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1

Introduction

1.1 What is this book about?

Had we but world enough and time ... we would want to trace foreign language learners' development with respect to all aspects of their communicative competence in the target language and in their first language. And we would like to do so year by year from their very first steps in the acquisition process until they are able to attend conferences and business meetings in the foreign language. But, alas, we have neither the time nor the finances for all this. However, the authors of this book have been fortunate enough to obtain funding¹ for a relatively large research project, which has enabled us to describe three groups of language learners on a number of language traits in both their L1 and their L2, and we are eager to share our results with the reader. We imagine our readers to be teachers, graduate students, postgraduate students and researchers who, as we do, wonder what goes on in the minds of language learners.

Not being able to cover all aspects of communicative competence, this book focuses on lexical competence and writing skills in L1 and L2. It is based on an empirical study of young Danes who are learning English as a foreign language, and we have adopted a comprehensive view by studying the same learner with respect to a number of skills and several learners at different stages of development.

The aims of the study are threefold: first, to investigate the relationship between a number of different skills for the same individual, second, to study the degree of mastery of these skills in the L1 and L2 for the same individual and, third, to investigate these issues for different learner groups from three educational levels.

We believe that these aims reveal the unique features of the project. With respect to the first aim, we study a number of skills for the same

individual. It is often deplored that only a few studies include more than one of the skills that together constitute competence in a foreign language. A typical research project focuses, for instance, either on writing skills or vocabulary knowledge. Over the last decades, research has become increasingly specialized, with the study of vocabulary acquisition and writing serving as clear examples of research areas arranging their own conferences and having their own international journals. Such specialization has advantages – or may even be necessary – but it certainly also has shortcomings; for instance, as pointed out by Haastrup and Henriksen (2001) in relation to vocabulary research. We believe that studies that allow for an investigation of the relationship between a set of skills are essential for achieving a better understanding of language acquisition (cf., for instance, the Trinity College Project (Singleton, 1999) and the Dutch Nelson project (Gelderen et al., 2004)). This is why the present project deals with three areas, not as isolated fields of research but as complementary research areas. In the study reported in this book, we have tried to bridge the gap between highly specialized areas by studying the relationship between various skills in a within-subjects design.

In relation to the second aim of our project, we find it optimal to adopt a comprehensive perspective, in this case by studying the same aspects of communicative competence in both the L1 and the L2 for the same individuals. In our view, such a within-subjects approach is ideal from a research standpoint as well as from a teaching perspective. In relation to the latter, the cross-linguistic issue is essential, considering the many contexts in which the first and foreign languages are acquired concurrently within a school setting. With the third aim of our study, we leave the within-subjects design in order to compare how learners at different grade levels manage with regard to the skills forming the focus of our study. The cross-sectional design enables us to describe how learners in comprehensive schools and in sixth-form colleges and students at university level operate on identical tasks in the foreign and the first language.

Viewed from the perspective of educational policy, curriculum planning and syllabus design for language teaching, our research addresses important questions such as: What is common in L1 and L2 and what is different? What are the similarities and differences between learners at different grade levels? At which level do significant developmental changes set in? In other words, we believe that the field of language teaching needs research of the kind reported in this book. With the large body of learner data that we collected and analyzed, we hope that

insights from our study will inform language teachers about what to expect concerning learner competence and development at different educational levels.

1.2 The linguistic situation and educational setting in Denmark

Before presenting an overview of the project forming the basis of this book, we need to define the context in which it is set. Denmark is a small country of five million people. Although a number of immigrants have come to the country during the past 20 years, Danish is the mother tongue of the great majority of the population and is the primary language of instruction. Throughout history, foreign languages have played an important role for a small country such as ours, which is dependent on trade with its neighbouring countries. The situation for English in Denmark can adequately be compared to that of other small European countries such as Norway, Sweden, Finland and Holland, where the first language is understood by few people beyond the national borders. Consequently, proficiency in a foreign language is essential.

Since the middle of the twentieth century, English has become the dominant foreign language both inside and outside the educational sphere, enjoying very high status. Most Danes are, therefore, highly motivated to learn the language and parents keenly ensure that their children receive proper instruction. Most Danish families frequently spend their holidays abroad, and, at an early age, children therefore experience a need to be able to communicate in English, often in communicative situations with people who use English as a *lingua franca*. The exposure to American and British English in the media is overwhelming and, as in most other western countries, people are bombarded with media products in English, teenagers being an especially targeted group. Moreover, TV programmes and films are subtitled rather than dubbed, and it is, therefore, no exaggeration to say that Danish teenagers experience a high degree of exposure to English, particularly spoken English, through television and films.

The informants of our study are Danish teenagers and young adults who are currently receiving formal language instruction at different educational levels. We therefore need to look into formal language education in Denmark, especially English as a school subject. Due to the influence of the Danish linguist Otto Jespersen, we have a long tradition of emphasizing the spoken language in the teaching of English. As early

as 1886, he was one of the founders of a Scandinavian association seeking reform in the teaching of languages, recommending the use of a natural or direct method, and his keen interest in the practical aspects of language tuition resulted in the publication of a series of school books. English enjoys the status of being the first foreign language in Denmark and, until recently, has been taught from grades 4 to 9 as a compulsory subject, placing it among the most important subjects in compulsory education.² One of our informant groups is drawn from comprehensive schools (Grade 7). In these schools, the aims specified for the subject, English, give clear priority to English language proficiency, including the development of all four skills, but with writing skills given the least attention. The official guidelines and aims reflect a communicative approach to teaching.

A second informant group comes from sixth-form colleges (here referred to as Grade 10).³ At this level, the syllabus objectives for English emphasize literacy skills. In relation to reading at this level, more attention is paid to text analysis, literary appreciation and cultural knowledge about English speaking countries. Finally, writing plays a major role, which is reflected in teaching as well as in testing.

Whereas we can offer the reader a broad characterization of the objectives of the teaching of English in the Danish educational system, it is not possible to give an account of a typical English lesson in our schools at any of the levels described. Unlike many other countries, our national syllabi are best characterized as very broad frameworks with learning objectives that are formulated in general rather than specific terms and with a number of guidelines for teaching. Teachers enjoy a high degree of freedom with respect to teaching approaches, including the choice of teaching materials.

Our third informant group includes university level students of English (here referred to as Grade 13) who are in the first year of their studies. Studying English at university level in Denmark is, of course, different from studying English in the USA and in Great Britain. Our university curricula reflect the fact that the students are non-native speakers of English and, therefore, there is much emphasis on linguistics, including instruction in grammar and phonetics with a contrastive focus, and university students receive instruction aimed at improving their written and spoken proficiency in the foreign language.

All in all, this leads us to the following conclusion concerning the Danish context and the expected influence on our informants' English language proficiency: all Danes, especially young people, receive considerable English input in their everyday lives, and the English language

enjoys high status in Danish society at large, including its position as the first foreign language taught in schools. Young people's motivation for learning English is high, and the fact that the typological relationship between Danish and English is close, in that they are both Germanic languages, makes the acquisition of English in Denmark a less daunting task compared with most other countries.

1.3 Focus of the study

As noted above, we wished to study several traits of individual learners' language competence, and these traits were to be studied in both the learners' L1 (Danish) and L2 (English). Moreover, an important aim was to describe the interplay between different areas of the individual students' competence and the interplay between their abilities in the first and the foreign languages.

Of the many skills that are important for learners' communicative competence in a first as well as in a foreign language, we focus on lexical competence and writing skills. The last two decades have seen a growing acknowledgement of the crucial role played by the lexical component of learners' communicative competence, reflected in the range of research publications within this area. There is an increasing awareness that not only the size but also the structural qualities of the lexicon are important features in vocabulary acquisition (cf. Meara, 1996; Henriksen, 1999; Read, 2004). In light of this fact, we decided that our study should include two aspects of declarative lexical knowledge, focusing on the size and organization of the learners' lexicon. Our study offers an in-depth analysis of the organizational aspect, exploring the learners' network knowledge in L1 and L2. Moreover, we focus on the procedural aspect of lexical competence by including a comprehensive study of the learners' lexical inferencing processes; that is, the procedures used when learners attempt to work out the meaning of unfamiliar words in a text.

Along with reading skills, writing competence constitutes the core of literacy training. Writing is normally the last of the four skills acquired and is viewed by learners and teachers as the most difficult area of language use. In teaching, as well as in testing, much attention is given to the actual product of informants' writing efforts, for obvious reasons. In this research study, however, we wanted to go deeper and have therefore explored the processes involved in essay writing, the aim being to learn more about the similarities and differences between processes in L1 and L2 writing.

In deciding which skills to include in the project, we considered the comprehension–production dimension. Along with the productive literacy skill of writing, we wanted to include a receptive literacy skill and chose to study lexical inferencing processes in L1 and L2. This is a prototypical learning-task, in that it is generally assumed that learners pick up many words incidentally while reading. It is our contention that the lexical inferencing study can be characterized as being placed at the intersection between a comprehension study (reading) and a vocabulary study (word comprehension and word acquisition).

In sum, the investigations of the three main areas mentioned above allow us to deal with the learners' declarative knowledge, in the form of lexical knowledge, and with their procedural knowledge, as studied in their writing processes and lexical inferencing procedures. Thus, the project reported in this book is a psycholinguistic study. We have no means of knowing how our informants have acquired their knowledge and skills, so readers looking for direct links to educational practice will have to stretch their imagination. Studies of classroom interaction have provided crucial insight into many aspects of second language learning. However, the outstanding feature of our study is that several skills are studied across the two languages in the same individuals, and that we are able to focus on learners' individual processes – a hidden feature in studies of classroom interaction. The study thus gives teachers insights into the competence and skills of learners across different levels in the educational system.

1.4 Informants

Let us start with a brief characterization of our foreign language learners. By definition, the adult learners of a foreign language have a number of skills in place compared with children acquiring their first language. Their conceptual framework is highly developed: they have knowledge of the world, of language and of discourse, and they have acquired first language literacy skills. However, the foreign language learners in this study (see Table 1.1) are not all adults; they are all young people ranging from teenagers to people in their early twenties, differing in age, maturity and educational experience with English. Therefore, with respect to conceptual and first language literacy development, our informants are also at various stages of learning.

The Grade 7⁴ informants are young learners from comprehensive schools who have had three years of instruction in English, and they are still very much in the process of acquiring L1 literacy skills, developing

Table 1.1 Characteristics of the three informant groups

Level	Educational group	Age	Years of English	Proficiency in English
Grade 7	Comprehensive school Not streamed	13–14	3	Beginners
Grade 10	Sixth-form college students Streamed	16–17	6	Intermediate
Grade 13	University undergraduates Students of English Streamed	Early 20s	9	Advanced

their conceptual framework and consolidating their L1 vocabulary knowledge.

The Grade 10 informants are in their first year at sixth-form college and have received instruction in English as a foreign language for about six years. They are likely to represent an intermediate stage of learning in the process of refining their literacy skills and their conceptual knowledge to prepare them for university entrance. Regarding Grade 10, we had to consider whether we wanted to choose our group from vocationally oriented or more academically oriented schools. Selecting the latter, we undertook a further screening procedure, in that we chose our informants from the group of students who had opted for arts subjects with a focus on language studies rather than students who had selected science subjects.

The university group comprises undergraduates who have just started studying English at a university or at a business school. They are in their early twenties and they have received formal instruction in English for at least nine years. The university students who have English as their primary subject are at a stage at which they experience their initial exposure to the discourse demands of academia proper.

In addition to the grouping according to grade level, we introduced a sub-division of the informants at each grade level, establishing high ability and low ability groups. In order to meet our objective of gaining insight into the processes used by our learner groups, we found it essential to employ introspective methods. However, since the analysis of verbal protocols is known to be extremely time-consuming, a consequence of this choice was that we had to give up the idea of working with very large informant populations. We settled for a moderate selection of

30 informants from each educational level. Still, our goal was – even with such a limited group size – to make sure that the informants would come from the extreme ends of the student population at a particular educational level. Thus, we had to identify the students who belonged to the high and low ability groups within each educational level. The procedure that is normally followed when dividing informants according to ability is to use intelligence tests; however, as such tests are not available in the Danish educational setting, we decided to use reading tests in L1⁵ (Danish) instead. This means that the high and low groups represent good L1 readers and poor L1 readers, respectively. Although this procedure is not ideal, grouping the students according to their L1 reading abilities tallies with our focus on literacy skills.

Our informants were selected from whole classes and from a number of different schools: nine Danish comprehensive schools for the Grade 7 informants, eleven Danish sixth-form colleges for the Grade 10 informants. The first-year university students of English were recruited from a university and a business school. Due to the moderate size of the data we were able to include in our study, we decided to exclude all students for whom Danish was their second language, to avoid introducing an additional research variable.

As mentioned above, the informants were selected based on their L1 reading skills, but we also took into consideration their ability to verbalize their thinking. The latter was essential, since the majority of our data comprises verbal protocols. The actual selection of the informants was therefore carried out in two stages. First, the L1 reading tests were administered to whole classes at the 20 different comprehensive schools and sixth-form colleges by their class teachers, who had been instructed in the administration of the tests at meetings with the researchers. Based on the results of the L1 reading test, we selected an equal number of potential informants; that is, a number of learners with low reading scores and a number with high reading scores. In the second stage, a team of student-assistants visited the 20 schools in order to test how willingly the selected informants verbalized their thinking. This was carried out by administering three small tasks, which they were to solve while verbalizing their thoughts simultaneously. A similar selection and screening procedure was used for the university informants.

Inspired by Ericsson and Simon (1993), the students had to: (1) close their eyes and say how many windows they had at home; (2) multiply two numbers without the use of pen and paper (for instance, $28 \times 32 = ?$); and (3) create as many words as possible from a string of letters without the use of pen and paper. Audio recordings were made of these tasks and the

recordings formed the basis of the final selection of the informants, eliminating learners who were not inclined to verbalize. In addition, performing these tasks served as a training exercise in verbalization for our informants.

Out of the many students who were screened for L1 reading skills and verbalization ability, 140 informants⁶ took part in the actual data collection, and 90 of these informants were selected as our core informants, yielding 30 informants at each grade level for analysis.

1.5 Introspective methods

As the majority of our data comprises verbal protocols, some attention will be paid to introspective methods in this general introduction. Extensive use of introspective methods is made in the form of concurrent think aloud and retrospection. The main advantage of these methods is that they give access to the informants' processing, which is not reflected in the final product and therefore cannot be inferred from the analysis of the product only.

In the three studies, we used think aloud and retrospection in slightly different ways and combinations. An illustrative example is given here, using the lexical inferencing study as a case in point. The reader should envisage informants who are confronted with a written text that includes a number of words that are unknown to them, their task being to offer suggestions for the meanings of these words. We first applied concurrent think aloud in order to uncover which knowledge sources the informants activated in their attempts to arrive at a proposed meaning for a particular word. However, since think aloud is known to have certain shortcomings – such as incomplete reporting and protocols that are difficult to interpret – the think-aloud session was immediately followed by a retrospection session, in which informants were asked to report on what had helped them arrive at their proposed meaning for a word. In the analysis phase, the researchers adopted a combined method; the retrospection data were regarded as a supplement to the think-aloud data. As expected, the addition of the retrospection session greatly improved the validity of the protocol analysis. The use of introspective methods in the studies will be accounted for in Chapters 2 to 4.

With regard to validity, we are fully aware that introspective methods have advantages and disadvantages (cf. Ericsson and Simon, 1993; Smagorinsky, 1994). Rather than entering into this important and ongoing discussion, we shall point out what our main assumptions are. First, think aloud gives access to the conscious processes only (see Section

1.8.2), and what informants report is what they pay attention to. Second, although we assume that there is a close connection between verbalizations and mental processes, we cannot claim that we obtain access to these. When researchers analyze verbal protocols, they are only able to observe what the learners pay attention to and, based on this, they attempt to reconstruct the learners' mental processes. In other words, the use of verbal protocols allows us to get as close as is presently possible to what goes on in our informants' minds while they are solving the many tasks.

1.6 Tasks

The tasks tapping into our learners' procedural knowledge (writing and lexical inferencing) can be characterized as literacy-related school tasks. They are tasks that are more or less familiar in educational settings, but are not so-called real world tasks. As noted above, the task that was chosen to tap into the domain of writing was essay writing, which is a regular and traditional task of the kind we believe is used in schools worldwide. In connection with the analysis of the learners' writing skills, we are able to present an in-depth study of the kinds of processes involved in essay writing, relating the process analysis to the products resulting from the learners' efforts.

In the second type of task, the learners are required to guess the meaning of unfamiliar words in a written text. The task is intended to throw light not only on the procedures that learners engage in to guess at the meaning of a word, but also on the results of their efforts; that is, whether their proposed meanings are correct. Since the lexical inferencing task is embedded in a reading task, the literacy aspect – so important for school learning – is highlighted. The task can be characterized as embracing both text and word comprehension and represents the very first phase of vocabulary acquisition.

As noted earlier, lexical competence was chosen as one of the focus areas for this project. The study of the learners' declarative lexical knowledge includes three different types of task, measuring both the size of the learners' vocabulary and their network knowledge; that is, the structural properties of their lexicon. The vocabulary tasks focus on individual lexical items, which are presented in isolation; that is, without any sentence or text support. While the vocabulary size test is a prototypical school task, the two other tasks are less well-known test instruments in school settings. In one of the network tasks, the learners are asked to supply word associations to a given stimulus word and, in

the other task they must select the words they consider most closely related to a number of target words. These elicitation tasks are included in the task battery to enable us to probe into other aspects of the learners' vocabulary knowledge than those usually measured in the better-known tests of vocabulary size.

An important feature of our study is that informants are required to complete all the tasks in both L1 and L2. Thus, parallel versions of all tasks were developed in L1 and L2, allowing us to investigate similarities and differences in the way our informants fare on the different tasks in their first language, Danish, as compared with their first foreign language, English. In addition, to enable a comparison of our informants at the three grade levels, all informants were given identical tasks. This posed a challenge with respect to the development of the tasks. We had to ensure that the tasks could be managed by the Grade 7 students but still would be sufficiently taxing for the university students.

As described above, L1 reading tests were used in the selection of the informants, but L2 readings tests were also included in the task battery proper. Due to the difference in proficiency levels between the three groups of learners, it was, however, deemed necessary to use two different L2 reading tests, one for the Grade 7 informants and one for the two other educational levels.

Let us finally emphasize that while the aim of our study is ambitious, in that we wish to throw light on how learners process and produce language, we are well aware that the tasks are all quite constrained, when viewed in relation to tasks in the real world. We must thus restrict our research ambitions by saying that what we are able to do is to describe carefully the kinds of processes we have investigated and describe the kind of knowledge we have tapped into. We believe that, taken together, the task types included in our study enable us to describe important aspects of our learners' declarative and procedural knowledge.

1.7 The data collection procedure

The data were collected in an experimental setting at the University of Copenhagen, in the period from September to the end of November of 2002. We decided to use language laboratories for two main reasons. First, most of our data required informants to verbalize their thoughts while solving the various tasks, and we required audio recordings this process. Second, the laboratory seating helped us minimize the interaction between the researcher/research assistant and the informant (see, for instance, Smagorinsky, 1994).

In all, 140 informants participated in the data collection. They were paid by the hour for the time spent at the university, including breaks between the tasks. They were organized in nine groups, each group coming to the university on four separate occasions for four to five hours each time. Their assignments of 15 hours and 30 minutes of time-on-task were completed within a two-week period. Table 1.2 shows the order of presentation of the tasks administered on two consecutive weeks and on two consecutive days each week.

The many tasks that each informant had to complete were given in a particular order. The most important aspect of this ordering procedure was the sequencing of the parallel tasks in L1 and L2. For instance, since each informant was to write an essay in English and another in Danish, we ensured that half of the informant group wrote their Danish essays first and the other half their English essays. The rationale behind this procedure is that experience from writing the first essay may influence the second essay. For all task types, such counterbalancing procedures were taken into account.

On the first day of the data collection, all informants received a general instruction in concurrent think aloud. This took the form of a video presentation showing extracts from a student's thinking aloud while writing an essay in English and an essay in Danish. In addition to this general session, informants received comprehensive task-specific instructions in what to do with respect to the elicitation tasks that included think aloud and retrospection.

Table 1.2 Order of presentation of the various tasks

Week 1: day 1	Week 1: day 2	Week 2: day 1	Week 2: day 2
Demonstration of concurrent verbalization			
Essay writing	Lexical inferencing	Essay writing	Lexical inferencing
Word association ⁷	*A writing task	Word association	*A writing task
Danish vocabulary test	Word connection	English vocabulary test	Word connection
		English reading test	*Questionnaire-bio data

Note: * Not reported on in this book

1.8 Theoretical framework and key constructs

Below, we shall briefly draw attention to the most important theoretical assumptions underlying our study. First, we shall define the way in which we use the terms *declarative* and *procedural* knowledge. Second, we will outline and discuss the distinction between *conscious* and *automatic processes* in writing and lexical inferencing, detailing the type of procedural knowledge addressed in this study.

1.8.1 Declarative and procedural knowledge in reception and production

The present study focuses on the declarative and procedural knowledge of our informants but, since these terms are used differently in the literature, we feel a need to clarify how we understand and use the two terms.

Based on the distinctions proposed by many researchers (for instance, Færch and Kasper, 1983; Wolff, 1994), we view declarative knowledge ('knowing that') as encompassing a wide range of different aspects of factual knowledge: knowledge of the world, knowledge of paralinguistic and extra-linguistic means of communication, linguistic knowledge, pragmatic and discourse knowledge, and socio-cultural knowledge. With respect to aspects of declarative knowledge, we are primarily concerned with describing and measuring our informants' vocabulary knowledge, on the assumption that the size and the organization of language learners' declarative lexical knowledge play an important role for all the four language skills. For instance, when learners encounter an unknown word in a text, their ability to activate relevant lexical cues in the surrounding text and in the unknown word is highly dependent on their degree of declarative lexical knowledge. Moreover, when writing in L2, learners will be spending considerable time finding the appropriate lexical items to express their intended meaning, drawing heavily on their declarative lexical knowledge during the ongoing search procedures.

Procedural knowledge ('knowing how') includes language learners' knowledge of a number of different procedural aspects: reception and production procedures, conversational procedures and communication strategies, and learning procedures. In short, procedural knowledge can be described as the various processes involved in comprehending, producing and learning language. In our study, we deal more narrowly with reception procedures in the form of lexical inferencing processes and with production procedures in the form of writing processes.

Declarative and procedural knowledge is in focus to varying degrees in the three areas investigated. Thus, the lexical knowledge study exclusively taps into declarative knowledge, whereas the writing study primarily measures procedural knowledge. The lexical inferencing study addresses both declarative and procedural knowledge and the interaction between the two types of knowledge.

As pointed out by Wolff (1994), declarative and procedural knowledge can take the form of both implicit and explicit knowledge. In this connection, it is important to point out that the concept of *proceduralization of knowledge* is used widely in the research literature in a different sense to the understanding of procedural knowledge described in the preceding paragraphs. Procedural or automatic ability to draw on knowledge in communication may, dependent on the learning view adopted by the individual researcher, be seen as the product of either extended practice (and thus automatization of explicit knowledge) or be described as the product of implicit learning procedures. When we use the term *procedural knowledge* here, it is in the sense proposed by Færch and Kasper (1983) and Wolff (1994). The term covers reception and production procedures, and this type of knowledge can be either implicit or explicit.

Since our study addresses the question of the degree to which our informants are able to apply the procedural knowledge they demonstrate in L1 to L2 lexical inferencing and writing, a discussion of learners' procedural knowledge in the native language is highly relevant in our context. In Wolff (1994), it is assumed that procedural knowledge is primarily language neutral and therefore a strong potential candidate for positive transfer. In the L1, procedural knowledge is most often stored as implicit knowledge; that is, native speakers have little conscious awareness of the procedural knowledge they utilize in comprehension and production. Deficiencies in declarative knowledge in the foreign language often prevent learners from transferring their procedural potentials to demanding L2 communicative situations. Moreover, being accustomed to teaching, which focuses on the development of explicit declarative knowledge, many L2 learners do not experience purposeful language use and therefore feel no need to use or develop their procedural knowledge in L2. In short, most learners have no explicit awareness of their procedural knowledge, and they are not likely to draw on their implicit procedural knowledge in L2 situations in which they lack declarative knowledge. They do not see and understand the parallel between L1 and L2 processing, and consequently do not exploit their processing potential in new L2

language contexts. As will be discussed later in connection with the lexical inferencing and the writing study, this may have serious implications for learners' processes in reception and production in L2.

1.8.2 Automatic and conscious processing in reading and writing

Having clarified how we understand the concepts of declarative and procedural knowledge, we now turn to a more detailed specification of the construct of procedural knowledge in the context of the present study. As already stated, processing is directly studied in this project in two areas; that is, in the contexts of writing and lexical inferencing. Although reading processes, as such, are not included in our study, reading theory is relevant to us, in that lexical inferencing forms a sub-process of reading, and the processes pertinent to lexical inferencing can be seen as more local manifestations of the kind of interactive processes that apply to reading in general.

Our investigations focus on conscious processes. However, recent theories of reading and writing have been developed with a much greater emphasis on automatic processing than has previously been the case. We therefore feel a need to position our work in relation to these theories.

Automatic processing

The two models dealt with below both invoke connectionist principles and describe processes as operating within a semantic network. This network responds to new input as a function of the nature of connections between the items of the network. The activation of the network caused by new input goes through a number of circles of activation until the network finds a stable configuration that will tally with the new input.

In reaction to the dominant role played by schema theory in models of reading comprehension, Walter Kintsch (1998) has proposed a theory that places more emphasis on automatic, bottom-level processes. According to Kintsch, comprehension proceeds as a constraint-satisfaction process, as described in his construction-integration model. In this conception of comprehension, the construction of the text base – that is, the reader's mental representation of the text – is seen as essential for the activation of the situation model – that is, the reader's background knowledge. In the construction process, which relates to the text base, it is assumed that, on reading a sentence, all the senses of a given word and associations based on the context in which the word appears will be

activated. The final selection of the relevant sense for the sentence in question will happen quickly via suppression of the senses and associations that are irrelevant in the context. The model is based on research that measures the time it takes for an informant to arrive at the relevant sense of a word. For instance, for the sentence: 'The townspeople were amazed to find that all the buildings had collapsed except the **mint**.' (Kintsch, 1998: 131), research has shown that all of the following associations are initially activated: 'money', 'candy', 'earthquake' and 'breath'. However, after 350 mss, the relevant sense 'money' remains the only active association. The integration process accounts for how the information from the text base is integrated into the larger discourse context whereby a situation model is created, forming a coherent mental representation of the text. Only if these automatic processes fail will the reader resort to conscious processing.

In a similar vein, David Galbraith (1999) argues for a theory of writing that focuses on automatic text production rather than conscious problem solving. As with Kintsch, his aim is to emphasize the importance of automatic, lower level processes at the expense of the higher level processes associated with problem solving. Where Kintsch's model is a reaction against schema theory, Galbraith's model is a reaction against the problem-solving metaphor that has dominated models of the writing process (for instance, Flower and Hayes, 1984; Bereiter and Scardamalia, 1987). The generally recognized assumption, that composing helps writers understand relationships and ideas that would be lost to them without the use of pen and paper, is attributed to the problem-solving nature of the writing process. The model by Bereiter and Scardamalia specifies the type of problem solving that triggers the acquisition of new knowledge, referred to as *knowledge transforming*. Galbraith does not dispute that writing often leads to discovering new ideas, but he has a quarrel with which mechanism leads to discovery while writing. His claim is that the knowledge-transforming processes described by Bereiter and Scardamalia (1987) do not lead to new insight on the part of the writer, simply because knowledge transforming represents problem solving related to known entities that are typically applied in planning and in textual revision. Instead, he maintains that knowledge is constituted during actual text production, and hence the model is referred to as the knowledge-constituting model. In the knowledge-constituting process, a semantic network is activated that consists of units that are not equivalent to separate ideas, but comprises sub-conceptual units. This network represents the writer's disposition. Information from the writing prompt or the topic feeds into this network and upsets the initial stability of the

network. Through repeated activation of the network, and also as a result of input from the actual formulation process, the network eventually settles into a new stable condition. This mechanism is seen to account for how new ideas are created in the process of writing. In other words, it is the non-problem-solving part of the writing process that leads to new knowledge. This spontaneous text production, involving implicit, automatic processes is, however, not likely to lead to a well-organized text. At this point, the explicit processes of problem solving are applied to the already generated text in order to achieve a well-organized and coherent text. Thus, problem solving still has an important role to play in writing, but the implicit processes are responsible for the creation of new knowledge. The model is presented as being in line with the instructional method of multiple drafting. The knowledge-constituting model for writing has not yet been empirically supported to the same degree as Kintch's comprehension model for reading.

Conscious problem solving

Let us now specify how our study relates to the two models presented above. The lexical inferencing task used in this study has been devised to include words that are unknown to the informants. According to Kintsch's model, multiple senses of a word are activated automatically when reading a text, but are then suppressed quickly by the sense that fits the context. Words that are unknown to the informant are therefore unlikely to activate multiple senses of the type described above, although thematic inferences based on the context are likely to be activated in the process of reading the text. In other words, the lexical inferencing task has been set up to ensure that automatic processes will fail, and hence the task invites conscious problem solving. Obviously, the kind of automatic processing described in Kintsch's model helps us account for poor and good readers, in that their processing of the entire text clearly has implications for their ability to utilize contextual cues to the meanings of the words that are unknown to them. However, automatic processing is not the focus of the present study.

In the writing study, the informants are given the rather taxing task of writing an argumentative essay while thinking aloud. Since writing processes in this project are studied through the use of verbal protocols, the basis for our analyses of the informants' writing processes is constituted by what they attend to during the writing process, and hence we are studying explicit processing in the form of conscious problem solving. The implicit processing, described in Galbraith's knowledge-constituting

model, will naturally affect the quality of our informants' writing processes, but these automatic processes are not the focus of the present study.

1.9 Research questions

The project is an exploratory study, which is evident from the way in which our research questions are phrased. Although there is much previous research to learn from when it comes to insight into aspects of either L1 or L2 competence, research that cuts across the L1–L2 dimension is not equally well represented with regard to the three main areas investigated here. Thus, there is not a strong research basis for formulating hypotheses concerning the interplay between skills in L1 and L2. Neither do we have access to research on which to form hypotheses as to the interplay of the three studies. Therefore, our main research questions are phrased in rather general terms:

- 1 For the within-subjects data, are there significant differences between the results for performance on tasks in L1 and L2?
- 2 For the cross-sectional data, are there significant differences in task performance across grade levels?
- 3 For the interplay between the three studies, can significant correlations be established between the results of the studies of lexical knowledge, lexical inferencing and writing?
- 4 Is it possible to set up profiles of the informants as a function of the level of development of their knowledge and skills within the areas studied?

1.10 How this book is organized

Since this book covers a number of areas that might not be of equal interest to all readers, some might prefer to focus on a single study. A chapter is devoted to each of the three studies, and we have made an effort to ensure that readers will benefit from reading any of Chapters 2, 3 and 4 in isolation from the other chapters, the exception being the present chapter, which gives details on our study not included elsewhere.

Chapter 2 details the lexical knowledge study, with an emphasis on the investigation of our learners' network knowledge. This aspect of declarative lexical knowledge has been less widely explored than, for example, language learners' vocabulary size. The chapter therefore opens with a somewhat extensive discussion of the construct of network

knowledge, and gives a review of different research approaches to studying structural aspects of lexical competence. The second half of the chapter presents the empirical study, which includes investigation of the learners' network knowledge and their vocabulary size.

In Chapter 3, we begin by situating the study of lexical inferencing within the broad field of research that explores the different aspects of guessing the meaning of a word. Whereas few studies include an investigation of the procedural aspects of lexical inferencing, this is a feature that is highlighted in the present study. The main focus of Chapter 3 is thus a presentation of a coding framework for processing types illustrated by extracts from learners' verbal protocols. However, the chapter also includes an investigation of the product dimension of lexical inferencing; that is, the quality of the informants' guesses at the meaning of a word. In our discussion of results in the last part of the chapter, much space is given to qualitative analyses, which support the interpretation of some of our major findings.

Chapter 4 is devoted to an investigation of the writing processes of our informants. Initially, we briefly review previous research pertinent to appreciating our research design and the results of our investigation, followed by a description of the writing models that have informed our study. Then we outline the design of the study, emphasizing the categories applied in the analyses of the verbal protocols, and detailing the quantitative analysis of the data and the interpretation of the findings. Since some of our findings were unexpected, we introduce a qualitative analysis of three selected verbal protocols, allowing the voices of our informants to be heard. In doing so, we find that the learners tell us more than was captured by the quantitative analysis. Thus, they help us arrive at more informed tentative suggestions for future research.

In Chapter 5, we bring together the results of the project and look at possible correlations between different key measures from the three studies outlined in the previous chapters. We also present 'learner profiles' of the informants as a function of how well developed their knowledge and skills are within the areas studied. Finally, we focus more specifically on learners from the intermediate educational level (Grade 10), presenting characteristic features of the language produced by this group of informants at a point that we believe is a transition point in their interlanguage development. A more detailed analysis is given of three learners in order to illustrate how well developed their knowledge and skills are with regard to declarative and procedural lexical knowledge.

As pointed out above, the project is exploratory. We describe a range of knowledge and skills components of learners from three educational

levels, operating in both their L1 and their L2. The task of developing comparable research tools in L1 and L2 suitable for informants at very different ages and educational levels has been a challenge. Chapter 6 therefore focuses on the insights gained in relation to the various research instruments used and on possible implications for future research. Our project is psycholinguistic in nature, but we feel that both the quantitative results and the in-depth insights into our learners' processing behaviour, obtained through the hours of verbal protocols analyzed, have pointed to some central issues pertaining to language instruction. The last chapter will therefore include some suggestions for instruction, which may be of interest to language teachers.

Notes

- 1 We were very fortunate to receive a generous three-year research grant from the Danish Research Council for the Humanities.
- 2 In 2002, English was introduced into the curriculum for grade 3 learners. However, the informants of the present study started their instruction in English in grade 4.
- 3 Comprehensive schools include grades 1 to 9. Danish children start school relatively late at seven years of age, and compulsory schooling is not streamed. We use the term sixth-form college to refer to schools for students in grades 10 to 12. For this three-year period, students choose between vocational training colleges and the more academically oriented colleges. The latter qualify students for university entrance. Our informants are drawn from the language line of the academically oriented stream.
- 4 In this book, we shall refer to the three groups as Grades 7, 10 and 13, although they come from different institutional settings. Regarding their general English proficiency, we use the terms *beginners*, *intermediate* and *advanced* learners as relative terms, basically reflecting the number of years of English instruction. We shall furthermore refer to *mature* and *immature* learners as terms pointing to language proficiency as well as general cognitive development.
- 5 For the informants from Grade 10 and Grade 13, Professor Carsten Elbro from the Department of Nordic Studies and Linguistics at the University of Copenhagen kindly gave us permission to use a Danish reading test developed by himself and Elisabeth Arnbak. For the Grade 7 informants, a reading test developed for Danish schools by Nielsen and Møller (1998) was used. Significant statistical differences were found between the high and the low achievement groups on the L1 reading test for all three educational levels (T-tests: G.7: $t(29) = -16.927$, $p < .001$; G.10: $t(29) = -14.259$, $p < .001$; G.13: $t(29) = -7.972$, $p < .001$).
- 6 The reason for the initial collection of data from 140 students was to ensure that we could afford to lose some students for our longitudinal study of the Grade 7 and Grade 10 students. Data analysis for the longitudinal part of our study is still pending. The high number of informants also allowed us to

exclude cases with missing data. In the final selection procedure, informants with the highest and lowest L1 reading results for each level were, if possible, included as core informants.

- 7 The productive word association task in one language was always given before the receptive word connection task in the same language.

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