Introduction

This book is predicated on the relatively uncontentious notions that discourse patterns – what people do when they talk or write – can provide trained observers with information about cognitive functions and affective states in speakers and, further, that cognitive functions and affective states may be signs of integrity of neurological function and structure. Neurolinguists, psycholinguists, aphasiologists, psychiatrists, psychotherapists and speech pathologists all take some variation on assumptions like this as their point of departure in studying brain–behaviour relationships and treating some neurological and affective disorders. However, discourse – people's talk and text – is inherently complex and apparently unstable and, worse, the neurological substrate and processes that support even superficially simple things like 'how words are represented in the brain', let alone 'what happens in brains when people talk' are matters of active debate and investigation rather than scientific givens. In the face of so much uncertainty and complexity, most of the work done on language–brain relationships has, very sensibly, centred on theoretically discrete and/or methodologically isolatable phenomena associated with particular semantic, morphosyntactic or phonological structures or processes. Work on discourse in clinical environments as another means of investigating neurocognitive (dys-) function, although often called for, has been less common.

This situation is changing now because of technological developments and, we think, a sea-change-like shift that is taking place in attitudes to brain–behaviour relationships. On the technological side, recent developments in neuroimaging techniques are providing new tools to investigate neural structure, chemistry and function, and developments in machine-mediated text analysis tools, storage and search capacities have made corpus-based discourse studies much more doable. The change in attitudes to brain–behaviour relationships is also at least partly technologically mediated insofar as imaging and other techniques enabling *in vivo* investigation of the effects of cognitive activity suggest that behaviours can have measurable effects not just on activation patterns but also on neurochemical and neuroplastic (structural) responses. What is novel in this is not that behaviour can alter neurochemistry and structure – therapy for people with brain injury or dysfunction presupposes and evidences this. Rather,

it is that the new technologies can make changes observable and measurable, and so present new possibilities both for understanding brain–behaviour relationships and, consequently, for developing new therapies to help people with neurological disorders or injuries. There are other factors that contribute to this drift – salient among them are recognition of the limits and risks of pharmacological interventions and an increased, computationally mediated, capacity to conceptualize complex interactions. The first three factors suggest that people interested in neurological disorders and diseases should have access to very detailed accounts of the discourse patterns (and other behaviours) of the populations that they study and treat; the computational capacity to store and process the data produced by such studies means projects that used simply to be unworkable can now be fruitfully undertaken.

It is in this environment that we offer this book as a first pass at 'clinical discourse analysis' or CLDA. It is intended as an introduction to the use of structurally, pragmatically and linguistically based discourse analysis techniques to investigate relationships between discourse behaviours and patterns and neurocognitive (dys)function in clinically defined groups. Because we work with teams specializing in the care of people with autism spectrum disorders and degenerative dementias, most of the examples we use refer to discourse samples from these groups. However, the techniques that we discuss and model for discourse analysis were originally developed for description of normal speech and writing and are applicable to any sort of speech sample, including corpora representative of the speech associated with other neurological disorders.

Our primary audience is discourse analysts (including linguists and cognitive scientists) – senior undergraduate or graduate students, faculty and researchers interested in investigating relations between discourse and neurocognitive functions. For instance, we see the book as a useful adjunct to courses in discourse analysis and clinical linguistics. However, it should also be of value to nurses, speech pathologists, clinical psychologists, neurologists and psychiatrists interested in the potential of discourse analysis (or working with discourse analysts) for informing clinical judgements of diagnosis and change and for addressing their own research questions. Finally, we wanted our book to be interesting and readable for non-professionals, especially caregivers, interested in Alzheimer's disease, autism spectrum disorders or just generally in discourse and neurocognitive function. So, although some parts of the book are unavoidably technical, we have worked to make the descriptions of discourse patterns in Alzheimer's and autism speakers accessible for a general audience. Readers will no doubt let us know whether or not we succeeded.

In the chapters that follow, we first orient readers to clinical discourse analysis (chapter 1) and the theoretical and clinical contexts and disorders our work engages (chapter 2). Chapters 3–5 present descriptive resources which allow coding of spoken discourse in terms of conversation analysis and intonation

(chapter 3), grammatical resources for meaning (chapter 4), and means for extracting patterns from these and relating the patterns to contexts of culture and situation presented as articulated aspects of memory (chapter 5). Chapters 6 and 7 address questions in study design associated with various discourse tasks and model applications for diagnosis (in autism spectrum disorders) and treatment monitoring (in Alzheimer's disease). Chapter 8, on cognitive models, inferencing and affect, and chapter 9 on modelling information across domains, situate the analytic constructs presented in neurocognitive and clinical perspectives through review of relevant neuropsychological, imaging and lesion studies and through detailed illustrations of the analyses and inferential processes involved in clinical discourse analysis. We close with remarks about the future and potential for clinical discourse analysis.

1 Introduction to clinical discourse analysis

> Discourse represents that aspect of mental activity that most clearly reflects the intimate and over-lapping connections among cognition, language, and communication.
>
> (Ulatowska *et al*. 1985)

1.1 What is clinical discourse analysis?

Clinical discourse analysis is the term we use to describe the analysis of language behaviour observed in clinical contexts. Language behaviour includes well-defined areas of clinical research addressing syntax, vocabulary, phonology, conversation skills and cohesion. It also includes areas less commonly described in clinical research such as argument roles, situational features and functional variation. The focus of clinical discourse analysis is natural language behaviour which requires examination of all these aspects of language use. Even the smallest of texts require analysis that can explore multivariate features.

Consider the following sentence:

(1) I can remember my Mom.

It is extracted from a brief sample of spoken discourse elaborated below. The sentence has an interactional function: it makes a statement which is modalized for capacity (*can*). It has a predicate that references a cognitive process (*remember*) and two argument roles, an experiencer (*I*) and a percept (*my mom*). It has an unmarked clause order: subject occurs first in English statements unless there is a reason to emphasize some other element of structure. One might also assume that the speaker interprets the situation as an informal one in that she chooses to refer to her mother as *Mom* rather than *mother*.

The larger text from which this example is taken appears in Text 1.1 below.

Text 1.1 My Mom

Ah the same thing with the – what was it we just discussed? – the stove. I can remember my Mom, she was as smart as a ticket. She was ninety-six years old when she died

and she would, you know, she had everything under control. But I knew I knew that I couldn't do that I couldn't go and I don't know. Now I'm lost again.

The speaker is a 76-year-old woman, Cleo, with moderate Alzheimer's disease (AD). She is responding to a question about her ability to use the stove, and commenting on her mother's competence in old age as compared with her own difficulties. Grammatically, her speech is well formed. Most sentences are complete. They have appropriate subject–verb agreement, and subordinate and co-ordinate clause structures that are typical for her age group (Mackenzie 2000; Kemper *et al.* 2001b). She uses idioms *she was smart as a ticket, she had everything under control,* and a metaphor *I'm lost again.* She also uses cohesive features such as pronouns and other referring expressions appropriately, with reference supplied either in prior or subsequent text. However, there are conversation and fluency features which reflect planning difficulties and repairs: she hesitates (*the same thing with the*) and checks reference (*what was it we just discussed?*) but then supplies it herself (*the stove*). She has false starts (*she would*) which she repairs (*you know, she had …)*; repetition (*I knew I knew*)*;* and one predication (*I couldn't go*) appears incomplete or tangential in that it does not refer to anything in either prior or subsequent discourse.

Cleo's abilities and difficulties, including her ability to monitor and repair her discourse, and her explicit recognition of difficulty (*I don't know, I'm lost again*) are characteristic for her age and stage of Alzheimer's (Asp *et al.* 2006a). Recognizing that this pattern is typical requires not only that all its elements be described, but also that samples described address both intra- and inter-individual variations relative to diagnosis, dementia phase, potential treatment effects and contexts of use. Thus clinical discourse analysis inherently requires both frameworks that enable comprehensive descriptions of language in use and the development of specialized text collections, or 'corpora', representative of the language used by speakers.

As the above brief description suggests, clinical discourse analysis not only involves description of formal linguistic features such as syntactic structures, but also characterizes patterns of meaning which may be relevant in understanding neural function in speakers. Consider Text 1.2: it is a transcript of a conversation between a research technician and a six-year-old boy with autism.

Text 1.2 Lions

(1) CHI: what would scratch you.
(2) CHI: wouldn't that be terrible?
(3) RES: umhum.
(4) CHI: awful!
(5) CHI: stink.

(6) CHI: and then you hate lions.
(7) CHI: stink hairy.
(8) …
(9) RES: do you like lions?
(10) CHI: na I hate lions.
(11) RES: you hate <lions> [>]?
(12) CHI: <bushy> [>] and hairy stinky.
(13) …
(14) RES: what's your favourite animal?
(15) CHI: an I hate lions.
(16) RES: yeah.
(17) RES: you hate lions.
(18) RES: but what what animal do you like?
(19) CHI: stinky and then I li ugly:
(20) RES: how about bunny rabbits?
(21) RES: do you like bunny rabbits?
(22) CHI: yes:
(23) RES: do you?
(24) CHI: why yes!

The text reflects some normal features of conversational interaction. Ted initiates a topic (*lions*). He knows when it is his turn to speak and when to let others have a turn. He develops his topic, giving characteristics of lions (*bushy, hairy* and *stinky*). And he expresses his attitude to lions (he hates them). However, when asked to shift topic and say what his favourite animals are, he doesn't collaborate in topic development but rather repeats the points that are of interest to him, that lions are *stinky* and *ugly* and he hates them. He also repeats *hairy*, *stinky* and *I hate lions*. Together, inability to shift focus and repetition, particularly of single words and phrases, create an identifiable pattern in this text. For instance, it suggests that Ted has difficulties managing topic and may have trouble staying with the drift of the conversation. Of course, such features may occur in the discourse of children who do not have autism. However, if such patterns appear as normative rather than exceptional in the discourse of an individual or group with diagnoses of autism spectrum disorders (ASDs), they may in fact reflect discourse patterns characteristic of ASDs. Identifiable recurrent patterns are the business of clinical discourse analysts.

Clinical discourse analysis is not as such a theory or discipline. Rather it is a goal-directed set of practices aimed at describing and explaining language behaviours as a means of investigating neurocognitive function. This implies a need for theoretical and descriptive flexibility. At present, there are few studies which investigate and attempt to fully characterize natural language behaviour of speakers with particular neurological disorders or diseases, although there is widespread recognition of the need for such work. We attempt to address this need by combining conversational analysis with comprehensive linguistic description of functions and structures as they relate to contextual variables.

As we use it, the term 'discourse analysis' refers to the types of description mentioned and not its more widely used sense associated with, for instance, the 'discourse of capitalism' or the 'discourse of libertarianism'.

1.2 What use is clinical discourse analysis?

Clinical discourse analysis can characterize language behaviour (i.e. discourse) from which inferences can be drawn about neurocognitive function. Discourse is a sensitive sign of global and specific function. In clinical contexts, its analysis can enable the development of tools for diagnosis and evaluation of treatment response. These may supplement existing measures and provide information for developing new therapies. Comprehensive descriptions of discourse patterns produced by speakers with neurological disorders may also lead to new understanding of brain–behaviour relationships.

Moreover, clinicians internalize the characteristic behaviours of the treatment groups they meet, and may use this information in making clinical judgements. Discourse analyses can make the basis for such clinical judgements explicit, replicable and generalizable. Such explicit characterizations can lead to the development of useful models for researchers, healthcare workers and families and thus help people to understand the behaviours they recurrently notice.

1.3 What use is this book?

Over the last thirty-five years, there has been increasing recognition that language behaviour is supported by a wide range of neural capacities, including attentional and memory systems, and that it is context dependent. While there is significant interest, a growing literature, and some established descriptive techniques and norms, there is as yet no agreed upon and validated set of practices which allow comprehensive analyses of language behaviour in clinical contexts. In the chapters that follow, we articulate a range of descriptive and theoretical tools and examples that may be useful for these purposes.

1.4 Sample analysis

Below we present and discuss in non-technical language, an example of discourse analysis. We illustrate how discourse techniques can highlight distinct, observable patterns of language behaviour which may be signs of neurocognitive function.

Text 1.3 The magic of the universe

(1) CHI: what's my favourite what?
(2) RES: your favourite game on the computer.

(3) CHI: well there's ex # well there's uh # eh # there's the there's this strange unusual game.
(4) CHI: uh well # there's a la a computer called an IBM Aptiva comes with games.
(5) CHI: uh # like my favourite is the # is from I is from a: place where there's a k.
(6) CHI: it's the game's about # it's a it's about a light bodied cube # k running getting the opposite colour on another light force called endorfun which is spelled e n d o r f u n.
(7) RES: umhum?
(8) CHI: and uh uh: light bodied cubes flying everywhere.
(9) CHI: and I have the power.
(10) CHI: I feel the magic of the universe.
(11) CHI: And et cetera et cetera et cetera.
(12) RES: is this a game you play by yourself James?
(13) RES: or with a partner?
(14) CHI: just myself.
(15) RES: hm.
(16) CHI: I am really completely good at it.

The speaker, James, is fifteen years old and has been diagnosed with autism. In this text he has a conversation with a researcher about his interests. James takes turns appropriately. In the first paragraph, he uses an echo question for clarification of a request for information. Subsequently in lines (3–6) and (8–10) he responds to and develops the request for information, identifying his favourite game as *strange*, *unusual*, the computer that it comes on (4), describing the game itself (5–6) and the player's role (9–10). In (14) he responds, again appropriately, to a question about the number of participants and evaluates his own ability as a player (16). This is very much a two-way conversation. James stays on topic throughout and pauses long enough at regular intervals to allow the interviewer to give feedback (*umhum*? (7), and *hm* (15)) and to ask for details (12, 13). He doesn't need to be prompted for topic development. His syntactic structures are varied with some simple and some co-ordinate and complex structures.

James' discourse is also characterized by pedantic features and dysfluencies. Specifically, he repeats information and phrases, supplies technical details, and has some initial difficulties organizing his talk. He uses redundant attributes (*strange, unusual* (3)) and degree modifiers (*really, completely* (16)). He fully repeats the phrase *light bodied cubes* when he refers to it a second time and repeats *et cetera* twice. He introduces technical details using one kind of grammatical structure, a reduced relative clause using *call*. He gives the brand name of the computer (*an IBM Aptiva*) on which the game is found and provides the spelling for *endorfun.* His description of the player's role (*I have the power; I feel the magic of the universe*) comes from the game and has a rehearsed quality.

In topic initiation there is also repetition: *well there's,* repeated three times, suggests the topic is in fact being reinitiated from the beginning (*well* is

normally discourse or topic initial (Schiffrin 1987)). In fact, there are marked difficulties in setting the topic. There are eight pauses, five hesitations, eleven false starts and three repaired clauses (3, 4, 6) in the first half of the discourse where James is describing his favourite computer game without actually naming it. His dysfluency occurs perhaps because he does not know or remember the name of the computer game. The dysfluency features disappear when James is talking about his role in the game and his speech becomes more formulaic.

Cumulatively, the amount of repetition, the technical specificity and formulaic elements are features typical of pedantic speech in autism. This is thought to occur across autism spectrum disorders (de Villiers *et al.* 2007). Even an informal analysis of a short sample such as James' *The magic of the universe* isolates specific features which contribute to the characterization of 'pedantic speech'. While the neural substrates of autism spectrum disorders are not currently known, articulating how dysfluency and pedantic speaking pattern together may shape research questions about neurocognitive function in autism spectrum disorders.

The steps by which one moves from observation and description of a discourse pattern in an individual or a group with a diagnosed neurological disorder to hypothesizing possible neurophysiological cause(s) for the pattern are only a beginning in understanding brain–behaviour relationships. Hypotheses, once generated, need to be checked if they are to be of any use. Checking requires designing research projects. For these, a clinic setting really is essential. Even if discourse data for clinical populations were readily available outside clinic settings, there are other issues of access. Access to accurate diagnostic information for participants, to neuropsychological and neurological expert opinion and evaluation, to neuroimaging as a potential source of information about neural structure and/or function are all essential if hypotheses are to be investigated in ways that have the potential to be useful. And for obvious ethical reasons, utility is a goal of research in clinical discourse analysis.

That said, knowing how to analyse the data, and being willing to work with and in interdisciplinary teams is enough to begin with. We hope this book will be useful to people who might be so inclined and, paraphrasing Orange and Kertesz (2000: 173), that clinical discourse analyses will become a window into the cognitive, linguistic and social performances of people with neurological disorders.

2 Theoretical and clinical contexts

2.1 Introduction

This chapter is intended to situate clinical discourse analysis in terms of relevant linguistic and non-linguistic fields and to orient readers to the developmental and degenerative disorders discussed. Sections 2.2 and 2.3 briefly sketch diagnostic criteria, epidemiological information, current treatment options and potential associations with neurophysiology in each area. Section 2.4 focuses on the theoretical background and sources for clinical discourse analysis. These include conversation analysis, ethnographic and interactional sociolinguistics, functional linguistic discourse analysis, cognitive and philosophical pragmatics, and formal (generative) linguistic models. Section 2.5 addresses the roles of neurology, neuropsychology, psychiatry and neuroimaging as essential in developing understanding of relationships between discourse behaviours and neurological disorders. Finally, section 2.6 addresses the role of normative discourse patterns in evaluating descriptions of the discourse of clinical groups.

2.2 Autism spectrum disorders

Autism spectrum disorder (ASD) is an umbrella term for a continuum of neurodevelopmental disorders, the causes of which are unknown. ASD manifests during infancy and is estimated to affect one in every 165 children (Fombonne *et al.* 2006). The first account of autism was published by Leo Kanner (1943). Since that time, an expansion in diagnostic criteria has led to the inclusion of more diagnostic categories in the autism spectrum. ASD now includes autism, Asperger syndrome and pervasive developmental disorders not otherwise specified.

ASDs affect more than one domain of functioning and are generally characterized by three core deficits:

1) impairments in socialization and interaction (e.g. lack of shared attention, lack of peer relationships),
2) impaired language and communication (delay or lack of functional speech, difficulties with conversation and pragmatics),