pragmatic problems, not all of which can be accounted for in terms of structural language deficits. The brain's right hemisphere is even more closely associated with pragmatic disorder. Since Penelope Myers' first formal study of right-hemisphere language disorder in 1979, clinical studies have consistently revealed marked pragmatic and discourse deficits in clients with right-hemisphere lesions.

Although cerebrovascular disease is a common cause of pragmatic disorder in the latter years, it is by no means the only organic problem to affect the brain which has implications for language and communication. Dementias of various types are becoming increasingly common in people of advanced years. Although pragmatic skills in clients with Alzheimer's disease, the most common cause of dementia, have been extensively investigated by clinical researchers, relatively little is known about these skills in individuals with one of the non-Alzheimer's

dementias. These dementias will be introduced in this chapter in preparation for a more detailed examination of their pragmatic deficits in [Chap. 6](#).

### 2.5.1 *Left-Hemisphere Damage*

The language centres in the brain's left hemisphere can be compromised by injury and disease. Among the organic conditions and other events which can damage these centres are traumatic brain injury, cerebrovascular accidents, infections (e.g. meningitis) and benign and malignant neoplasms. The language and pragmatic impairments that result from adult TBI have already been examined and will not be considered further in this section. Among the remaining organic causes listed above, cerebrovascular accidents (CVAs) or strokes are the most significant cause of left-hemisphere damage (LHD) in adults. The World Health Organization states that stroke is the second leading cause of death above the age of 60 years (Mackay and Mensah 2004). It is also the single biggest cause of major disability in the UK. Aphasia is one of the sequelae of stroke, occurring in 35 % of adult stroke patients—an incidence rate of 60 per 100,000 persons per year (Dickey et al. 2010). Less commonly, aphasia is caused by cerebral infections and neoplasms (Mukand et al. 2001; Kastenbauer and Pfister 2003). While aphasia often attends LHD, it is important to acknowledge that LHD can also occur without any resulting aphasia. This section will examine the pragmatic and discourse deficits that are found in adults with aphasia and in adults with left-hemisphere damage in the absence of aphasia.

Language impairment in aphasia can affect the production and reception of language at all levels (e.g. phonology, syntax, semantics<sup>10</sup>) and across all modalities (i.e. speech, writing and signing). Linguistic symptoms tend to coalesce around a number of aphasia syndromes which can be broadly classified as fluent and non-fluent. A comprehensive discussion of these symptoms and aphasia syndromes is beyond the scope of this chapter (see Bastiaanse and Prins (2014) for a detailed account). Not all symptoms have equal implications for pragmatics and discourse. Through their disruption of the linguistic processes of encoding and decoding upon which utterance production and interpretation depend, syntactic and semantic deficits often have adverse consequences for pragmatics and discourse. But even in the presence of these deficits, adults with aphasia can still display pragmatic competence. For example, the adult with agrammatic (non-fluent) aphasia produces utterances in which there is reduced syntactic complexity and omission of grammatical morphemes. These utterances lack the syntactic structure needed to produce conventional indirect speech acts (e.g. the subject pronoun-auxiliary verb inversion present in *Can you open the window?*). However, the relative preservation of content words means that the adult with agrammatic aphasia is often still able to produce informative discourse.

An extensive literature exists on pragmatic and discourse deficits in adults with aphasia. Among these adults, studies have found evidence of impaired comprehension of idioms with understanding taking the form of literal interpretation

(Papagno et al. 2004; Papagno and Caporali 2007), problems with the processing of metaphoric meaning (Giora et al. 2000; Gagnon et al. 2003) and speech acts (Soroker et al. 2005) and impaired comprehension of proverbs (Chapman et al. 1997) and sarcasm (Giora et al. 2000). Rousseaux et al. (2010b) found severe verbal pragmatic disorders during conversation in stroke patients with cortico-sub-cortical lesions and sub-cortical lesions. Narrative and procedural discourse deficits have also been reported in adults with aphasia (Weinrich et al. 2002). Andreetta et al. (2012) examined the narrative discourse skills of 10 subjects with chronic anomic aphasia. These subjects produced more errors of cohesion and global coherence and fewer lexical information units than healthy control individuals. Moreover, these discourse problems were related to the lexical retrieval difficulties of the subjects with anomic aphasia (but see below). The written narratives of eight adults with aphasia were examined by Behrns et al. (2010). Alongside linguistic deficits, these adults were found to produce narratives in which there was reduced productivity and coherence. All but two adults with aphasia produced narratives with relatively well crafted initiating events and last episodes.

The traditional view of pragmatic and discourse deficits in adults with LHD is that these deficits are the consequence of structural language impairments in aphasia. However, there is clear evidence that this is not always the case. Firstly, pragmatic language impairments have been shown to persist despite improvements in structural language in adults with aphasia. Coelho and Flewellyn (2003) examined coherence in the story narratives of a subject with anomic aphasia over a 12-month period. These researchers found that although microlinguistic skills improved over this period, local and global coherence failed to improve appreciably.

Secondly, pragmatic and discourse impairments have been found in adults with LHD who have no aphasia. Ellis et al. (2005) examined cohesion in the narrative discourse of 12 subjects who sustained left-hemisphere strokes. None of these subjects were diagnosed with aphasia or were generally language impaired. Notwithstanding this fact, 8 % of all cohesive ties used by these subjects were incomplete or erroneous, with errors involving ties of reference type (82 %) and lexical type (18 %). Thirdly, pragmatic impairments have been found in extra-linguistic communication where they cannot be related to the presence of linguistic deficits. Cutica et al. (2006) found that subjects with LHD were unable to use videotaped fictions in which actors performed gestures to establish an actor's communicative intention. Studies such as these indicate that researchers must look beyond aphasia-related structural language impairments to explain the pragmatic and discourse deficits of adults with LHD.

### ***2.5.2 Right-Hemisphere Damage***

The brain's right hemisphere is at risk of injury and disease from the same illnesses and events which cause lesions in the left hemisphere. Focal lesions of the right hemisphere are most often caused by a CVA but may also result from



a brain tumour. Beyond the different functions of the left and right hemispheres, there are reasons for viewing stroke-induced lesions of the right hemisphere differently from those of the left hemisphere. Compared to patients with left-hemisphere stroke, adults with right-hemisphere stroke present later to emergency departments, are less likely to receive thrombolysis, and have worse clinical outcomes (Di Legge et al. 2006; Palmerini and Bogousslavsky 2012). Delays in, and lack of, medical treatment are related to poorer awareness of neurological deficits in right-hemisphere stroke among patients (Ito et al. 2008) as well as insensitivity of stroke severity scales to these deficits (Yoo et al. 2010).

Even as right-hemisphere strokes are underreported and not fully diagnosed, so too are the language deficits caused by these strokes. The high-level language deficits associated with right-hemisphere damage (RHD) are quite unlike the structural language impairments associated with aphasia. Moreover, standardized language batteries are known not to be sensitive to these deficits (Joanette et al. 2014). With these considerations in mind, it can be seen that right-hemisphere language disorder following a stroke is likely to be a somewhat neglected consequence of a cerebral event that is itself not fully recognised and diagnosed.

Clinical researchers have come to the study of right-hemisphere language disorder much later than that of aphasia. However, there is now widespread awareness among investigators of the part played in communication by the brain's right hemisphere and of the substantial number of people who experience communication disorders when this hemisphere is damaged. The incidence of (nondysphasic) language and communication problems in RHD has been estimated to be 50 %, with marked difficulties for 20 % (Benton and Bryan 1996). More recently, Côté et al. (2007) estimated the incidence of these problems to be higher than 50 % in a rehabilitation centre setting. Pragmatic and discourse impairments in the RHD population have been extensively investigated since the late 1970s when Penelope Myers' study of patients with RHD first brought this client group to the attention of clinicians (Myers 1979). Some of the results of this research are considered below.

Findings of pragmatic impairments in adults with RHD are commonplace in the clinical literature. Most often, they describe impaired comprehension of non-literal language. This impairment affects the interpretation of implicatures (Kasher et al. 1999), metaphors (Rinaldi et al. 2004), idioms (Papagno et al. 2006), humour (Heath and Blonder 2005), sarcasm (Giora et al. 2000; Shamay-Tsoory et al. 2005) and indirect speech acts (Hatta et al. 2004). Typically, comprehension problems in RHD are characterized by a tendency towards literal interpretation of utterances. Adults with RHD have been found to have difficulty establishing a speaker's communicative intention in producing non-literal utterances (Cheang and Pell 2006) and contributing to the development of the intentional structure of conversation (Hird and Kirsner 2003). Problems with the interpretation of non-literal language in RHD have been attributed to theory of mind deficits (Winner et al. 1998), visuo-perceptual and visuo-spatial deficits (Papagno et al. 2006) and impaired processing of affective (emotional) prosody and language (Lehman Blake 2003).



Discourse deficits were the focus of Myers' early work<sup>11</sup> and have been extensively documented in adults with RHD. Non-aphasic adults with RHD have been found to produce narratives which contain tangential errors and conceptually incongruent utterances (Marini 2012). Compared to normal controls, adults with RHD have been shown to produce picture descriptions which have poorer information content, cohesion and coherence (Marini et al. 2005). Lehman Blake (2006) reported that discourse produced by adults with RHD during a thinking-out-loud task was rated as more tangential and egocentric than the discourse of healthy older adults. RHD discourse also contained extremes of quantity (i.e. extreme verbosity or paucity of speech). Adults with RHD are less able than non-brain-damaged individuals to use discourse context to resolve lexically ambiguous words (Grindrod and Baum 2005).

In a series of studies by Tompkins and colleagues, discourse deficits in RHD have been related to difficulties in generating and suppressing inferences. Adults with RHD have been found to have difficulty drawing high-level inferences about the motives of characters in narratives (Tompkins et al. 2009). Although adults with RHD are able to generate predictive inferences during the presentation of narratives, they are less able to maintain those inferences than non-brain-damaged adults (Lehman-Blake and Tompkins 2001). The suppression of inappropriate inferences is a significant predictor of narrative discourse comprehension in adults with RHD (Tompkins et al. 2000, 2001). Conversely, greater activation for contextually inappropriate interpretations is associated with poorer discourse comprehension performance in adults with RHD (Tompkins et al. 2004). Tompkins et al. (2008) found that adults with RHD who had difficulty sustaining activation for the peripheral semantic features of nouns—a phenomenon known as coarse coding—were also relatively poor comprehenders of implied information from narratives. For further discussion of this research, the reader is referred to Joannette et al. (2014).

### 2.5.3 *Dementias*

The dementias are a large and varied group of neuropathologies that lead eventually to the loss of cognitive and physical functions in affected individuals. People with dementia may experience mild cognitive impairment initially which develops over time into mutism, incontinence, immobility and dependence on others for all aspects of care. Dementias can be caused by infections (e.g. HIV infection), excessive alcohol consumption over an extended period of time (e.g. Korsakoff's syndrome), cerebrovascular disease (e.g. vascular dementia) and age-related degenerative changes in the brain (e.g. Alzheimer's disease).

Many people who develop dementia do so outside of the period we are describing as advanced adulthood (i.e. 66–85 years). These cases of early-onset dementia are often associated with certain types of dementia. In a sample of 948 patients meeting established clinical criteria for a dementing illness,

McMurtray et al. (2006) found that 278 patients (about 30 %) had an age of onset less than 65 years. These patients had significantly more dementia which was attributed to TBI, alcohol, HIV and frontotemporal lobar degeneration. Nevertheless, the age of onset for the large majority of people (about 70 %) who develop dementia is greater than 65 years. These cases of late-onset dementia are typically associated with Alzheimer's disease (McMurtray et al. 2006). It is these latter cases which we will examine in this chapter. The non-Alzheimer's dementias will be discussed in [Chap. 6](#).

Alzheimer's disease (AD) is a common condition which places a large economic and health burden on developed countries with aging populations. Currently, it is estimated that approximately 5.4 million Americans have AD, a figure which is expected to nearly triple to 14.5 million people over the next 40 years (Lopez 2011). The prevalence of AD is 4.9 % while the incidence is 2.3 per 100 person-years (Katz et al. 2012). Although AD rates increase with age, they do not differ by sex (Katz et al. 2012). The neuropathological processes of AD are relatively well understood even if what triggers these pathological changes to occur has still to be established. Brain tissue is characterized by the presence of amyloid plaques, neurofibrillary tangles, neuronal loss (and synapses) and cerebral amyloid angiopathy, which is the build-up of proteins called amyloid on the walls of the arteries in the brain (Lopez 2011). Once symptoms appear, the disease has a relentless progression. On one estimate, the median survival from initial diagnosis is 4.2 years for men and 5.7 years for women (Larson et al. 2004).

Along with other cognitive functions, language deteriorates with the onset and progression of Alzheimer's disease. However, there is evidence that this deterioration does not affect all language levels to the same extent or at the same time. The language hierarchy, which proceeds from simple to more complex units of language along the ranks of phonology, morphology, syntax and semantics, was the focus of a review of studies of language impairment in AD by Emery (2000). It was concluded that the decline of language in AD is hierarchical in nature, with late-acquired aspects of language deteriorating before aspects of language which are acquired early in development. Semantic and lexical aspects of language are thus more vulnerable to early deterioration in AD than phonological and syntactic aspects. Even within language levels there is an age of acquisition effect. This effect has been demonstrated for word production and recognition, for example. On a semantic fluency task, Sailor et al. (2011) found that patients with AD produced words which have an earlier age of acquisition. Cuetos et al. (2010) observed a similar age of acquisition effect during a word recognition task, with AD patients recognizing fewer late than early acquired words correctly.

Pragmatic and discourse aspects of language are still being acquired long after phonology and syntax are well established components of a child's linguistic competence (Levorato and Cacciari 2002; Nippold et al. 2005). To this extent, one might reasonably expect pragmatic and discourse skills to be particularly vulnerable to early deterioration in AD. There is evidence to indicate that this is the case. In one of the few studies to document longitudinal deterioration of language skills in patients with Alzheimer's disease, Bayles et al. (1992) found significant

discourse impairments at stages of the disease when structural language skills were still relatively intact. Two discourse tasks examined the ability of patients with AD to produce relevant information units about the setting, events and main idea of a picture (picture description task) and to provide relevant, non-redundant and truthful information about an object (object description task). The Global Deterioration Scale (GDS; Reisberg et al. 1982) was used to determine the stage of dementia in patients. Of the seven stages of dementia recognized by the GDS, three will be examined here.

Patients at GDS = 3 exhibit the earliest, clear-cut clinical deficits of dementia. While these patients scored at the 90 % or better level of the normal mean on oral reading, superordinate identification, auditory comprehension and writing to dictation, they performed at only 55 % of the normal mean on both discourse tasks. Patients at GDS = 4 are in the late confusional stage. These patients still approximate normal performance on oral reading, reading comprehension and auditory comprehension. However, their performance on picture description is 50 % of the normal mean and is even less than that on object description. Patients at GDS = 5 have moderately severe cognitive decline and exhibit early dementia. These patients' performance on auditory and reading comprehension is still greater than 50 % of the normal mean, while their performance on object and picture description is less than 50 % of the normal mean. The pattern of linguistic impairments is consistent across these stages—the performance of patients with AD on structural language tasks surpasses that on discourse tasks. In a later study, Papagno (2001) reported that decline of figurative language was not an early symptom of dementia in 39 patients with probable AD. Clearly, more research needs to be undertaken into the stage at which language skills in general, and pragmatic skills in particular, deteriorate in AD.

Stage of deterioration aside, pragmatic language skills have been repeatedly found to be impaired in adults with AD. In some studies, impairment of these skills is associated with cognitive decline but not aphasia (Hays et al. 2004). Comprehension of non-literal language is particularly affected. Amanzio et al. (2008) reported that patients with probable AD displayed impaired comprehension of non-conventional or novel metaphors, although their comprehension of conventional metaphors and idioms was intact. Papagno (2001) found that metaphor comprehension in patients with probable AD decreased significantly over time, a pattern not observed for the comprehension of idioms. Idiom comprehension was found to be poor in the patients with AD examined by Rassiga et al. (2009), with comprehension performance correlating with executive tests. Even when literal comprehension in patients with AD is normal or only mildly impaired, idiom comprehension has been found to be very poor (Papagno et al. 2003). Comprehension errors typically take the form of literal interpretation. Of 350 idiom comprehension errors committed by the patients with AD examined by Papagno (2001), 149 (47.3 %) were 'literal or concrete' interpretations.

Studies of the comprehension of sarcasm or irony in patients with AD have produced mixed results. The patients with AD examined by Kipps et al. (2009) had no difficulty appreciating sarcastic statements. Shany-Ur et al. (2012) found that

patients with AD did not demonstrate impaired comprehension of sarcasm when overall cognitive deficits were accounted for. However, Bara et al. (2000) reported a significant difference in the percentage of correct responses of 14 patients with AD (19 %) and controls (59 %) on a pragmatic task examining recognition of non-verbal ironies. Leyhe et al. (2011) found that the performance of patients with early AD on a proverb interpretation test was significantly worse than that of healthy controls. Errors produced by these patients included concrete answers and senseless answers. The completion of proverbs has also been shown to be compromised in patients with AD (Lindholm and Wray 2011). Chapman et al. (1998) found that patients with AD exhibited significant difficulty formulating correct non-literal explanations for proverbs and selecting the correct abstract interpretation of proverbs during a multiple choice proverb interpretation task. Often, patients chose the abstract foil which took the form of another proverb (e.g. selecting *There's more than one way to skin a cat* as the meaning of 'One swallow doesn't make a summer').

Discourse deficits in patients with AD have been examined in conversational and narrative contexts and during referential communication and picture description tasks. Mentis et al. (1995) identified problems with topic management during casual conversational interaction. Patients with AD exhibited reduced ability to change topics, difficulty contributing to the propositional development of topics, and a failure to maintain topics in a clear and coherent manner. Carlomagno et al. (2005) examined the discourse skills of patients with AD during a referential communication task and a picture description task. These patients displayed reduced lexical encoding of information during both tasks, and reduced efficiency in establishing reference during the referential communication task. They also produced confounding and irrelevant information during the referential communication task. As well as expressive discourse deficits, patients with AD have significant difficulty with the comprehension of discourse. Welland et al. (2002) reported poorer overall comprehension of narratives in subjects with early-stage and middle-stage AD than in subjects with no brain damage. The comprehension of subjects with AD was better for main ideas than for details, and for stated information than for implied information.

## 2.6 Summary

This chapter has examined pragmatic disorders from a life span perspective. This perspective takes a chronological approach to pragmatic disorders, from problems with the development of pragmatic language skills in childhood to the disruption of those skills by injury and disease in adulthood. The organic and other conditions which cause pragmatic disorders have been examined throughout the chapter in a wide-ranging discussion of the aetiology of pragmatic impairment. The chapter has also addressed the prevalence and incidence of pragmatic disorders, most often through an examination of the epidemiology

of the conditions that cause these disorders.<sup>12</sup> Pragmatic findings have included the results of experimental studies, analyses of conversation and investigations of non-dialogical discourse (e.g. narrative). These studies have revealed a broad spectrum of pragmatic disorder in children and adults which will be examined further in subsequent chapters.

## Notes

1. Several clinical conditions which have marked pragmatic disorders (e.g. autism spectrum disorder, or ADS) are more commonly found in males than in females (see Sect. 3.3.1 in Cummings (2008) for a discussion of sex ratios in ASD). To this extent, more males than females do have pragmatic disorders. However, apart from these specific populations, there is no evidence to suggest that being male per se places one at greater risk of having a pragmatic disorder.
2. It should be noted that substantial investigation of the genetic basis of SLI has been undertaken in recent years. For reviews, the reader is referred to Bishop (2009) and Newbury and Monaco (2010).
3. Katsos et al. are testing these children's understanding of scalar implicatures. A scalar implicature is a type of generalized conversational implicature. In the utterance 'Mike attended some of the classes' there is a scalar implicature to the effect that he did not attend all the classes. The terms <all, most, many, some> differ in informational strength, with 'all' the semantically strongest and 'some' the semantically weakest terms in the set. By asserting the weakest term 'some', a speaker may be taken to implicate 'not all/most/many'.
4. In DSM-5, ADHD is included in the category Neurodevelopmental disorder while selective mutism is a specifier in the category Social anxiety disorder (Social phobia). Conduct disorder occurs alongside a number of other conditions (e.g. oppositional defiant disorder) in the category Disruptive, Impulse Control, and Conduct disorders.
5. The presence of hydrocephaly has been identified as a factor in reduced language outcomes (Lewis and Murdoch 2011a).
6. Di Rocco et al. (2011) identified pre-surgical language impairment in children with posterior fossa tumours. Moreover, pre-surgical language impairment was found to be a risk factor for the development of cerebellar mutism syndrome following surgery.
7. It is important to note that the treatment of childhood brain tumours does not always result in language impairments. Docking et al. (2005) found that six children treated for brainstem tumour demonstrated intact language and phonological awareness abilities. In a later study, Docking et al. (2007) reported intact abilities in receptive language (including vocabulary), expressive language and naming in four children treated with surgery and/or radiotherapy for cerebellar tumour. Richter et al. (2005) found no signs of aphasia in 12

children and adolescents who underwent surgery for cerebellar astrocytoma. Frank et al. (2007) found preserved naming and verb generation accuracy in nine children and adolescents following surgery for cerebellar tumours. Lewis and Murdoch (2011b) reported intact language skills and semantic processing in a 14-year-old female who received fractionated cranial radiation dosages for treatment of medulloblastoma at 10 years and 3 months. In other cases, treatment has actually resulted in improvements in language function. Mabbott et al. (2007) found improvement in receptive language in a preschool child who received surgery, chemotherapy, stem cell transplant and radiation for the treatment of medulloblastoma.

8. Many higher-level pragmatic and discourse impairments in childhood TBI are related to memory deficits and other executive function disorders in this population (see [Chap. 3](#), this volume). The relationship of pragmatic and discourse impairments to executive function deficits, often in the absence of structural language problems, is the basis for the use of the term ‘cognitive communication disorder’ in relation to the communication difficulties of both children and adults with TBI.
9. It should be noted, however, that the exact nature of the inferences involved in utterance interpretation is still unknown. The reader is referred to chap. 3 in Cummings (2005) for further discussion.
10. Not all language levels are impaired in individuals with aphasia. El Hachoui et al. (2012) examined phonology, syntax and semantics in 141 subjects with acute stroke-induced aphasia. In 22.4 % of subjects, deficits were found in only one of three linguistic levels. Phonology was the language level most likely to be disrupted (16.3 %) followed by syntax (3.4 %) and semantics (2.7 %). Also, the recovery of language levels does not follow a parallel course, with evidence of earlier recovery (up to 7 weeks post-stroke) for syntax and semantics and somewhat later recovery (up to 4 months) for phonology.
11. Myers (1979) had her subjects with RHD describe the cookie theft picture from the Boston Diagnostic Aphasia Examination (Goodglass and Kaplan 1972).
12. This ‘indirect’ approach to the epidemiology of pragmatic disorders is necessitated by the lack of epidemiological work on communication disorders. Some indication of the extent to which epidemiology has been neglected in the study of communication disorders is apparent from a workshop held in March 2005 by the National Institute on Deafness and Other Communication Disorders (NIDCD). At this workshop, it was reported that only 1.1 % of all NIDCD funded grants are associated with epidemiology.





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