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TWIN-SINGLETON DIFFERENCES AMONG ESL STUDENTS

A study of affective and cognitive factors at the age of 12

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Tutkielmassa selvitetään englannin kielen oppimiseen vaikuttavia yksilöllisiä eroja ja niiden välisiä suhteita. Tutkittavia affektiivisia ja kognitiivisia tekijöitä ovat: luokkahuoneorientaatio, kieliminä, kielenoppimisstrategiat ja persoonallisuustekijöistä sosiaalinen konstruktivisuus ja ahdistuneisuus. Nämä tekijät heijastavat sosiaalista käyttäytymistä. Yksilöllisiä eroja tutkitaan erityisesti kaksosten kielenoppimisen näkökulmasta. Tutkimuksen otokseen valittiin 6. luokkia, joissa oli kaksosia. Yhteensä otoksessa oli 190 oppilasta, joista 22 oli kaksostyttöjä. Kaksosten vieraan kielen oppiminen on erityisen mielenkiinnon kohteena, koska voidaan olettaa, että kaksokset ovat sosiaalisempia kuin muut oppilaat, mikä taas vaikuttaa myönteisesti oppimistuloksiin. Toisaalta kaksosuus vaikuttaa kielteisesti ensimmäisen kielen kehitykseen osana kognitiivista kehitystä. Siitä saattaisi olla myös haittaa vieraan kielen oppimisen kannalta. Kaksosuus tarjoaa lisäksi mahdollisuuden selvittää kielenoppimisen perinnöllisiä tekijöitä.

Tutkimuksen lähtökohdasta muodostui kuitenkin vain osa suurempaa kokonaisuutta, johon kuuluvat seuraavat ongelmat: 1) Mikä on affektiivisten ja kognitiivisten tekijöiden vaikutus vieraan kielen oppimistuloksiin? 2) Onko kaksosuus etu vai haitta vieraan kielen oppimisessa 12 vuoden iässä? 3) Mikä on perinnöllisyyden vaikutus vieraan kielen oppimistuloksiin? 4) Miten sukupuoli vaikuttaa vieraan kielen oppimiseen? 5) Miten affektiiviset ja kognitiiviset tekijät ovat suhteessa toisiinsa vieraan kielen oppimisessa? Oppimisen selittäjiä mitattiin kyselylomakkeilla. Oppimistuloksia mittaivat kouluarvosanat, opettajien erikseen antamat numerot kirjallisesta ja suullisesta kielitaidosta sekä järjestetyn kokeen tulokset.

Tilastolliset analyysit osoittavat, että positiivinen kieliminä, konstruktivisuus ja sisäinen motivaatio vaikuttavat merkittävästi oppimistuloksiin. Myös kielenoppimisstrategioiden käyttö on vähintään epäsuorassa yhteydessä oppimiseen. Kaksosuus ei ole vieraan kielen oppimisen kannalta merkittävä hyöty eikä haitta. Kaksokset olivat vain marginaalisesti muita oppilaita sosiaalisempia. Merkittävää on sen sijaan se, että kaksosten varhainen kognitiivinen heikkous ei häiritse enää tässä vaiheessa ainakaan vieraan kielen oppimista, sillä kaksokset pärjäsivät kuitenkin kaikissa oppimismittareissa keskimäärin verrokkejaan marginaalisesti paremmin. Kontrolliryhmään verrattuna kaksokset tosin käyttivät joitakin yksittäisiä affektiivisia strategioita merkittävästi vähemmän, ja osoittivat eräissä suhteissa alhaisempaa ahdistuneisuutta. Nämä tulokset jäivät kuitenkin irrallisiksi kielenoppimisesta. He myös arvioivat ääntämistaitonsa merkittävästi huonommaksi, mikä saattaa viitata kaksosille ominaisen kypsymättömän kielen jäänteeseen, koska siihen liittyy häiriintynyt fonologinen kehitys. Tämä ei kuitenkaan vaikuttanut mitatun kielitaidon tasoon. Tästä voidaan päätellä, että kaksosten mahdolliset ongelmat koskevat tässä iässä kielen piirteitä eivätkä yleistä oppimista. Identtisten ja epäidenttisten kaksosten kielen oppiminen ei ollut missään suhteissa merkittävästi erilaista. Parien sisäiset suhteet sen sijaan osoittivat, että kaksossisarukset muistuttivat oppimistuloksissa toisiaan merkittävästi enemmän kuin affektiivisten ominaisuuksien perusteella valitut kontrolliparit, varsinkin suullisen kielitaidon suhteen. Tämä viittaa perinnöllisiin taipumuksiin sekä ympäristötekijöihin kielen oppimisen selittäjinä. Merkittäviä sukupuolieroja ilmeni tyttöjen hyväksi oppimistuloksissa ja sosioaffektiivisten strategioiden käytössä. Koska näiden kahden tekijän väliltä on löydetty yhteys, voidaan tyttöjen menestystä osittain selittää sosiaalisuudella. Korrelaatioiden perusteella varsinkin sisäinen motivaatio, positiivinen kieliminä ja ahkera strategioiden käyttö toimivat merkittävästi yhdessä kielenoppimistulosten hyväksi. Persoonallisuustekijät eivät olleet samassa määrin yhteydessä muihin tekijöihin. Havaitut oppilasprofiilit kuitenkin osoittavat, että menestykseenkin on monta tietä.

Vieraan kielen oppimisessa on merkittäviä yksilöllisiä eroja. Kaksosuuteen ei liittynyt kielen oppimista selittäviä eroja, joita sitä vastoin sukupuoleen liittyi. Kaksokset sen sijaan osoittivat kuroneensa umpeen varhaisiän kognitiivisen puutteensa. Affektiivisten erojen perusteella kaksosuutta kannattaisi kenties tutkia kielen käytön ja interaktiivisen oppimisen suhteen. Englannin kielen oppiminen vaikuttaa olevan monen psykologisen tekijän sekä perinnöllisten taipumusten ja ympäristötekijöiden yhteistoimintaa.

Asiasanat: second language learning, individual differences, cognitive and affective factors, heredity and environment, language learning of twins, twin studies.

Abstract

Twin studies open up new perspectives for second language acquisition (SLA) research. The aim of this study was to examine individual differences among 12-year-old students studying English. The five main research areas were developed around the language learning of twins: (1) general relationships between affective/cognitive factors and learning outcomes, (2) twinship in these relationships, (3) hereditary factors in language learning, (4) gender differences, and (5) interrelationships between affective/cognitive factors. The affective and cognitive factors reflect social behaviour. Twinship can be considered a social advantage, which might benefit SLA, but also an early cognitive disadvantage, which might interfere with it. The purpose was to find out the direction of influence at the age of 12. The sample was composed of 190 students including 22 female twins. The measures included self-report questionnaires concerning language behaviour, teacher ratings of personality and language skills, grades, and a language test.

Significant correlations were found between proficiency and some affective factors: self-concept, active prosociality, and intrinsic orientation. There were also significant correlations between strategy use and proficiency, although the associations were not strong. Significant twin-singleton between-groups differences relevant for learning outcomes were not apparent at this age, but within-pair differences were significant. The twin-singleton group comparisons suggested that twins no longer suffer from an early cognitive disadvantage concerning SLA at the age of 12, which was the most important finding. They were not significantly more social than the singletons. They used some affective strategies significantly less frequently than the singletons, and they were less anxious with respect to the tolerance of peers' annoying behaviour, but these results remained separate from other findings. Their perceptions of their pronunciation skills were also significantly lower, which may point to a residue of twin language, which is characterized by disordered phonological development. It did not, however, affect the general level of proficiency. The finding suggests that twins' possible problems at this age are rather linguistic than generally cognitive. Twinning might be more important in other aspects of language learning and use than proficiency. The within-pair comparisons pointed to hereditary and environmental influences in SLA. A tendency was also observed for the females to outperform the males in proficiency, and the females also scored higher on the use of socioaffective strategies, which also supports the relationship between social behaviour and proficiency. Significant interrelationships between the affective/cognitive factors were also found. Different interrelationships were associated with achievement, and different learner profiles were discovered. Second language learning appears to be a rich combination of psychological learner factors as well as genetic and environmental influences. There seem to be different routes to success.

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1 INTRODUCTION

There is much more to second language learning than meets the eye at the first sight. At school students have traditionally been divided into those who are *naturally talented* in languages and those who are not. The classification goes even further: there are people who are good at languages and those who are good at mathematics. Recent research suggests that there are multiple intelligences, yet not mutually exclusive, but the persistent views on the uncontrollability of linguistic endowments are not particularly encouraging to those who do not consider themselves naturally talented. They suggest that foreign language learning is a special kind of gift, and there is not much to do about the lack of it. This, of course, is not true. There are likely to be stable hereditary influences in language learning, but the role of various controllable learner factors is also important.

Besides genetic talent and aptitude, the role of other *cognitive* skills has also been traditionally recognized. Successful language learning requires successful cognitive functioning, such as the use of appropriate strategies and learning styles. The significance of relevant strategy use, which can be learned, brings naturally consolation to those who do not find themselves gifted in language learning.

In the light of recent research, it is justified to argue that natural talent and improved cognitive skills alone do not explain success in second language learning. There is also an *affective* side to it. This domain refers to factors such as personality traits, motivation, self-concept, and attitudes. This is a psychological aspect of language learning, the importance of which should not be ignored.

It can be concluded that second language learning is affected by many *learner factors*, which suggests that there are *individual differences* among second language learners. There are both successful and unsuccessful learner types. The present study deals with these individual differences, and a special interest is taken in the affective domain of language learning, the role of sociability, in particular.

The present study was initially motivated by an interest in the special situation of *twins* in language learning. Individual differences can also be studied from this fresh perspective, because variation is possible in both proficiency and learner factors between twins and singletons. Twins live and go to school in circumstances where there is always a companion around, someone to talk to, someone to listen to, and someone to practise a second language with. One could argue that the chances of becoming social are considerable. *Sociability* happens to be one of the factors considered advantageous to second language learning. It is a personality factor representing the affective domain of language learning. In the present study sociability is reflected by active prosociality (a personality concept), among other things. It can also be expressed by the use of social strategies. Sociability also has a connection to other language learning factors.

All the examined learner factors of the present study more or less reflect *social behaviour*, which is a broader term for various actions and perceptions in relation to other people. These *psychological* factors might also cause differences between twins and singletons. It can be argued that being a twin may contribute to second language learning and cause individual differences.

Being a twin is also a much more complicated matter in terms of second language learning than one might expect. Many studies have been made of the first language learning of twins. These studies have made it clear that twins are in a disadvantageous position with respect to first language learning. There is evidence for a special kind of twin language, and arguments have been made that the first language of twins develops both quantitatively and qualitatively slowly. Being a twin is an early *cognitive disadvantage*. However, twins have been found to catch up their singleton counterparts later. Nevertheless, the cognitive aspect of being a twin suggests that twinship might be a disadvantage to early second language learning.

To sum up, twinship may be either an advantage or a disadvantage in second language learning. Or it may have no influence. Twin-singleton comparisons are required to explore the effects of being a twin. The subjects of the present study are twins and singletons in the sixth grade in the Finnish comprehensive school. The question is whether twins at this age have

overcome the potential initial lag or whether they benefit from their possible social advantage. The aim of the present study is to cast some light on the nature of twins' second language learning and associated language behaviour, which, to my knowledge, have not been studied before. This represents a new perspective to the study of individual differences.

The fact that the sample of the present study consists of twins and single-borns offers a great deal of possible research questions. A study of the alternatives of the positive and negative influences of twinship on language learning outcomes alone does not take us far. The reasons for patterns of behaviour and interrelationships between different variables should also be studied to add to the understanding of the research area. Thus, variation in language learning must also be studied in general.

With respect to different psychological influences on learning, in general, the present study concentrates on motivational orientation in the classroom, foreign language self-concept, language learning strategies, and personality factors in relation to learning English as a second language (ESL). In this respect the study mainly deals with the affective domain of language learning; only strategies represent the cognitive domain.

The study also deals with stable *hereditary learner factors* in language learning, which point to the cognitive domain and less defined learner factors, but this perspective is explored in contrast to the above mentioned *psychological affective/cognitive learner factors*, which are unstable.

With respect to psychological factors, the affective and cognitive domains are connected. Dealing with strategies is justified in the context of affective variables, because both affective and cognitive factors represent individual differences, and furthermore, indirect strategies, the use of affective and social strategies, for example, often reflect the affective domain. Direct strategies are more cognitive. It is also useful to find out what types of learners in terms of personality, self-concept, and motivational factors are successful users of language learning strategies. In other words, the aim of the study is to clarify some aspects of the relationship between the affective and cognitive domains, and particularly the influence of these factors on achievement. These

areas were also studied in relation to twin-singleton and gender differences. A contrast is provided by also examining hereditary factors.

Because the nature of *twin studies* is unfamiliar in second language research, it is useful to clarify some alternatives that this interesting area provides. This explains the choices of the present study. In general, there seem to be two different approaches to twin studies: one, which is interested in finding out something about twins themselves, and the other, which is merely using twins as a method to find out something else. The first approach is concerned with the nature of twins' behaviour in contrast to nontwins. The second approach, using twins as a methodological choice of subjects, points to the various similarities in the members within a set of twins. With the help of twins, different research topics can be studied with respect to hereditary and environmental influences, because twins share the same environmental influences, when not living separated, and identical twins are genetically similar, whereas fraternal twins have genetic resemblance. Environmental influences can be eliminated and hereditary influences indicated by using identical and fraternal twins as tools. Separation offers the best possibilities of studying environmental influences on different factors. For the purposes of the present study, environmental influences in terms of separation would have proved a very difficult topic to study, because finding enough separated twins at the same age would have been very difficult. Thus, the focus of the approach in the present study is on hereditary factors, which as predictors of learning are also consistent with the theme of the study, learner factors.

The difference between the two alternatives is that studying twins themselves in contrast to nontwins means that twins and singletons are compared as groups. When hereditary and environmental influences are the focus of interest, individual sets of twins are studied by contrasting co-twins. Within-pair differences can then be examined between appropriate groups of twins and singletons. Accordingly, *twin-singleton differences* can be explored with reference to *between-groups* and *within-pair differences*.

The two alternative twin study approaches are also available in the present study. The main *interest* of the present study is *in twins themselves*, the nature of their foreign language learning. The differences between twins and

singletons may add to the understanding of the influence of individual differences on learning outcomes, the role of sociability being particularly interesting. The case of twins makes the research design interesting.

Studying second language learning with *twins as a methodological choice* also provides highly interesting research possibilities, which are utilized in the present study by examining within-pair differences. Hereditary influences, which possible co-twin similarity reflects, are also very important in explaining success in second language learning. Furthermore, when heredity is studied by contrasting co-twins and control pairs, it must be acknowledged that the similarity in twins may also reflect the influence of a shared environment. This is why environmental influences are discussed in the context of heredity.

The research design involving twins provides a unique opportunity to examine the role of controllable affective/cognitive learner factors, on the one hand, and stable hereditary influences, on the other hand. These two factor sets both represent individual differences: two sources of influence, which can be contrasted. The contrast is made by comparing these sources of influence. The significance of either influence cannot be ignored.

Hereditary influences are included in individual differences, since aptitude, for example, is considered a language learning talent pointing to genetics and also a factor of individual differences representing the cognitive domain. The genetic basis of language learning is likely to be related to aptitude. Aptitude can be studied directly by assessing it, but it can also be pointed to by studying the heredity of language learning, because aptitude is likely to be related to the heritability of proficiency. The heredity of language learning may also point to IQ (intelligence quotient) or a universal innate language faculty. Genetic endowment causes variation and can thus be seen as a factor of individual differences regardless of which concept it is associated with. In fact, all psychological learner factors may have a genetic basis, but in the present study heredity is studied with reference to stable cognitive language ability by controlling some affective factors.

The research design of the present study being complicated, some detailed further clarifications are needed. The study proceeds towards the conclusions so that first the *relationships* between each affective and cognitive

language learning factor and achievement in English are examined. These relationships are the basis for the interpretation of group differences, mainly twin-singleton differences. Furthermore, it is important to examine which factors of individual differences have influence on proficiency to be able to choose control pairs that are as similar as possible with respect to these variables for the purpose of within-pair comparisons between twins and singletons to serve as indications of the heredity of language ability. These affective variables are controlled to make the heredity results more reliable. The examined relationships include the connection between proficiency in English and four affective or cognitive factors:

- (1) orientation in the classroom;
- (2) foreign language self-concept;
- (3) language learning strategies; and
- (4) personality factors.

The sample consists of 190 students. The connection between personality and proficiency in English makes an exception. The sample consists of the group of twins and their control pairs only, because data on personality were not collected of all 190 students. The aim at the first stage of the study is to get the general picture of the relationships between language learning achievement and psychological factors.

Secondly, *twins and singletons are compared as groups* in terms of proficiency in English and the affective and cognitive variables. The general relationship between proficiency and learner factors serves as the ground for these analyses: the area is extended by this new perspective. Possible twin-singleton differences in proficiency are explained by possible group differences in the affective and cognitive domains. Comparisons between identical and fraternal twins are also made. In this part of the study, the sample consists of 11 sets of twins (22 individuals) and their control group of the same size. On the basis of the achievement of twins in contrast to the achievement of nontwins, and similar comparisons concerning the psychological variables, conclusions are drawn on the quality of twins' second language learning at the age of 12 in contrast to the special situation of twinning. Twinship may turn out to be an

advantage or a disadvantage. It may also not have any observable influence at all.

Thirdly, to cast some light on *within-pair differences between twins and singletons*, proficiency differences between co-twins (including identical and fraternal sets) and members in control pairs are also compared. Co-twins should be more alike than fellow controls, if heredity/environment is involved. Comparisons between the groups of identical and fraternal co-twins provide further information about heredity. These influences are contrasted with affective influences, because the control pairs are chosen so that they are as similar as possible in some affective characteristics, which counterbalances family resemblance. Consequently, the twin sample is the same one that is used in the group comparisons, but other control samples are selected.

Fourthly, *males and females are compared*, because it is likely that they differ in the affective and cognitive domains. Consequently, differences in achievement are also likely to arise. The procedure is basically the same as with twin-singleton group differences, but the whole sample of 190 students is included. Studying gender differences supplements the examination of the general relationship between proficiency and learner factors, because gender differences in proficiency can be attributed to differences in intervening learner factors. Gender is also studied for another reason: gender is a control variable in twin-singleton examinations. At the age of 12 gender may influence cognitive development. The choice of a female twin sample in the present study makes an investigation of gender differences useful.

Fifthly, *interrelationships* between the affective and cognitive language learning variables are examined to add to the understanding of the general picture of the influence of learner factors on achievement. The aim is to find out which variables are correlated with each other. The sample consists of all 190 students, and the purpose is to explore interrelationships between variables which are potential predictors of achievement. Also, it is possible to discover that some factors have indirect influence on learning outcomes by interacting with other variables that have direct influence on learning. Learner profiles are also identified to find out patterns of behaviour that are associated with success

and failure in achievement. Learner types are also discussed with regard to twinship.

Finally, it is possible to draw conclusions on individual differences in second language learning: those related to the influence of affective/cognitive variables and heredity on second language learning, those related to differences between twins and single-borns as well as gender differences, and those related to interrelationships between language learning variables. All the five research areas are connected to studying twinship.

The study represents *linguistic research with a psychological perspective*. It was conducted in co-operation with the Department of Psychology, University of Jyväskylä, in association with a larger research project. The ongoing research project is called the Longitudinal Study of Health and Behaviour in Twin Children. The purpose of the project is to obtain data on the genetic, social, and environmental factors predicting national diseases, the development of children's health habits, and personality development. The study involves five consecutive birth cohorts from the age of 12 to puberty. The subjects are 12-year-old Finnish twin children born 1983-87 and their parents. Data are collected by means of self-report questionnaires, parental and teacher ratings, peer evaluations, and interviews. (www.psykonet.jyu.fi 1999.) Accordingly, the present study represents interdisciplinary research between linguistics and psychology.

2 INDIVIDUAL DIFFERENCES IN LANGUAGE LEARNING

The theoretical background of the present study will be dealt with in six parts. The background provides a combination of examining general factors affecting language learning among all learners, on the one hand, and language-related factors associated with twinship, on the other hand. These two perspectives are related, because they both deal with individual differences. The aim is to indicate how twin studies contribute to the study of individual differences.

The first part deals with theories of first and second language learning, in general. The second part includes a detailed description of psychological learner factors contributing to variation in foreign language learning. The third part clarifies how twin studies can be utilized in the study of language behaviour. The fourth part addresses the nature of the language learning of twins. In the fifth part of the chapter language learning is studied in the light of hereditary learner factors and environmental influences. Finally, in the sixth part all learner factors influencing learning are discussed together under the title of emotional intelligence, which is contrasted with traditional intelligence.

There are certain grounds for the division of the theoretical background. An examination of language learning theories provides a framework for individual differences. Exploring the general connection between language learning outcomes and affective/cognitive learner factors, in turn, creates the basis for further investigations such as the language learning of twins, which is a central topic of the present study. Twin studies also open up other possibilities for second language learning research, which must be explored. A discussion of hereditary influences on language learning indicated by twin resemblance provides a contrast to the discussion of the influences of individual differences caused by affective and cognitive factors. Language genes can also be considered a source of individual differences. Finally, the perspectives about the role of psychological factors and the importance of hereditary factors can be combined by discussing the role of intelligence: favourable psychological factors reflect emotional intelligence, and the genetic

endowment for language is often associated with general or linguistic intelligence, which represent traditional views on intelligence. A favourable genetic endowment can be ruined by an unfavourable environment and rearing causing affective barriers, and a less talented learner may profit from emotional intelligence.

With reference to the main purposes of the study, firstly, the aim is to find out what kind of evidence there is for the relationship of behavioural factors and language learning. Secondly, it will be examined whether these relationships are relevant in terms of twinship. Thirdly, the area of language learning will be observed from a wider perspective with reference to combining cognitive language learning talent and affective talent by utilizing twin study methodologies. The chapter addresses language learning from first language acquisition to second language learning, from variation to common processes. The focus is on second language learning and individual differences.

2.1 Theories of language learning

Although the primary focus of the present study is on second language learning, it also deals with first language learning to some extent. The study is based on the assumption that there is a *relationship between first language learning and second language learning*. This view is based on earlier research. It is presumed that first language learning deficits among twins may have influence on second language learning. Consequently, an examination of the theories of both first and second language learning is relevant in this context. It provides information about individual differences and clarifies the basis of hereditary influences.

Theories and studies of language learning will be discussed in terms of a division between learner similarities and learner differences by Skehan (1998). Learner differences are emphasized. Similarities are reflected by *universalist* accounts of learning, and differences are reflected by factors causing *variation* in learning. Universalist accounts point to language learning processes affecting learning that are fairly similar among all learners. Variation points to individual

differences among learners. These two approaches are discussed with reference to both first and second language learning. The universalist accounts are presented only in the section of first language learning, where they are more relevant. Theories involving learner differences in second language learning are divided into those with focus on cognitive processes, those with focus on social processes, and those with focus on learner characteristics.

It is natural that theories of variation are presented in the present study, since it primarily seeks to define individual differences. Variation is examined in singletons and twins. It is, however, considered important to cast some light on universalist learner similarities as well. They are often contrasted with learner differences and thus add to the understanding of the theoretical framework. Universalist accounts are important also, because they can be discussed in terms of heredity, which is within the scope of the present study. Possible hereditary influences on second language learning may end up supporting universalist accounts of learning, on the one hand. Some theories of learner differences, on the other hand, also involve heritability: some factors causing variation may be genetic. Consequently, heredity may be involved in both learner differences and similarities. The contradiction is discussed later.

Various language learning models are introduced to provide a general picture of the field. The present study is not directly based on any of the introduced models, although associations exist and they are highlighted. Within the present research design it is not possible to investigate all the factors of the presented models. The present study involves variables that are not included in the earlier models. Literature search suggests that no related study of the second language learning of twins and individual differences connected with it has been conducted before. Accordingly, it is necessary to develop a new framework for the purposes of the present study. It involves factors of individual differences affecting learning and the role of twinning in these relationships. The assumptions of the framework are tested in this study. This framework is presented in Figure 1 in section 3.2, and it concentrates on the social aspects of psychological behaviour in relation to learning outcomes.

After the theories of first and second language learning have been introduced, first and second language learning are discussed in terms of the

continuity between them. This is essential, since the study is based on the expressed assumption that twins' first and second language learning are associated, and the hereditary basis of first language may be related to that of second language.

The presentation of theories proceeds as follows:

(1) first language learning:

- universalist accounts of language learning,
- variation in first language learning;

(2) second language learning:

- variation in second language learning:
- focus on the cognitive process, and
- focus on the social process, (resulting in)
- focus on learner characteristics; and

(3) continuity between first and second language learning.

2.1.1 First language learning

There are three relevant theories of first language learning that involve *universalist* learner similarities. They are the notion of a Language Acquisition Device (LAD), the Universal Grammar (UG) approach, and the Critical Period Hypothesis. There is, however, also *variation* in first language learning. The variation is perhaps more apparent in second language learning, but it has been reported in first language learning as well. Individual differences among first language learners include variation in the rate and style of development caused by environmental (and genetic) factors. Variation is mainly discussed on the basis of conducted studies, because there are only a few theories. Learner differences are further highlighted in section 2.4.1.

Earlier research concerning first language learning has focused on differences between child and adult grammar and the development of grammatical forms, whereas more recent research has focused on the situational context of language acquisition and communication exchanges. The data base was earlier the isolated utterances of the child, while the parent-child

dialogue has become more important later. (McLaughlin 1980, 335.) The studies reporting on variation emphasize the child-parent dialogue, which is also essential in the situation of twinning. The universalist theories represent earlier research with the emphasis on the development of grammar.

Universalist accounts of language learning

Universalist accounts reflecting learner similarities apply to both first and second language learning, but they are more apparent in first language learning. Individual differences seem to become more important with age and in second language learning, which is often associated with conscious efforts to learn.

There are two theories that point to *innate language knowledge*: LAD and UG. They are based on related assumptions suggesting that language is wired in the human beings. These arguments have been proposed by Chomsky. LAD implies that there is an innate equipment for language consisting of a set of genetically transmitted universal principles in human beings. LAD denotes that certain structural properties of grammar, in particular, are innate. It does not precisely specify a language, but defines the limits on the forms. The device enables learners to work on what they hear and extract the abstract rules that explain how the language is organized. A later interpretation of the in-built ability, the UG approach, in turn, even further emphasizes the role of an universal in-built grammar, on the functioning of which language development is supposed to be based. UG is constituted by a set of grammatical properties common to all languages. The UG theory tries to specify a certain subsystem of rules and explain what structures and processes are involved in language learning. The two central concepts in the theory are principles and parameters. Basic principles are inbuilt, but they are supplemented by parameters, which are properties of variation and fixed by experience. Principles such as structure dependence are invariant characteristics shared by all languages. Parameters such as pronoun position are variant features of language, which can have more than one setting. UG explains the relative ease of first language acquisition. According to the theory, structure is imposed on the input data as a result of built-in expectations in learning. Input is also needed: the correct settings of

principles and parameters are triggered by it. (Chomsky 1968; Bickerton 1981, 136; Chomsky 1986; Klein 1986, 7-9; Long 1990; Larsen-Freeman & Long 1991, 228-240; Ellis 1994, 24; Skehan 1998, 76-77, 222-232; Aitchison 1999, 27-28.)

It has been argued that UG principles might not be available to adult second language learners any more (see Lakshmanan 1995, 302). Skehan (1998, 78-80) states that UG is more relevant in explaining a formal and underlying competence, but it is not as relevant to second language learning, which is more associated with a processing perspective: after childhood language development can be seen as human information-processing system at work.

Chomsky's recent work, the Minimalist Program, concentrates on finding basic economy laws concerning language: broad general principles instead of the details of individual languages. The program is still based on the notion that there is a component of the human brain that is dedicated to language. (Chomsky 1995; Aitchison 1999.) The relevance of UG-related theories for the present study lies on this point, and the details of the grammatical principles are not the issue.

It can also be questioned what is innate in language development. According to Aitchison (1999, 126-127), the innate aspect has widely been acknowledged, but there are different views. Extreme supporters of a content approach rely on a universal framework imprinted on children, whereas supporters of a process approach deny this and argue that children are merely innately geared to processing linguistic data. The distinction between UG and readiness for learning languages is highlighted.

The Critical Period Hypothesis deals with *biological* factors in language learning and suggests that there is a maturationally determined point of advantaged learning. Originally, Penfield and Roberts (1959) and Lenneberg (1967) suggested that advantaged learning is based on the plasticity of brain prior to puberty. According to the hypothesis, there are maturational schedules of development in the first language. Learners share similarities in the rate and route of development, transitional structures used, and error types. The hypothesis also asserts that language and other cognitive developments are

independent. Humans possess a special capacity for language early in life, but plasticity in cerebral potential is lost after puberty with lateralization being complete by that period. The decline in abilities is gradual. After puberty language learning is less efficient, and wider individual differences exist. The question arises whether the sensitive period is still active when second language learning is started. (Klein 1986, 7-9; Long 1990; Ellis 1994, 24; Skehan 1998, 222-232.)

Language development has also been connected to other areas of child development. Elliot (1981, 23) argues that language acquisition is associated with biology on the basis that there is a close correspondence between the stage of language development and biological factors such as the stage of motor development or the weight of the brain.

There is also evidence suggesting that the sensitive period is not necessarily relevant to second language learning. Bialystok (1997) hypothesized that language learners find it relatively easy to master a structure shared across the first and foreign language, but age should not play a role in this. The hypotheses were confirmed in two small-scale studies. The first study involved 26 university students learning the French system of gender marking for nouns. They had started studying French either before or after early adolescence. The second study investigated the grammatical knowledge of English by native speakers of Chinese, who had arrived in Canada at different ages. Bialystok concluded that second language learning is not wholly or even primarily determined by maturational factors.

There is a contrast between LAD/UG and the Critical Period. It is controversial whether grammar is something that develops in time or whether its elements are present from the very beginning. Ritchie and Bhatia (1999, 12-13) distinguish between *maturation* and *continuity* theories of first language acquisition. Continuity theories of innate knowledge suggest that UG is completely available to the child throughout the process of acquisition. Language development is seen as a process of grammatical mapping from UG to an adult language through the construction of the grammar for the language. The critical period hypothesis, in turn, supports maturation. The maturationists argue that UG is not a characterization of the initial state of the language

faculty. Maturation hypotheses imply that the human genetic endowment in the cognitive domain of grammar is associated with a sequence of grammatical theories, but not only a single grammatical theory such as UG. In the maturation of the language faculty each member of the sequence specifies the class of grammars available to the organism at a particular stage. (Ritchie & Bhatia 1999, 12-13.) Wexler (1999, 55) summarizes that children show certain deviations from adult UG and that the change to adult UG takes place through a process of growth guided by the genetic program of language.

Theories can also be divided into *modular* and *nonmodular* theories of language acquisition. The former points to a specific language learning faculty, whereas the latter relates language learning to general cognitive functioning. The views on the existence of a LAD, UG, and the Critical Period are modular in nature. (Ritchie and Bhatia 1999, 14-15.) According to the modular model, different cognitive processes are discrete processes in the brain, which is the view of current cognitive neuroscience (Plomin & DeFries 1998, 44). It must be noted that not all modular views suggest that there is universal language knowledge, which is one view in linguistics. Modularity broadly points to the existence of different information-processing systems for different skills, and although UG might not be operative in later language learning, some linguistic information-processing system must be.

The nonmodular theory of acquisition, in turn, does not require a special endowment for language acquisition, e.g. in the form of UG, but rather associates the facts of language acquisition with the principles of general cognitive functioning (Ritchie and Bhatia 1999, 14-15). Modularity will be discussed in terms of the present study in the section of the continuity between first and second language learning. Twins are supposed to have both general cognitive and linguistic disadvantages in early life. These two deficits may be connected or due to different causes.

LAD, UG, and the Critical Period can also be viewed together. According to one view, a human being possesses a LAD involving the rules for syntax and constituting a UG (Edelman 1992, 14). Such a language faculty is not necessarily effective later in life any more. Correspondingly, after the sensitive period, the nature of language learning is supposed to change. The point where

UG is not considered effective any more is also referred to as the point when the critical period ends. These theories are consistent in that they suggest that the advantage of language learning is based on a language specific module and the special capacity is lost at some point, but the explanations of what happens before that are different. It is not, however, relevant for the present study whether the full capacity for language exists from the very beginning of life or whether maturational processes are involved.

The universalist accounts of second language learning are, however, linked to the assumption of *hereditary influences* in second language learning, which is included in the present study design. It can be speculated whether there is a genetic basis for the special language capacity. In fact, UG principles are considered to involve a genetic endowment for language specific knowledge (Larsen-Freeman & Long 1991, 228). Human genetic inheritance forms the physical basis of UG (Cook 1988, 73). If the capacity is hereditary, the question remains whether the device and knowledge involving grammar itself is determined in genes or whether there is a genetic program that controls the development and maturation of language.

If the device is genetic, a disruption of the associated gene might result in grammatical problems in the development of language or variation in DNA would result in differences in learning. Possible deviations would also be apparent later in life. This implies that also a second language would be affected. Some genetic studies of grammatical difficulties have been reported (see e.g. Gopnik 1990; Fisher et al. 1998). The distinction between the genetic basis of normal and impaired language will be discussed in section 2.5.1.

If the process of development rather than the language device/universal knowledge is genetically programmed, a disruption of the genes involved or DNA variation might result in abnormal development. It might affect the rate of acquisition rather than the grammatical properties of language. If deviations occur in a continuum from mild to severe, language learning problems other than clear language impairment could also be explained. Bates et al. (1995, 96-98) make the point that variation in the rate of language development is likely to be partly based on genetic factors. Pine (1995) has made a similar point.

Wexler's (1999, 55) point of maturation suggests that the process of development is guided by genes.

Most studies support the existence of language genes that rather affect the grammatical properties of language from the very beginning. It is possible that all human beings possess a very similar genetic program for the maturation of language. The disturbing genetic influence related to maturation might not be severe or extend to second language learning. The same may be true of UG, but the variation that it causes in terms of problems seems more apparent. Furthermore, clearly *favourable* genetic endowment connected to language development may become significant only in advanced learning, since the basic first language is acquired fairly similarly by all learners and is characterized by genetic variation mainly expressed by *disorders*. Furthermore, the genetic endowment for SLA may also be different from that of first language learning.

There are opposing views against the genetic basis of language development. This mainly concerns maturation. Edelman (1992, 125, 129-131, 243) argues that syntax is built in a definite order, independently of genetics. Phonological capabilities are related to learning concepts, which enable the development of semantics, which, in turn, allows the accumulation of a lexicon. Syntax emerges on the basis of conceptual and lexical learning. Acquisition is subject to a developmental critical period. Edelman also poses the question whether the rudiments of language were simply invented at some point of evolution and handed down from generation to generation.

The universalist accounts are supposed to represent learner similarities (see Skehan 1998), because the processes and innate devices are supposed to be the same in all individuals. The factors of learner differences are, instead, individual. Social backgrounds and learner characteristics vary. *Universalist features may, however, also cause variation* in learning. A disruption of a gene or DNA variation may cause individual differences. The concept of a universal language device might even be slightly misleading: it could rather be a mechanism which allows variation, although practically everyone eventually learns a native language. The definition of UG does not actually rule out variation between individuals (Cook 1988, 73). The concept of similarity rather points to the existence of a factor such as LAD among all individuals than its

equal functioning in all learners. Maturation, in particular, is supposed to be fairly similar among all human beings. Learner characteristics such as motivation, in turn, may or may not exist and thus clearly represent individual differences. There is reason to argue that UG and LAD might not only reflect learner similarities, although the features are universal. This is why the concept universality is preferred in the present study rather than similarity.

The universalist accounts of language learning primarily deal with the biological aspects of learning, but these theories more or less *ignore the context* in which language is learnt. It is acknowledged that to develop the in-built capacity into language, input is also needed. These theories do not, however, extend to the social and affective factors of learning, which are particularly important in second language learning. It is possible that UG is important in first language learning, but individual differences become more important in later language learning. The hereditary capacity to learn a language is also important in second language learning, but a lack of innate talent can be compensated for by favourable individual characteristics and unfavourable individual features may also hinder learning in spite of "good language genes". Cook (1988, 176) also argues that a second language can be learnt by other means than the language faculty especially in non-natural learning.

In other words, first language learning, despite variation, might be characterized with linguistic universals to a greater extent than second language learning, which is more affected by psychological learner differences (controllable) and information-processing abilities (probably also heritable), because the innate language equipment might not be effective any more. After all, almost everyone learns a mother tongue, but the same cannot be said about a foreign language. At least there are great differences in rate.

Variation in first language learning

Although individual differences are emphasized in second language learning, they also have a role in first language learning. Foster-Cohen (1993, 143) makes the point that first language learning research should adopt the view of second language research that there is variation among learners. Child language

research has historically pointed out similarities in the sequence of development, but there are also individual differences in the rate of development as well as in learning style (Bates et al. 1995, 96-98).

Variation in first language learning is studied here to indicate the basis for twin-singleton differences in first language acquisition. The factors that have differences among all learners (usually singletons) are related to those that involve twin-singleton differences. The specific characteristics of twins' first language will be discussed later.

According to Bates et al. (1995, 96-98), there are both quantitative and qualitative variations. Biological factors are important in child language development, since there are dramatic events in postnatal development. Variation in *speed* within the components of early language exists in word comprehension, word production, first word combinations, and the first stages of grammar. This variation challenges the notion of a universal maturational timetable. The variations are probably based on both genetic and environmental factors. Variations in learning *style* include such qualitative styles as referential vs. expressive, or nominal vs. pronominal, or analytic vs. holistic style, which will be discussed in detail below. Besides differences in the rate and style of development, different components can develop at different rates. There is variation between comprehension and production, for example. There might also be asynchrony between lexical production and grammar. The route of development is considered fairly similar among all learners.

Bates et al. (1995, 122) discuss differences in learning style by distinguishing between two strands of development, which are important to understand studies that are reported below. With reference to semantics, the first strand with referential, nominal, and analytic style is characterized by a high proportion of nouns in first words, while the second strand with expressive, pronominal, and holistic style is reflected by a low proportion of nouns. In terms of grammar, the first strand involves a consistent application of rules and is related to fast learning, while the second strand involves an inconsistent application of rules and is connected with slow learning. With regard to pragmatics, the first strand is object oriented and declarative, while

the second strand is person oriented and imperative. Concerning phonology, the first strand is word oriented, whereas the second strand is intonation oriented.

There are also several studies reporting factors that influence child language. A summary of the reported studies suggests that child language is strongly affected by child-directed speech, which also seems to have a relationship with birth-order. The family's socio-economic status also appears to have at least indirect influence on child language by affecting adult input. The role of child-directed speech is also important with respect to twins' language development. Among the studies reported below there is only one study which is based on a *model*. Bornstein et al. (1998) rely on the Multivariate Developmental Ecological Model in their study of vocabulary development: this framework was developed for their study and tested.

The Multivariate Developmental Ecological Model suggests that socio-economic status and maternal personological characteristics have direct effects on child vocabulary competence and indirect effects mediated through maternal vocabulary. Gender has a direct influence on child vocabulary competence. Child social competence predicts vocabulary competence indirectly through its influence on maternal vocabulary. Maternal verbal intelligence and socio-economic status are expected to covary and relate to mothers' knowledge of development. (Bornstein et al. 1998, 367-393.)

Bornstein et al. (1998, 367-393) studied individual variation in child vocabulary development in terms of the model. The sample consisted of 126 American children aged 1 year and 8 months and their mothers. The results revealed that child gender and social competence as well as mother's vocabulary and attitudes towards parenting affected vocabulary competence directly. Girls performed better than boys. The influence of social competence was explained so that children who show responsibility and sensitivity to others are highly verbal and generally mature. Maternal vocabulary was influenced by socio-economic status, among other things. The model was supported in many aspects, but the role of factors as direct and indirect influences varied.

In the related study of Bornstein and Haynes (1998, 654-671) no systematic patterns emerged between the language of 184 English-speaking

children and family socio-economic status or mothers' education. Girls scored higher than boys in terms of the level of child language.

Socio-economic status is likely to influence maternal language rather than child language directly, which was found out in the study by Bornstein et al (1998). The study by Bornstein and Haynes (1998) did not examine the relationship between child language and socio-economic status from the perspective of maternal language, which may have affected the lack of association. The studies were consistent with respect to gender differences. In the present study gender cannot affect twin-singleton differences, because it is controlled.

The Multivariate Developmental Ecological Model is not particularly relevant for the present study, since it highlights the influence of social background on child language, which is not emphasized in the present study. Nevertheless, important associations can be found from the effects. It is possible that higher socio-economic status mothers talk more to their children and use richer language than lower socio-economic status mothers, whose children seem consequently disadvantaged in language development. This, in turn, supports the role of *maternal input* as such (also without a reference to background factors), and it was also recognized in the model. It appears significant in the case of twins. However, the *quality and quantity of child-directed-speech* represent different sources of influence. The qualitative characteristics of maternal language do not yet indicate the quantity of child-directed speech. The amount, in particular, may cause variation in the case of twins, although quality is also likely to be affected by the twin situation. The quantity of direct maternal input is limited and learning is disadvantaged, when there are two children at the same age in the family. Some studies emphasizing the role of child-directed speech rather than social background are consequently more relevant in terms of the present study.

The *importance* of child-directed speech can be examined from the perspective of *birth-order*. It is possible that it also affects maternal input, like twinship. First-borns enjoy more child-directed speech and are thus advantaged in language development, compared to later-borns, who, in turn, have more

experience of communicative skills with several speakers. Such findings have been reported (see Hoff-Ginsberg 1998).

According to Pine (1995, 272-281), however, the role of child-directed speech may have been overemphasized. She found out that later-borns' early language was rather qualitatively different than disadvantaged, and she argues that the differences may be due to a higher degree of observational learning. It was concluded that birth-order has effects on stylistic variables such as the composition of the vocabulary, but the rate of development was assumed to be related to similarities in language-learning environments and genetics.

As was stated above, there is also positive evidence for the importance of child-directed speech. The *amount* will be discussed first. Hoff-Ginsberg (1998, 603-629) revealed that first-borns and high socio-economic status American children were advantaged in language development as a function of received input. The findings of variation in children's language were interpreted as a result of variation in language learning experience. It was also assumed that advanced conversational skills make later-borns socially more successful. (Hoff-Ginsberg 1998, 603-629.) Similarly, in the case of twins, it is also possible that they are socially advantaged in multiparty conversations.

Both Hoff-Ginsberg (1998) and Pine (1995) have provided support for a connection between birth-order and child language. Pine pointed out only stylistic variation. The difference between the studies is that Hoff-Ginsberg studied mothers' language in relation to children's' language, whereas Pine assessed only child language. The study by Hoff-Ginsberg indicated that there were differences in children's language experience among first- and later-borns, and they were due to differences in mothers' input. Pine drew conclusions only on the basis of assumed differences in language experiences and adult input. The fact that the children's language experience remained unknown may have resulted in Pine concluding that the role of child-directed speech has been overemphasized. The sample was not large (9 English-speaking first-borns and their younger siblings), and the maternal input of first-born children and their siblings may have been different from the average due to factors that were not studied.

The relations between maternal speech and children's vocabulary have been studied without a reference to birth-order, social background, or the amount of input. The emphasis is sometimes on *quality*. Pine et al. (1997, 807-819) found significant relations between maternal language use and child language use. There was a significant correlation between maternal descriptiveness and the percentage of children's' statement initiations at 50 words. Mothers who provided the child with information about where new words begin and end had children with less unanalyzed phrases. It was, however, argued that children's noun learning preferences may be set rather early in development and be relatively unaffected by subsequent variation in mothers' speech.

Hampson and Nelson (1993, 313-342) also examined the relation of maternal language to the rate and style of child language acquisition. According to variation in the rate of acquisition, children were divided into two groups: early and late talkers. The mothers of early talkers used a higher percentage of descriptions and referential repetitions, whereas the mothers of late talkers provided more request for action and conversational devices. The earlier talkers were also exposed to more nouns, object references, and object nouns and later talkers to abstract nouns and pronouns. The sample was divided into expressive and non-expressive groups in terms of style. There was a positive relationship between maternal use of nouns, objects, and object nouns for the nonexpressive group, but the expressive group did not show such a tendency.

Both Hampson and Nelson (1993) and Pine et al. (1997) have found a connection between maternal descriptiveness and child language. Hampson and Nelson found out that the mothers of earlier talkers used more descriptive language. Pine et al. found out that children's language use rather than vocabulary composition were related to maternal descriptiveness. It is possible that maternal descriptiveness was one of the influential factors resulting in early talkers speaking earlier, and this was the same factor that contributed to advantaged language use in the study of Pine et al. There is, however, a contradiction in conclusions drawn on the relationship between children's noun learning and maternal language. Pine et al. suggested that children's noun learning is affected by factors other than maternal input, but Hampson and

Nelson found a connection between maternal language and noun learning. The contradiction might be explained by stylistic variation. Hampson and Nelson suggested that the vocabulary of expressive children (a low proportion of nouns in first language) is not influenced by maternal language in the same degree as it affects nonexpressive children. Pine et al. did not distinguish between expressive and nonexpressive or referential children. It is possible that there were no nonexpressive children in the sample.

Vihman et al. (1994, 651-652) studied the role of specific adult input in the early word production of children and found no evidence of specific maternal influence on the phonetics of the child's speech among 1-year-old children. On the basis of the studies by Vihman et al., Pine et al. (1997), and Hampson and Nelson (1993), it seems that the characteristics of child language use rather than phonology are affected by child-directed speech.

The *styles* of learning do not, however, necessarily follow a *universal* pattern. Camaioni and Longobardi (1995, 203-218) studied individual differences in the rate and style of language acquisition among 15 Italian-speaking children. The results indicated great variation in the rate and type of early vocabulary development, but Italian subjects could not be grouped according to referential or expressive style, which suggests that this distinction in early lexicon may be more appropriate for English-speaking children with reference to stylistic variation. (Camaioni & Longobardi 1995, 203-218.) The results suggest that there might not be a relationship between the influence of maternal input and the style of learning in all languages. The findings of Hampson and Nelson (1993) might be language-specific.

Besides universalist learning, there also appears to be variation. In the reported studies a pattern emerged for the importance of child-directed speech in child language development. Later-borns tend to get less maternal input and are thus more or less disadvantaged (see Pine 1995; Hoff-Ginsberg 1998). Besides birth-order, maternal language may also vary due to socio-economic status and individual differences (see Hampson & Nelson 1993; Bornstein et al. 1998). Twinning is also a situation where child-directed speech is reduced, which has a negative impact on language acquisition. The importance of this factor was supported by the reported studies, although there was variation in

the interpretations of the nature of the influence. On the basis of this information and twin studies reported later, it is possible to expect twins to be disadvantaged in first language development, which may in turn affect second language learning.

2.1.2 Second language learning

SLA is characterized by a variety of influences. Some universalist processes may also be common to all second language learners. Furthermore, achievement is also affected by variation in psychological learner characteristics. In other words, there are also individual differences in learner profiles predicting success. Thus there are individual differences in learning outcomes.

Skehan (1991, 275-276) points out that psychology has recognized two approaches to the study of human functioning: the experimental and differential. The former concentrates on examining structures and processes common to everyone and model making. The latter investigates differences between people and attributes on which people differ relating them to performances. Theory-based prediction is less important and model making involves causation between variables. Most research in applied linguistics has been of the former type emphasizing common and universal features in language, and fewer studies have been conducted into the differences between language learners.

In his more recent work Skehan (1998) deals with the same concepts. He distinguishes between learner *similarities*, which point to universalist processes of language learning (besides universal knowledge, this group also involves common cognitive processes), and learner *differences*, which are associated with individual differences in second language learning, although he finds this division unfortunate. Ellis (1994) discusses second language acquisition by dividing factors influencing learning into *external* and *internal* factors. Furthermore, he distinguishes *individual* differences that affect learning. External factors include social factors and input-interaction factors. Internal

factors include factors such as language transfer, cognitive accounts of learning, and linguistic universals. Ellis discusses individual differences in second language acquisition as a whole of its own including individual learner differences and learner strategies.

According to Ellis (1994, 24-28), external factors are associated with the environment in which learning takes place, and their influence is likely to be indirect. For example, attitudes often reflect the social setting in which learning takes place. Learning is also different in natural and educational settings, which involve different social factors. Sociolinguistic variables such as age, sex, social class, and ethnic group as well as the social and cultural milieu in which learners grow up are also likely to have some influence. With reference to the input-interaction factor, learning is very much dependent on the input learners are presented with. Access to input may take place in the context of interaction or non-reciprocal discourse such as watching TV.

Internal factors are, according to Ellis (1994, 28-35), also important in SLA. Transfer implies that the features of the first language are incorporated into the knowledge system of the second language. Translation, borrowing, as well as code-mixing and -switching are such processes. Transfer may manifest itself as errors, avoidance, overuse, and facilitation. Learning a related language to the native language requires less time and effort than learning an unrelated one. The internal factors referred to as cognitive accounts of learning point to the processes of noticing features in the input, comparing them with existing mental grammars, and integrating them into the interlanguages. The third class of internal factors, linguistic universals, points to above examined innate knowledge, which is also considered to be an influential factor in second language acquisition.

Ellis (1994, 35-37) distinguishes between general individual factors and learner strategies. General individual factors include factors such as motivation, aptitude, and cognitive style. Learner strategies, in turn, represent the learners' conscious attempts to learn.

Skehan's (1998) learner similarities in terms of universalist accounts of learning are consistent with Ellis's (1994) cognitive accounts of learning and linguistic universals, which both represent the internal factors of learning.

Similarly, Larsen-Freeman and Long (1991, 227) regard the examples of universalist theories and cognitive accounts as a whole: the nativist theories of second language acquisition usually pointing to an innate biological endowment.

Individual differences have been further classified separately. Gardner (1985) approaches language learning from a social psychological perspective. He also recognizes the importance of the context in which acquisition takes place. He argues that there are four major classes of individual difference variables: attitudes and motivation, on the one hand, and aptitude and personality, on the other hand. Consequently, Gardner divides the theories of individual differences into two classes: those with focus on the linguistic process (can be considered a cognitive process) and those with focus on the social process.

Theories with focus on the linguistic process address individual differences by directing attention to the hypothesized processes operating on the individual and causing variation, whereas theories with the social process focus involve the social psychological variables that have positive or negative effects on second language learning. Motivation is considered a central factor in the social process. (Gardner 1985, 124-125, 142-143.)

Gardner's (1985) second class of individual differences deals with external factors and associated individual difference variables together, reflecting the social process. This class includes both Skehan's (1998) learner differences (although he does not refer to social aspects) as well as Ellis's (1994) external factors and individual differences. With reference to the difference between external factors and individual differences, social factors affect learners as groups and individual differences affect individuals (Ellis 1994, 269). Furthermore, Gardner also regards linguistic/cognitive processes subject to individual differences. Theories involving these processes are regarded by Ellis as internal cognitive accounts and by Skehan as universalist accounts, not belonging to individual differences.

It is obvious that many models that have been proposed deal with social and cognitive processes as well as individual differences simultaneously. The social and cognitive processes of learning also ultimately deal with individual

differences, which some researchers deal with separately, focusing on learner characteristics, not processes. This approach is characterized by a lack of theory. In Gardner's view, however, many earlier theories reflect individual differences.

Consequently, the area of individual differences has been acknowledged as a whole of its own in language learning by Skehan (1998), Ellis (1994), Gardner (1985), and many other researchers, although there is variation in the interpretations. It seems that both external and internal factors associated with different processes represent individual differences, which are often studied as a whole of its own consisting of different variables.

Consequently, when factors causing variation in language learning are dealt with, it is essential to point out the *variety of influences*. Learning is affected by various *causes*: those connected with the learner himself, the teacher, the environment, etc. Different theories point out different factors. Theories focusing on the social aspects of learning point out the environment, whereas general models of individual learner differences highlight learner factors without a social reference. These are also related. The present study concentrates on variables concerning the learner.

There are several sources of variation, but their influence must be studied in relation to *effects*. There are different aspects of learning that can be affected. Second language learning can be studied in terms of learning as such or its outcome. This refers to the division of language learning into *processes* and *outcomes*. Individual difference variables and other causes affect both processes and outcomes.

According to Naiman et al. (1978), learning includes unconscious processes, such as generalization, transfer, and simplification, and conscious processes such as language learning strategies, for example. The outcome, in turn, is reflected by the proficiency in language skills, errors, and affective reactions, for example. Language skills are usually divided into reading writing, listening, and speaking. The processes identified by Naiman et al. are cognitive processes, but social processes also exist.

Many of the models presented below also involve processes and outcomes. In fact, *processes*, which can also be studied as such, *produce*

outcomes: proficiency is often seen as a result of various kinds of processes. There are, in turn, different *individual factors* that have *influence* on the specific *processes* of learning. For example, linguistic intelligence is a individual difference factor affecting the efficiency of the cognitive process, the functioning of which produces proficiency. However, it can also be said that intelligence is a cause of proficiency, because it is intimately bound up with the process, which, in turn, actually reflects proficiency. It is just a matter of definitions.

The present study also deals with the relationships between processes and outcomes. Proficiency in English can be considered an outcome of learning, whereas language learning strategies reflect aspects of the cognitive language learning process. The affective factors reflect the social process. Proficiency, the outcome of learning, is, however, emphasized as an effect and psychological and inherited factors as potential causes, i.e. individual differences, since the design does not allow a deeper analysis of processes that are influenced by these causal factors. Psychological factors are thus studied without a reference to the aspects of cognitive information-processing or the process involved in the social learning situation, which is the same among all the subjects of the present study. It is not always easy to distinguish between causes and effects; the causal relationships are often complicated in nature. Different factors involved in different processes represent individual differences and affect outcomes.

The theories and models of individual differences presented below are thus divided into three classes: those with focus on (1) a cognitive process, (2) a social process, and (3) general learner characteristics. General factors (3) are influenced by the processes (2 and 3). In fact, class (3) is seen as a product of classes (1) and (2).

It is convenient to refer to the processes as at least causing variation, even if including them in individual differences is considered slightly misleading by some researchers. There are also clear reasons to include processes in individual differences. There are differences between individuals in a group going through a social process depending on individual difference variables such as motivation. Cognitive processes also differentiate between learners and

are not similar or equally efficient among them. The processes, the social process, in particular, are also often associated with indirect influences on learning outcomes, such as environment, which operates indirectly through affecting learner characteristics. Different cognitive processes may also work in different situations.

Consequently, in this background section the term variation is emphasized to refer to all the three groups dealing with learner differences. The first two classes remind of the division by Gardner. The third class, the focus on learner characteristics, involves some general models of learner-centred individual differences without a reference to processes involved.

Universalist theories were discussed in the section of first language learning, although the same theories are sometimes also applied to second language learning. Nevertheless, their role might not be as important in second language learning as in first language learning. In the present study affective and cognitive learner differences are emphasized. Universalist features are primarily discussed with their possible reference to inherited language ability reflecting cognitive differences.

Variation in second language learning

McLaughlin (1980, 331-332) argues that two themes have become important in language research: the importance of the social situation and individual differences. It has been recognized that language occurs in a social context and there are differences in learning styles among first and second language learners. The importance of the interaction between these two themes should not be ignored. The overlap in the influences of external factors and individual differences becomes here obvious again. Different individuals react differently to the same learning situation, and different situations influence the same learner in many different ways. The present study emphasizes the differences in reactions to the same type of learning situations among learners. Some of the models that have been presented emphasize different learning situations and the role of the process involved.

There are two general *traditions* in the research of individual differences. They involve different *contexts*. Naturalistic research implies that learners are studied in real-life settings, and it involves the collection of qualitative data. In confirmatory research, learning environment is controlled, and subjects are assigned to specific groups. Data is collected with the help of tests, which produce numerical material, which can be processed statistically. (Ellis 1994, 475.) The present study represents the confirmatory tradition, since the setting is the classroom, data is statistical, and group comparisons constitute the core of the analyses.

Another classification of *approaches* to the study of individual differences is made according to *methodology*. The hierarchical approach is based on the elaboration of a theory of the influence of individual differences on learning. Predictions are made, and they have explanatory power. The concatenative approach is considered more appropriate for research concerning individual differences. It is based on research questions. In this type of research the influence of various variables on language learning success is examined. Relationships among independent variables and between them and dependent variables are studied. Such research is often correlational. (Skehan 1989, 5, 10.) The present study is closer to concatenative research, since different relationships among the variables are important in the study. The elaboration of a theory is not central.

As was stated before, Gardner (1985) has identified two types of theories concerning individual difference. The theories with focus on the *social process* concentrate on external social factors that involve individual differences. The theories with the linguistic focus deal with the *cognitive processes* of learning and associate the effectiveness of these processes with individual differences.

A third approach to individual differences, separate from the classification of Gardner (1985), was, however, also discussed. This class can be further clarified. There are models and studies that examine learner characteristics more closely without a reference to the context or a process. It is true that the social process reflects some socially oriented learner characteristics such as motivation and self-concept, but these features can also be explored without a direct reference to differences in the environments and

natural learning. Further, focus can be placed on an individual rather than a group. In classroom learning some affective and cognitive factors and the contrast between them becomes important from the point of view of an individual learner. Also, the functions and mechanisms of the linguistic process may produce learner characteristics: efficient linguistic processing may reflect high aptitude, linguistic intelligence, and successful strategy use. Different aptitudinal components may work in linguistic processing, for example. These factors can also be explored in general as a part of a wider framework, without directing attention to the details of information-processing.

This third type of research on a variety of learner factors is here referred to as research with focus on *learner characteristics*. This class is what many researchers consider the core of individual differences (see Skehan 1998; Ellis 1994). The social process seems to involve affective characteristics, while the linguistic process reflects cognitive characteristics. Affective and cognitive factors that are important in different processes are dealt with as one whole in this context. Among the reported models and studies of individual differences, those with focus on learner characteristics are the most relevant. They are particularly important, because they involve affective learner factors, which are often ignored in other models of universal and variation features.

Krashen's (1978; 1981a; 1982) Monitor Model will be introduced as an example of the theories with the cognitive focus. Also, Skehan's (1998) Dual-Mode System will be introduced, although he does not refer to his principles as a model of language learning. The theories with the social focus that will be introduced consist of Lambert's (1963a; 1963b; 1967; 1974) Social Psychological Model and the Socio-educational Model by Gardner (1985). Skehan (1991) states that there is no comprehensive theory of individual differences in second language research. It is true that various factors that operate in different processes are seldom discussed together and without an association to the process involved: with focus on learner characteristics. Some frameworks have been developed in this area. The learner focus is discussed in terms of Ellis's (1994) framework, the classification by Naiman et al. (1978), and Skehan's (1991) model. The contrast between theories emphasizing different types of learner characteristics is also discussed: the cognitive factors

of learning with reference to aptitude, on the one hand, and the affective factors of learning, on the other hand. The Linguistic Coding Differences Hypothesis by Sparks and Ganschow (1991; 1993a; 1993b; 1995), which points out the role of aptitude, and the critique against it pointing out affective factors, will be addressed.

In general, theories of second language acquisition process differ in their scope (Larsen-Freeman & Long 1991, 288). For example, Krashen's (1978; 1981a; 1982) theory is assumed to cover all types of acquisition, whereas some social models only explain naturalistic acquisition. This is why general frameworks of different variables are also needed.

To sum up, three types of theories of variation are introduced: those with the cognitive, social, and learner focus. The learner focus involves the same factors that are important in linguistic and social processes. Only some examples of theories are presented to introduce the framework, since only few of the earlier models directly relate to the present study.

Focus on the cognitive process

According to Krashen's Monitor Theory, adults have two means of linguistic processing. Acquisition is involved when language is used for communication. Krashen points to "feel for correctness". Conscious learning is associated with the internalization of rules. Language acquisition represents the subconscious system and results from the active use of language, while language learning refers to the conscious system and is associated with rule learning. Fluency is based on active communication, and thus utterances are initiated by the acquired system. The learned system works when there is monitoring of the output from it. The monitor is seen as a conscious grammar. Monitoring points to the learner's effort to control his language output and self-correct it. Monitoring involves a focus on form rather than meaning, but output can also be modified using acquired knowledge. (Krashen 1978; Krashen 1981a; Krashen 1981b, 155-156; Krashen 1982; Gardner 1985, 125-128; Ellis 1994, 356.)

Although strategy use and aptitude are the only factors among those examined in the present study that directly operate in the cognitive process, the model can also be interpreted in terms of the study so that some learner factors are indirectly associated with conscious learning and some with subconscious learning. The use of strategies can naturally be seen as an example of conscious language learning, whereas self-concept, personality, and orientation often also affect subconscious learning, although they are likely to have impact on conscious learning as well. It can be concluded that various individual differences favour different types of learning. Anxiety and sociability are associated with language acquisition through language use. By using learning strategies consciously the learner can enhance rule learning and contribute to "learned knowledge".

Skehan (1998, 53-59, 88-89) has criticized earlier models because of their lack of attention to the process perspective. According to his Dual-Mode System there are both rule- and exemplar-based systems in language learning working together. On the one hand, processing is a question of learning structures, which is a rule-based system. Underlying rules become the basis for generalization and transfer. On the other hand, learners try to match current input with previous input, and what is learned consists of an accumulation of chunks and idioms. This is a memory-based system. The dual-system allows access to both rules and exemplars.

The question remains how linguistic/cognitive processes themselves differentiate between learners. Expert language learners use different information-processing strategies from more novice learners. Expert language learners show greater plasticity in restructuring their internal representations of the rules governing linguistic input and are thus more flexible. Some learners have an advantage in language learning because of strategies they have developed and their knowledge base, but other students can develop their skills in these aspects. (McLaughlin 1995, 372-383.) Practice can also lead to better performance. Bialystok (1990, 146) also points out that strategies are central in ordinary language processing. These views accord with the assumptions of the present study. It is assumed that the use of language learning strategies, which

is controllable, may contribute to learning outcomes, although the efficiency of some information-processing systems may be genetically driven.

Focus on the social process

Lambert's (1963a; 1963b; 1967; 1974; as cited in Gardner 1985, 132-135) Social Psychological Model is a theory of bilingual development and self-identity modification. Lambert points out that an appropriately oriented learner becomes an acculturated part of a second linguistic-cultural community by learning the new language. According to the model, the extent to which a language is successfully acquired depends on ethnocentric tendencies, attitudes toward the other community, orientation toward language learning, and motivation. Attitudes and orientation together influence the level of motivation. Attitudes and orientation, motivation, as well as aptitude have direct influence on proficiency. A level of proficiency affects self-identity, which will result in additive or subtractive bilingualism.

Gardner's (1985, 146-153) Socio-educational Model, in turn, interrelates the social and cultural milieu, individual learner differences, the setting, and learning outcomes. According to the model, the learners' social and cultural milieus determine the degree in which they wish to identify with the target language culture and in which they hold positive attitudes towards the learning situation, both of which contribute to motivation. There are four types of individual differences that influence learning outcomes: intelligence, language aptitude, motivation, and situational anxiety. Motivation and aptitude are central in determining learning outcomes. A distinction is made between formal and informal contexts. Aptitude is important only in formal contexts. Consequently, the relationship between social milieu and proficiency is indirect, whereas motivation has a direct influence on proficiency. Learning is claimed to have both linguistic and nonlinguistic outcomes such as attitudes. (Gardner 1985, 146-153.) The influence of motivation may not always be closely connected with social milieu, which in turn may also have several ways to influence proficiency.

Gardner et al. (1997) have later returned to the matter: they conducted a study based on the Socio-educational Model among university students enrolled in introductory French. The results of the study strongly supported the model, which was also improved. The variables of the study were incorporated into an extended version of the model. The model linked attitudes, motivation, and aptitude to second language achievement. It suggested that two attitude constructs, integrativeness and attitudes towards learning situation, are causes of motivation and that motivation is a cause of self-confidence and the use of language learning strategies. In the study motivation, language aptitude, and learning strategies were causes of language achievement, and field independence was a correlate of language aptitude. The model was improved by adding a path between achievement and confidence: achievement creates confidence.

Lambert's (1963a; 1963b; 1967; 1974) model is in many ways consistent with Gardner's (1985) model. These models are discussed, because they are both consistent and contradictory. In both models attitudes are considered causes of motivation. Aptitude and motivation are considered central causes of achievement. Contrary to Lambert, Gardner connects aptitude to only formal learning. Lambert's model is concerned with acculturation, which is not the focus of the present study that deals with classroom learning. Nevertheless, there are similarities between formal and informal learning situations. Attitudes towards language and culture might not be as central in determining motivation in classroom learning as in natural learning, but the role of motivation and aptitude is obvious regardless of the context of learning. A high level of self-identity resulting from proficiency in Lambert's model may be replaced by a high foreign language self-concept in classroom learning. Gardner's model also supports the framework of the present study by pointing out the influence of anxiety on proficiency. Gardner et al. (1997) also highlighted the role of strategies and relationships between different affective and cognitive factors, which are also examined in the present study.

To sum up, some factors of social models are important in the studies of classroom learning. Formal and informal learning are, however, associated with different social processes. Orientation and motivation, for example, often

predict learning in all contexts, although the sources might be different. The role of the cognitive domain represented by aptitude seems somewhat contradictory. It should predict variation at least in classroom situations. All these factors operating in the social process clearly represent individual differences.

Focus on learner characteristics

The present study focuses on general learner characteristics that are different between individuals. The characteristics are studied without a clear process perspective. The influence of the factors is interesting. Ellis (1994, 523-524) argues that there are two approaches according to which the relationship between individual differences and learning can be viewed. The aggregate view denotes that success is the result of the accumulative effect of facilitating individual differences. The alternative view implies that there are various ways to succeed, and it is not possible to indicate a single profile of the successful learner. In the present study the latter alternative is also explored: all advantageous characteristics may not be required to succeed. Individual differences have also been interpreted as conditions for learning. Some learners succeed, because they satisfy the conditions for learning. Individual differences constitute typical and graded conditions, which are not necessary. This could be one reason why there is no comprehensive theory of individual learner differences. Another explanation might be the fact that different factors are very much interrelated and have indirect influences: it is difficult to propose a holding theory.

Several factors that are often involved in different processes have been incorporated into some models and frameworks. The variables included in the models of learner factors can be classified according to a two-class division. The aspects of language learning have often been referred to as the *affective* and *cognitive* domains of learning. The affective domain refers to personality factors and sociocultural factors. The cognitive domain is associated with cognitive learning processes, styles, and strategies. Learners show individual differences concerning both affective and cognitive variables. (Brown 1987,

78-99.) A detailed description of factors concerning individual learner differences follows in section 2.2.

Cognitive functioning refers to general intellectual and linguistic skills. Perceiving, reasoning, remembering, understanding, judging, and problem solving, for instance, are cognitive processes, and they are involved in learning languages. (Taylor & Taylor 1990, 342.)

Cognitive functioning involves conscious cognitive processes. When learning languages, every individual is faced with problems and learning tasks, which can be approached in different ways. Field independence, tolerance of ambiguity and reflectivity/impulsivity are cognitive learning styles, but also more specific learning strategies have been discovered. (Brown 1987, 78-91.) Strategies often refer to specific learning situations, whereas styles are more general in nature. O'Malley and Chamot (1990) refer to language acquisition as a complex cognitive process and to learning strategies as cognitive skills aiming to facilitate learning.

"*Affect*" refers to emotions and feelings. The affective domain is the emotional side of linguistic behaviour. The affective domain contains both contributing and disturbing factors regarding language learning. An affective filter is referred to as a barrier, a mental block, which prevents the learner from fully profiting from input. If the filter is low, the input becomes acquired competence. (Brown 1987, 87.)

The relationship between the two domains is obvious. Cognitive factors are often considered the main influence on language learning, but affective factors make learners use their cognitive skills (Laine 1988, 1). The focus of individual differences on the cognitive process points to the cognitive domain, whereas focus on the social process points to the affective domain. Learner characteristics may thus involve factors associated with both processes.

The variables of the present study can be divided into the affective and cognitive factors of second language learning. Affective learner factors are emphasized. Orientation (with reference to motivation), self-concept, and personality factors are affective in nature, whereas language learning strategies are cognitive. Some strategies such as affective and social strategies actually point to the affective domain. Aptitude is not measured in the present study, but

it is discussed in terms of heredity. It is also a cognitive factor producing individual differences. In contrast to unconscious aptitude, strategy use can be learnt; it is often characterized by conscious attempts to learn rather than innate cognitive abilities. All chosen controllable factors, affective and cognitive, however, have something in common. They represent psychological learner variables. This does not mean that teacher and context influence have been totally ignored. The influence of environment is studied with reference to heredity.

There is a contrast between research emphasizing the role of cognitive language aptitude, on the one hand, and affective factors, on the other hand. Also, in the present study the roles of affective factors and heredity pointing to aptitude are contrasted. The approach that supports the importance of aptitude is known as the Linguistic Coding Differences Hypothesis, LCDH (Sparks & Ganschow 1991; 1993a; 1993b; 1995). The contrast between the two views is discussed after some general *frameworks* and models of individual learner differences including both factor types have been introduced.

Attempts have been made to classify the causal factors of second language learning. According to Ellis's (1994, 472-474) framework for individual differences, there are three sets of interrelating variables: individual learner differences, learner strategies, and language learning outcomes. Firstly, individual learner differences interact with learner strategies. Secondly, there is a similar interrelationship between learner strategies and language learning outcomes. Finally, language learning outcomes interact with individual differences. These interrelationships form a triangle. Besides the three sets of interrelating variables, there are also learning processes and mechanisms involved in language learning. Ellis has placed these hidden processes in the centre of the triangle. They account for how input becomes intake, which is integrated into the learner's interlanguage system. The cognitive process is, after all, somehow involved in this model, too.

In Ellis's (1994, 472-474) framework individual learner differences include three types of differences: beliefs about language learning, affective states, and general factors. Learners have beliefs about the nature of language learning. Affective states can vary from fearful of starting to learn a second

language to confidence. Anxiety is also an affective state. General factors vary according to the learners' control over them. For example, learning style can be controlled. Different factors can interact so that personality factors, for instance, may affect learners' beliefs. The mutability of general factors may vary. Aptitude is considered a stable factor, while motivation may change. Learner strategies constitute a whole as such. Language learning outcomes include proficiency, achievement, and the rate of acquisition. Proficiency is an overall concept, while achievement can be viewed with regard to performance on a particular task.

On the basis of earlier findings, the present study is also based on the assumption that learning outcomes are associated with learner strategies and individual learner differences. It is also assumed that there are associations between strategy use and other individual differences. In the research design learner strategies are not, however, stressed as an individual factor different from other individual differences. Still, they belong to the cognitive domain, whereas other psychological learner factors are affective.

Naiman et al. (1978) identify learner factors such as age, intelligence, aptitude, motivation, attitude, personality, and cognitive style. The factors closely resemble those of Skehan (1991, 276-277), who suggests in his model of individual differences that learner strategies and styles have an intermediate position between variables such as aptitude, motivation, IQ, personality, and age, on the one hand, and outcomes including linguistic outcomes such as proficiency and errors and nonlinguistic outcomes such as affective outcomes, on the other hand. The model is similar to that of Ellis (1994) in many ways. In Skehan's model there are three sets of variables, which remind those of Ellis, but there is no direct relationship between individual learner variables and learning outcomes. In the present study a direct relationship between proficiency and learner variables is also examined.

Behind proposed models and frameworks, there are two *contrasting approaches* dealing with the strength and causality of individual learner differences in second language learning, as was stated above. LCDH by Sparks and Ganschow (1991; 1993a; 1993b; 1995) suggests that language aptitude is the primary source of individual differences in foreign language achievement,

which suggests that cognitive rather than affective explanations account for foreign language learning. Consequently, according to this theory there are difficulties in theories that regard affective and social context variables in foreign language learning as causal factors. The opposite view by MacIntyre (1995a; 1995b) suggests that affective factors are central in foreign language learning. According to this view, LCDH ignores the context in which language learning occurs and affective variables. More precisely, LCDH makes a significant omission by assigning mere epiphenomenal status to language anxiety, in particular.

The two approaches also have opposing views concerning foreign language learning difficulties: whether they are a result of native language learning problems in terms of LCDH or of an affective filter including anxiety. LCDH is also important because of its links to the continuity between first and second language learning, which will be discussed later. Aptitude will also be discussed more closely in the context of hereditary influences.

LCDH (Sparks & Ganschow 1991, 3-11; 1993a, 58-68; 1993b, 295; Ganschow and Sparks 1996, 201) suggests that second language learning difficulties are related to first language learning difficulties, which implies that language learning is based on *aptitude*. Students with foreign language problems may have underlying *linguistic coding* deficits. Their aptitude is poorer. The deficits in the native language are often masked by compensatory strategies, but they become unworkable in situations where a totally unfamiliar and new linguistic coding system has to be learnt. Overt or subtle speech articulation difficulties, dyslexia, language delay, otitis media, or other language-related problems are the precursors of later differences in a student's language learning. Phonological components often pose the most difficulty, and this module is considered responsible for several aspects of learning. Aptitude is considered central in all language learning.

Ceci and Baker (1989, 98) also make the point that if a basic psychological process needed to understand language, such as phonemic awareness, memory, or rule learning, was truly impaired, this impairment could be expected to be manifest across all language-based domains but not just one.

Individual differences, in turn, are according to LCDH due to the inefficiency of the language processing codes, and aptitude is the main variable causing individual differences in foreign language learning. It is assumed that motivation, attitude, and anxiety may hinder learning, but their causal role is likely to be small. Poor attitudes and high anxiety are likely to arise from difficulties in language learning. Native language learning difficulties may be followed by affective differences, and low achievement in a foreign language course might result in the student exhibiting affective qualities that are different from successful learners. (Sparks & Ganschow 1991, 3-11; 1993a, 58-62; 1995, 235-239.)

Sparks and Ganschow have also conducted some studies supporting the hypothesis. Aptitude has been studied in relation to anxiety. In their recent study Sparks et al. (1998, 181-216) found differences among high-, average-, and low-proficiency foreign language learners: foreign language ability was reflected by native language skill and foreign language aptitude. Ganschow et al. (1994, 44-52), in turn, confirmed that high-anxious students learning introductory Spanish exhibited poorer language skills and foreign language aptitude than low-anxious students. Correspondingly, the findings of a study (Ganschow & Sparks 1996, 199-208) among high school women explained the association of aptitude and anxiety. The study revealed that native language skills might influence foreign language aptitude, whereas they might affect the anxiety level together. It was assumed that the effect of anxiety is indirect, since success in language skills usually allows the foreign language learner to experience the learning environment in a more positive way, and the positive experiences together with stronger language skills lead to stronger achievement.

MacIntyre's (1995a) *critique* of LCDH points out that the hypothesis ignores the social context. Sparks and Ganschow (1995, 239), however, state that each student and his social context is different. Thus, the study of the social context becomes problematic, because nothing can be generalized. The student cannot be studied as a part of a larger group or setting, but only as an individual case study. MacIntyre, instead, defends the role of *affective variables* and states that language anxiety can play a significant causal role contributing

to individual differences. Language learning is a cognitive activity based on encoding, storage, and retrieval processes, and anxiety can interfere with each of them. An anxious student does not learn as quickly as a relaxed student, because his performance suffers due to the restriction of task-related cognition and an increase in self-related cognition: when responding to a question in the classroom, he concentrates on answering and evaluating the social implications of the answer while giving it. Anxiety may also disturb the student's ability to demonstrate his knowledge as a result of "freezing up".

MacIntyre (1995b) also argues that language learning is more than acquiring the technical skill needed in encoding and reproducing sounds and that LCDH concentrates on learning the sound system of language. Language learning involves learning a new communication system and new experiences. He refers to Gardner and Lambert's (1972) point that when the social situation requires a second language, almost everyone learns the required language, regardless of differences in aptitude. (MacIntyre 1995b.) It must be noted that not all learners are likely to reach an equal command of the language, written language, in particular. MacIntyre (1995b) also states that there is a wide range of potential influences in language learning, such as anxiety, attitudes, motivation, strategies, learner beliefs, general intelligence, personality, group dynamics, intercultural issues, etc., but one variable is not likely to explain the majority of variance in language achievement. Native language coding deficits are not likely to be the primary source of individual differences, because native language encoding differences are not overt but rather subtle.

Aptitude is not assessed in the present study, but it is referred to when the hereditary basis of learning is discussed. The present study design is consistent with LCDH in the aspects pointing to a connection between first and second language learning (among twins). However, on the basis of several studies of psychological learner factors, individual differences such as anxiety and motivation do not seem merely manifestations of native language problems or (unfortunate) side-effects of second language learning. The examination is not based on such assumptions, although this possibility and causality are discussed. Both inherited cognitive factors and affective learner factors may

turn out influential, which is consistent with MacIntyre's (1995b) view of the factors supplementing each other.

2.1.3 Continuity between first and second language learning

The present study is concerned with the *relationship between first and second language learning development, i.e. developmental continuity*. Drawing on earlier documents, the present study is based on the assumption that twins may have an early deficit in their cognitive development, which is connected with an early linguistic disadvantage. It is also possible that these disadvantages only represent retardation which is overcome before puberty. After the presentation of the developmental continuity view, the *relationship between language learning and general cognitive functioning* will be discussed with reference to modularity, which points to the origin of the deficits among twins. The relationship is relevant in both first and second language learning. Finally, *different causes and their origins in early and later learning* are discussed also with regard to possible similarities between them. All these three perspectives are based on the continuity between the two languages.

With reference to the present study design, continuity is important for two reasons. Firstly, developmental continuity is the basis of the assumption of twins' first language problems being related to SLA. Modularity also has to be examined to discuss where the problems lie. The origin of causes is important with respect to environmental influences, because to the extent they affect development, twins' learning is affected. Secondly, the relationship between the heredity of first and second language learning is also concerned with developmental continuity regardless of what the interpretation of the timetable of development and the availability of language knowledge is. Modularity specifies here which constructs are genetically affected. The origin of causes is important, since it clarifies when and what type of influence heredity/environment exert.

Developmental continuity

It has to be pointed out that the continuity between first and second language learning is not the same thing as transfer. Continuity implies that the same learning mechanisms are involved in both first and second language learning. Transfer, in turn, implies that the learner may rely on the first language knowledge when learning a second language; Ringbom (1987, 1) refers to the concept of crosslinguistic influence including transfer, interference, avoidance, and borrowing.

The continuity between first and second language learning can be viewed from the perspective of aptitude. It is assumed that aptitude is involved in both native and second language learning. Learners with a high level of aptitude are often successful in second language learning. LCDH and related studies (Sparks & Ganschow 1991; 1993a; 1993b; 1995) serve as an example of the view implying that second language learning difficulties are related to first language learning difficulties. Carroll (1973) has stated that aptitude is possibly what is left of a first language learning ability, which fades at different rates in different people. Carroll (1973; 1981) argues that persons with high overall language aptitude may have been able to retain and maintain native-language acquisition skills, whereas low aptitude persons have lost these skills. Also Skehan (1998, 194) makes a similar point: aptitude for second language learning is associated with aptitude for first language learning.

The Identity Hypothesis asserts that first and second language learning are basically one process governed by the same laws (Klein 1986, 23-27). According to the UG theory, language is wired in the human brain. Besides first language learning, it may also account for second language learning. This possibility also points to the continuity between first and second language learning. Klein (1986, 15) argues that there is no sharp division between first and second language acquisition, because the latter is often initiated before the former has come to a close. Consequently, UG might still be active in early second language learning. The same applies to the Critical Period Hypothesis, which asserts that the relative ease in which languages are learnt ends at puberty. This theory has also been extended to second language learning as

well. The subjects of the present study are 12 years old, which means that the sensitive period or UG might not be completely lost.

With reference to continuity, one difference between these theories and LCDH is that in the latter aptitude is primarily viewed from the perspective of unsuccessful learning (which is not the perspective of many models involving aptitude) extending from first to second language learning, whereas UG and the Critical Period Hypothesis also point out the innate factors of normal learning development, although problems in these mechanisms may cause learning difficulties. The concepts also point to different factors of learning, although their association is interesting. These constructs are considered inherited, and the question remains whether the same heritable factors operate in first and second language learning. This will be discussed later.

Modularity

The relationship between linguistic skills and general cognitive functioning with reference to modularity attracts attention in the context of the present study. Twins are supposed to have deficits in their early cognitive functioning and linguistic skills. The relationship between these two deficits is interesting. In the present study design, the relatedness of them does not, however, play a significant role, because twins are supposed to be somewhat impaired in both of them regardless of their association. It is possible that the linguistic deficit can be explained by the twin situation (e.g. minor exposure to adult language) more often than by biological factors (e.g. neonatal state), which accounts for cognitive deficits. These issues are closely dealt with in section 2.4.1.

Oposing views of the relatedness have been expressed. According to some views, the relation of first language acquisition to general cognitive functioning seems more obvious than the relation of second language learning. Thus modularity can be discussed in terms of continuity.

Foreign language aptitude is considered a specific talent, not merely belonging to general intelligence and cognitive abilities (Skehan 1998, 187). Sparks and Ganschow (1993b, 289-295) argue in terms of LCDH that the student with foreign language learning problems has a language-related deficit

that does not affect overall cognitive functioning; foreign language learning deficits are language-related and modular in nature. Plomin and DeFries (1998, 44-45) state that current cognitive neuroscience assumes a modular model of intelligence, in which different cognitive processes are in discrete modules in the brain. This statement does not differentiate between first and second language learning.

With reference to *first language* acquisition, Klein (1986, 4) states that it is intimately bound up with the child's cognitive and social development. First language is an intrinsic component of a child's cognitive and social development, while before second language acquisition this development has been more or less completed (Klein 1986, 24). Elliot (1981) suggests that when a child learns to talk, it may modify the rest of his intellectual and social abilities and that he may use his discoveries about language to help his general cognitive and social development and vice versa. Also, the nonmodular theory of child language acquisition associates the facts of language acquisition with the principles of general cognitive functioning, although the modular theory does the opposite (Ritchie and Bhatia 1999,14). It must be noted that the simultaneous development of different skills does not necessarily mean that they are one process.

Language learning is likely to be associated with a separate module, but there might be even further differentiation within this module. Views have been expressed that modularity is different in first and second language learning. Skehan (1998, 207) argues that the former is organized according to syntax and semantics and the latter according to information-processing stages: input, central processing, and output.

The twins' language learning problems can be associated with the discussion on continuity and modularity by addressing the area of twins' deficit: (1) *generally cognitive* i.e. affecting general intellectual skills or also other skills besides language (depending on the structure of information-processing in learning) or (2) *purely linguistic*. As was stated before, in the latter case the origin of influence also becomes important.

If twins' problems are *generally cognitive* and learning is *nonmodular*, they are still likely to continue when a second language is learnt, unless these

problems have been overcome. However, if language learning at this stage is purely *modular*, and only general cognitive functioning was impaired in twins, not the linguistic module, linguistic coding should not be affected. But school learning requires also general cognitive intelligence and conscious cognitive functioning, which in this case points to problems also in later language learning, unless the deficits have disappeared.

If the problems are purely *linguistic* due to *environment* (twinning), the continuity between the two languages in terms of aptitude and language universals is not so important, because they do not account for the deficits (i.e. they are not largely influenced by environment), unless these constructs are also affected by language experiences in early years rather than genetics exclusively, as has also been proposed. But if the problems are linguistic due to *biological* causes (resulting in the slow development of linguistic coding due to slow maturation, for example), aptitude and language universals (which can be influenced by biology) are important and may affect second language learning. Modularity does not play a role in this, because language would be affected in both cases, although linguistic problems due to environment assume that language learning is also strongly related to factors other than information-processing; in fact, modularity is irrelevant in this case.

These contradictions are solved by the fact that twins are likely to suffer from both cognitive and linguistic deficits due to different causes regardless of their associations. Evidence has been found regarding both deficits. If modularity exists, several modules might be affected. It also seems likely that they are somehow bound up with each other at an early age.

With reference to heredity, the modular view is more important in terms of the present study if the heredity of language is associated with language universals, because they support modularity. Also, aptitude, which will be more closely examined later, points to a language module. A third possible source of genetic influence on language learning, intelligence, has also currently been considered modular. It will also be discussed later. However, if learning is nonmodular, the construct of cognitive functioning is still likely to be genetic, and it is likely to affect SLA in formal contexts, in which conscious attempts to learn are required.

Causes of learning and their origins

Language learning is influenced by several factors, and it is not always easy to decide to what extent the factors involve similarities or differences between learners. When we are examining the *causes* of similarities and differences in *learning outcomes*, a distinction must be made between (1) the predictive *learner factors*, *i.e. constructs*, which these causes represent and (2) the *origin* of these causes. Direct causes, the learner factors, may be psychological or ability characteristics originating from genetics or environment. Environment may affect some learner characteristic and be an indirect cause of learning outcomes, whereas the genetic influence is more strongly related to the construct and actually reflects it and often determines the factor wholly rather than affects it. Both origins and influential constructs might be different in first and second language learning. A summary of theories is required.

First language seems to be affected by causes that originate from genetic and environmental influences. It is more difficult to define what these causes/factors are: possibly UG or aptitude, which are rather genetic than environmental. Psychological learner factors such as motivation are not decisive at this age. The importance of social competence has been reported, though, and it may be one direct cause. Research on language *universals* deals with direct factors of learning (causes), but the studies in the field of *variation* in first language learning emphasize the origin, either environment (socio-economic status etc.) or genetics, which are also causes of certain constructs. But the factors (the direct causes of the learning outcomes) that become operative through these influences are not often defined. Researchers mainly talk about the rate and style of acquisition, the outcomes of learning. Rate might actually point to the aptitude factor (see Skehan 1998, 194). Stylistic variation and some other variations may not reflect any constructs, but they may simply be directly influenced by environment as such. The bias of variation research may be on the origin partly because first language learning has fewer psychological direct causes than second language learning, and the aim is to influence certain origins that are controllable.

Second language learning also seems to be affected by causes that have their sources in genetics or the environment, but the examination of the factors that are affected by these origins and the direct influence of these constructs on learning outcomes are emphasized in research. This applies to factors producing both differences and similarities. The factors are often carefully defined. They are psychological characteristics or cognitive constructs. The origins are not strongly pointed out in *variation* research, although they are sometimes also explored. The social process reflects the influence of the environment. The cognitive process may also vary due to the setting - formal learning or natural acquisition - in its forms. It may also vary due to genetic influences in its efficiency. The factors operating in the processes are considered central, and they create a tradition of their own, individual differences, in which causes of learning outcomes among individual learners are emphasized. Also in second language learning, environment may naturally influence learning outcomes directly and cause variation without an effect on the development of a particular construct. Research on language *universals* is more concerned with first language learning.

The point is that the constructs of individual differences in SLA are defined, although variation also emerges due to undefined causes. This may be one reason why the concept "variation" is often preferred in first language learning rather than the concept of individual difference. The bias of research on (learner-centred) causes in SLA must be partly a result of the facts that (1) the origins of many factors are often obvious and do not require research, (2) the role of uncontrollable environment is smaller than the language experiences that a learner himself chooses to get, (3) genetic influences (e.g. UG, aptitude) may be the same as those in first language learning and have already become explored, and (4) genetic influences that are more obvious later in life (intelligence) are often studied in other contexts. The outcomes and their direct causes matter in second language learning. Naturally there is also overlap between first and second language research, because the same constructs operate in both of them.

In the *present study* factors that cause differences in learning outcomes are emphasized in the case of psychological learner factors. When examining

cognitive language learning ability, the origins (heredity) of these factors become emphasized, because the research design allows an examination of the origin rather than the constructs that it affects.

Nevertheless, the most important part of the present study concentrates on the influence of certain causes from the point of view of their origin. Twins' disadvantages are considered a potential cause of unsuccessful learning originating from several environmental sources, which are discussed later. Here the continuity between first and second language learning is important, because early and later learning involve the same cause and its origin, although other moderator variables may become influential later in life.

From the point of view of heredity, it seems that genetics as an origin of a language ability construct is obvious in both first and second language learning. It is, however, possible that different inherited constructs become operative at different ages and in different situations. The role of the environment, another origin, seems more decisive in terms of psychological factors. It also seems more obvious in SLA, as far as the outcomes are concerned. However, the rate of first language learning also seems to be affected by environmental influences, even if there might not be great differences in final outcomes.

In general, the interest of the present study is to examine whether in the case of twins, social behaviour factors representing individual differences influence second language learning. This is studied in relation to the fact that twins' first language learning does not seem advantageous because of cognitive and linguistic disorders. The notion is that first and second language are connected (both linguistically and cognitively), but social behaviour may produce differences in second language learning outcomes. It is acknowledged that variation also occurs in first language learning, but it also seems disadvantageous to twins primarily due to reduced adult input. This may be associated with second language learning. The differences may be significant between twins and singletons.

2.2 Psychological learner factors connected with second language learning

Theories of language learning involve several influential factors of different kinds. Those dealing with individual differences, and more specifically psychological learner characteristics, are emphasized in the present study. They are psychological, because they are related to how the mind works, mainly emotionally, but some of them also in relation to conscious cognitive activity. Most of the factors introduced below represent the affective domain and are mostly controllable. Language learning strategies are also introduced, and they are cognitive. However, they greatly resemble the affective factors: their use can change and be developed because of their often conscious and unstable nature. Unconscious cognitive abilities such as aptitude are different, because they are considered stable, and they are not dealt with here. All the factors that will be discussed somehow reflect *social behaviour*: activity and perceptions in relation to other people. Learning is also a social phenomenon.

The individual factors will be explored, and previous studies conducted in these fields will be reported after that, but it must be pointed out that there is some variation in the concepts used in different studies. There is also some overlap in the reports. Some studies deal with several factors simultaneously. One purpose of the present study is to examine the importance of the interrelationships between the individual factors contributing to achievement. Thus, the reviews of previous studies deal with these aspects, too. Gender differences also play an important role in this domain, because they reflect individual learner differences, and they will also be included in the review.

2.2.1 Orientation in the classroom

Orientation, motivation, perceived control, and the locus of control are all different aspects of one and the same thing. The present study deals with orientation in the classroom in terms of Harter's (1980) model. The model

seeks to examine motivational orientation by dividing it into two alternate poles: intrinsic and extrinsic motivation. The focus will be placed on this classification because of its usefulness to the present study. Because orientation is not the only concept used to refer to the idea of a learner's intrinsic versus extrinsic bias of learning, other concepts and classifications will also be dealt with.

Harter (1980, 5) has developed a scale of intrinsic versus extrinsic *orientation* in the classroom. It deals with the sources of motivation, an intrinsic interest in learning, mastery, curiosity, and preference for challenge versus an extrinsic interest, which refers to a bias towards teacher approval and guidance, grades, etc. The scale consists of a number of items, which can be divided into five groups:

- (1) preference for challenge in contrast to easy work assigned;
- (2) curiosity and interest in contrast to pleasing the teacher and getting the grades;
- (3) independent mastery in contrast to dependence on the teacher;
- (4) independent judgement in contrast to reliance on the teacher's judgement; and
- (5) internal criteria versus external criteria.

Item group (1) aims to examine what kind of work is preferred by learners. The purpose of item group (2) is to find out reasons for learners' effort, whereas item group (3) is concerned with a bias to independence or dependence when dealing with problems and assignments. The scale was designed so that it is appropriate across several age levels. (Harter 1980, 5-6.)

Item groups (1), (2), and (3) are used in the present study, because they clearly deal with motivation. Groups (4) and (5) are left out in the present study, because they do not clearly deal with reasons to learn but concentrate on reactions to the process and outcomes of learning (e.g. whether students have independent opinions and whether they know how they are doing without comments). Motivational orientation is the focus of perceived control in the present study partly because of its interesting and close relationship to other factors which contribute to language learning outcomes. Individual studies, which will be reported later, serve as the evidence.

According to Gardner (1985, 10-12), orientation and motivation are different concepts. Orientation points to reasons for studying a second language, while motivation is related to the effort made to learn a second language. *Motivation* is defined as the combination of effort, a desire to achieve the goal of learning, and favourable attitudes towards learning the language. There are two types of orientation. Integrative orientation is associated with social-emotional purposes of interaction, whereas instrumental orientation is linked to advantages in obtaining a job or becoming educated. Both types of orientation are, according to Gardner, extrinsic, because the language is learnt to achieve some goal but not because of an intrinsic interest in language. (Gardner 1985, 10-12.) In Harter's (1980) classification intrinsic orientation points to the learner's own motives, whereas extrinsic orientation points to external factors for learning a language. With reference to the distinction between motivation and orientation, it can be concluded that intrinsic orientation, in particular, reflects strong motivation. Orientation may alternatively lead to motivation. Discussing motivation is consequently relevant in the context of orientation.

It is essential to distinguish between the degree of motivation and its source. A learner may have a high degree of motivation originating from either intrinsic or extrinsic sources. A high degree of motivation does not exclude either of them, although an intrinsic interest usually leads to better performance in the long run. Extrinsic interest might create motivation, but extrinsic preference and dependence may not do that. The concept of orientation has a motivational bias, but it is based on the concept of *perceived control*, which is a term dealt with in many studies. Perceived control, like orientation, points to perceived reasons for learning, which can be divided into two groups: intrinsic and extrinsic causes. According to Adelman et al. (1986, 1011), perceived control subscales are personal power/decision making, self-determination, others' interference with autonomy, powerlessness, and impersonal interference with autonomy.

Skinner et al. (1988, 369-370) deal with perceived control more widely. They have divided the general term perceived control into three subgroups:

- (1) beliefs about control;

(2) beliefs about mean-ends; and

(3) beliefs about agency.

With control beliefs Skinner et al. (1988, 371-372) refer to generalized expectancies about how much one can influence the outcomes without explicit reference to the means involved.

Means-end beliefs are, according to Skinner et al. (1988, 371-374), generalized expectancies about the degree of influence of certain means and causes on desired outcomes. There are two means-end belief categories: internal causes such as effort and attributes, and external causes such as powerful others, luck, and unknown factors.

Skinner et al. (1988, 371-381) consider agency beliefs generalized expectancies about the degree of the potential means possessed by the agent. Age differences are not regarded as considerable in terms of this aspect of perceived control.

There is yet another concept used to refer to perceived control: the *locus of control*. The locus of control can be intrinsic or extrinsic, but there is more to it. In studies dealing with the locus of control perceived control is viewed on a more general level. Skinner et al. (1988, 371-374) distinguish between the two closely related concepts - the locus of control and mean-ends beliefs - the former referring to the agent himself (beliefs about "myself" in terms of a certain cause) and the latter to agents in general (beliefs about "anybody" in terms of the same cause).

Grolnick et al. (1991, 514) have used the concept *perceived autonomy* in contrast to perceived competence. Perceived autonomy deals with reasons why a child engages in patterns of achievement behaviour. Perceived autonomy obviously overlaps perceived control.

Perceived control can be studied in general with respect to language learning, but it can also be studied in relation to success or failure. Some studies have concentrated on either of the two alternatives. Harter (1984, 226) has also suggested a model where a person's reactions to successes and failures are examined. A person's perceived control can be defined again as internal (feels responsible for his learning) or external (feels that the locus of control is on external factors).

Frieze et al. (1983, 5) have explored the causal attributions to success and failure concerning examination situations. A student's success may be dependent on internal causes of ability, effort, or feeling good. But it may also be dependent on external causes such as having an easy test, someone's help, or a good teacher. Effort is considered controllable, while abilities and moods are regarded as uncontrollable. Success criteria may vary from child to child. What is experienced satisfactory by one child may be considered a failure by another. (Frieze 1983, 5.) Weiner (1983, 58) also suggests that ability in terms of the locus of control is comparatively stable, whereas effort is considered unstable (controllable).

The issue of control can also be dealt with by contrasting perception and reality. Blank et al. (1993, 264) use the term triad of control. The three aspects of control are perceptions of control, desire for control, and actual control. Perceptions of control are interesting in terms of the controllability of events, the nature of internal or external causation of the event, and the predictability of the event. (Blank et al. 1993, 264.) The actual control is reflected in the present study in proficiency in English, whereas perceptions of control are viewed from the point of view of motivational orientation. Desire for control is not studied.

Stine et al. (1993, 345-346) suggest that in situations where actual control is limited - classroom listening situations, for example - a student's perceived control may play an important role in the degree of effort made. On the one hand, a student may try to listen even harder and devote more attention resources to the task, if he believes that it will facilitate the situation. On the other hand, those who do not perceive themselves capable of such control of effort may be disadvantaged. Furthermore, the teacher influence may be considerable for the students with external control beliefs. (Stine 1993, 345-346.) In the present study the classroom situation constitutes a particular interest. It seems likely that perceived control plays a significant role in achievement.

2.2.2 Self-concept

When it comes to the idea of self-worth, the present study concentrates on the nature of foreign language self-concept. It is a term used by Laine and Pihko (1991, 25) to refer to perceived competence. Foreign language self-concept can be understood as a part of general self-concept including school self-concept; it consists of specific target language self-concept and task self-concept. (Laine & Pihko 1991, 25.) Thus, in the present study, self-concept consists of

- (1) general foreign language self-concept;
- (2) specific target language self-concept; and
- (3) task self-concept.

In this background report, self-concept can be considered from a wider perspective.

Self-concept is involved in many different areas of human behaviour. Each individual has a general self-concept, which some researchers (see Leondari 1993) call global self-worth. This general self-concept can be divided into various subcategories, which contain specific and situational self-concepts. Foreign language self-concept could be considered one of them. The subcategories can also be classified further.

General self-concept and foreign language self-concept are not entirely comparable, and there may be cultural differences in situational self-concepts. As regards foreign language self-concept from a point of view of different nationalities, it has been argued that Finns find their foreign language aptitude low, compared with many other nationalities, although one nationality is not likely to be any more competent than another in classroom learning (Sajavaara 1993, 32). Low foreign language self-concept does not necessarily imply that global self-concept should be low, too. There are individual differences between Finns, too. A purpose of the present study is to find out whether those with a higher foreign language self-concept are also more successful in English classrooms.

The concept of *perceived competence* refers to the same characteristic as self-concept. According to Harter (1982, 87), separate perceived competence subscales are cognitive competence, social competence, physical competence,

and general self-worth. The term foreign language self-concept, which is used in the present study, would belong under the title of perceived cognitive competence, if this classification was used. Several studies, which will be reported later, deal with perceived cognitive competence, which is reflected by perceived linguistic competence among other things.

Perceived competence is considered a factor representing individual differences and affecting learning outcomes in the present study. It can also be seen as a non-linguistic outcome of learning. The contradiction between the source of influence and its outcome is acknowledged in the present study by considering the interaction between causes and effects and pointing out a possible interrelationship between perceived competence and proficiency rather than a one-way-relationship.

There is yet another term referring to self-concept: *self-efficacy*. Berry and West (1993, 351-356) deal with self-efficacy referring to the perceived competence and confidence of an individual in terms of performance in a given task. There is also some overlap between this concept and perceived control. For example, Skinner et al. (1990, 22-29) refer to self-efficacy as capacity beliefs for effort. The concept is slightly contradictory. This fact points to a relatedness between perceived competence and perceived control. Berry and West (1993, 355-356), however, point out that the controllability of outcomes is theoretically independent of one's perceptions of one's abilities.

Self-esteem is an affective factor. It is also associated with self-concept. There are three types of self-esteem. Global self-esteem refers to general, stable self-esteem. Situational self-esteem refers to behaviour in certain life situations such as social interaction and education. Task self-esteem is connected with particular tasks in specific situations. (Brown 1987, 87-102.) Task self-esteem is evidently related to task self-concept. Larsen-Freeman and Long (1991) see self-esteem as a part of personality. Self-esteem is, however, slightly different from perceived competence reflecting self-concept, which is considered a linguistic factor of its own in the present study and separate from personality, which, in turn, is examined as a whole of its own.

2.2.3 Language learning strategies

Language learning strategies, which will be dealt with in the present study, follow the classification made by Oxford (1990, 16-17). Consequently, the emphasis will be placed on this classification. A few other perspectives are also introduced before previous studies on the relationship of proficiency and strategy use can be discussed.

Oxford (1990) has listed indirect and direct strategies for the general management of learning and the four language skills. Both types of strategies have a connection to language learning. Strategies concerning general management were chosen for the present study, because young pupils are not likely to use very complicated strategies for the different language skills. Their competence is still considerably low.

There are many interpretations of what strategies really are. According to Drozdial-Szelest (1992, 45-48), they all have in common the fact that they are problem-solving in nature and have a facilitating function in language learning. Drozdial-Szelest also draws the conclusion that achievement is influenced by strategy use and aptitude in classroom tasks, while outside the classroom, strategy use is usually related to the attitude of the language learner. The strategy use of the subjects of the present study is likely to be limited to school work, because this competence level is assumed too low for extensive activity outside the classroom.

Oxford (1990, 1-8) states that strategies are important in terms of language learning, because they are tools for active self-directed involvement, which is essential for the development of communicative competence. Learning strategies are activities used by the learner to facilitate the acquisition, storage, retrieval, and use of information. They not only facilitate learning but accelerate it and make it more enjoyable and effective.

There are many factors influencing the choice of strategies. Oxford (1990, 13) identifies factors such as degree of awareness, stage of learning, task requirement, teacher expectations, age, sex, personality, motivation, and purpose. The argument parallels the present study design.

Oxford's (1990, 38) direct strategies contribute to learning without any indirect operations. They include three strategy groups:

- (1) memory strategies;
- (2) cognitive strategies; and
- (3) compensation strategies.

Memory strategies as a group include items such as creating mental linkages, applying images and sounds, reviewing well, and employing action. Cognitive strategies, in turn, can be divided into practising, receiving and sending messages, analysing and reasoning, as well as creating structure for input and output. Compensation strategies contain guessing intelligently and overcoming limitations in speaking and writing.

Oxford's (1990, 38) indirect strategies have influence on other factors connected with language learning. They consist of

- (4) metacognitive strategies;
- (5) affective strategies; and
- (6) social strategies.

Metacognitive strategies involve centering of learning, arranging and planning of learning, and evaluating of learning. Affective strategies consist of strategies such as lowering the anxiety, encouraging oneself, and taking one's emotional temperature. Social strategies are divided into asking questions, co-operating with others, and empathizing with others.

Memory strategies help learners in the storage and retrieval of new information. They have a key function in enlarging knowledge base. They aim at making the learning meaningful for the learner as an individual. (Oxford 1990.)

Cognitive strategies are the basis for learning. They are closely related to the four language skills (writing, speaking, reading, listening) because of their direct nature. They facilitate the learning process as such by involving direct manipulation of material. (Oxford 1990.)

Compensation strategies help learners overcome limitations in their competence. For beginning learners these strategies are important because of the limitations they have in all four language skills. (Oxford 1990, 90.)

Metacognitive strategies provide learners with ways of co-ordinating their own learning processes. They are essential particularly when there is a risk of the learner being overwhelmed by too much "newness". Research has shown, however, that learners use these strategies without much sense of their importance. (Oxford 1990, 136-138.)

Language learners can gain control over certain injurious personality factors through *affective* strategies. According to Oxford (1990, 140-143), good language learners are those who know how to control their emotions. Consequently, these strategies might be related to good school grades. Only a few studies have examined these strategies, but it is known that they are underused. Affective strategies contribute to self-confidence and perseverance needed in language learning.

Learning a language involves other people, and thus appropriate *social* strategies are very important in this process. Competition is often strong in an educational establishment, which leads to learners seldom reporting a preference for co-operative strategies. Empathy is a personality factor that might have a relation to social strategies and increased interaction. (Oxford 1990, 144-146.)

Different strategies are also linked, even direct and indirect strategies. Wong-Fillmore (1979, 220, 227), for example, argues that before the learner can exercise the cognitive strategies which would ultimately result in language learning, he needs to make social contacts, and to do this he needs social skills.

O'Malley and Chamot's (1990, 118-120) classification of strategies is slightly different. This grouping consists of metacognitive strategies (which have an "executive" function in the learning process), cognitive strategies (which are limited to specific learning tasks), and socioaffective strategies (which refer to social mediation). Metacognitive strategies include strategies such as directed and selected attention, self-monitoring and self-evaluation, advance preparation, etc. Cognitive strategies involve strategies such as repetition, grouping, note-taking, imagery, and contextualization. Social strategies focus on co-operation. (O'Malley & Chamot 1990, 118-120.) This classification has a great deal in common with that of Oxford (1990), but the

number of strategy groups is reduced. The model concentrates on the most common strategies.

Individual differences may also be affected by cultural differences, which is a useful observation when various studies are interpreted. According to Donato and McCormick (1994, 455), sociocultural theory explains the emergence of language learning strategies, which is a process related to the practices of cultural groups. It is possible that social strategies, in particular, are culturally dependent. This aspect is not, however, likely to affect the results of the present study, since all the subjects are Finnish students.

2.2.4 Personality factors

Personality is clearly one of the aspects subject to individual differences in language learning. An individual's personality is affected by many factors. It is a unique blend flavoured with experiences. Leontiev (1981, 10-19) points out that personality is a combination of characteristics, and each combination is different. It is not purely a product of hereditary characteristics or environmental causes. It is also influenced by learning. Man's activity is social and systematic in nature. The task of education is here to determine the structure of a child's personality through motives important to society.

Emotional states have influence on learning activity. Gardner (1985, 31) states that it makes sense that sociable students willing to interact freely with others should be more successful at language learning than more reserved students. Leontiev (1981, 70-81) makes an interesting point that a school child has the capability of learning what he wants to learn, and the ability to communicate successfully in a native language contributes to the ability to start communicating in a foreign language. These arguments justify an exploration of the general relationship between language learning and personality without a linguistic reference.

Personality factors may also be subject to cultural differences (Larsen-Freeman & Long 1991, 186). This is an important observation that should not

be neglected when comparing the findings of different studies. The effect of personality may sometimes be indirect in nature.

Personality factors represent the affective domain in language learning. These factors are numerous, but the present study deals with only two of them. The choice for the present study was made on the basis of the availability of appropriate data already collected, the significance of the factors for the relationship between twinship and language learning, and the literature concerning the relationship between language learning achievement and personality. The chosen personality factors were:

- (1) active prosociality (positive influence) and
- (2) anxiety (negative influence).

These factors are also relevant in the present study, because they directly reflect *social behaviour*, which is a special interest in the study. These are also the factors which are dealt with in the background section. It is important to note that not all personality factors are considered advantageous for achievement. Factor (1) represents anticipated positive influence, whereas factor (2) represents anticipated negative influence.

It must be stated that the personality data which were used for the present study were not collected with language learning in mind. These data represent personality factors as traits, not situational constructs connected with the language learning situation. The data were collected by psychologists (see Chapter 3) for their own purposes. In terms of language learning studies personality factors are usually measured with specific situations in mind.

Because of considerable overlap between the concepts, several related studies will be covered in the review of individual studies. They do not necessarily deal with exactly the same constructs, but they share many qualities characteristic of the concepts used in the present study.

Pitkänen (1969, 107) has developed a model describing social behaviour. The model divides behaviour into four classes at two levels: according to control and reaction, which can be strong or weak. According to Pulkkinen (1980, 2-3), the model has later been interpreted so that control refers to the self-control of behaviour, and reaction points to active or passive behaviour. Active prosociality is associated with strong self-control and active behaviour,

whereas anxiety represents weak control and passive behaviour. Compliance represents passive self-controlled behaviour, whereas aggression is associated with active but not self-controlled behaviour. (Pulkkinen 1980, 2-3.) Strong control and active behaviour (active prosociality) are likely to influence language learning positively, while the opposite poles found in anxiety are likely to disturb learning. Personality is assessed in the present study according to Pulkkinen's (1980) view.

Active prosociality in the present study is expressed by friendliness, negotiating skills, reliability, sociability, and co-operativeness. It is a personality factor, which overlaps a few other personality aspects that have been studied in terms of second language learning.

Sociability is a characteristic of extroversion. Extroversion consists of sociability and impulsivity. Sociability, in turn, includes qualities such as gregariousness, people-orientation, and fear of isolation. Impulsivity is characterized by a need for excitement and change as well as for risk-taking. (Skehan 1989, 100-101.) According to this definition, sociability and active prosociality are close to each other.

Brown (1987, 110) states that extroversion is a culturally dependent variable, too. In Western culture, active extrovert participants are often praised in the classroom. He claims that extroversion may contribute to the performance in a foreign language particularly in face-to-face situations, but it hardly has any influence on writing, reading, and listening tasks.

Anxiety associates with feelings of uneasiness, self-doubt, and worry. Trait anxiety is a permanent or global type of anxiety. State anxiety, in turn, is experienced in relation to some particular event. Anxiety can have both positive and negative effects on language learning. Usually it points to disadvantages, but in a certain degree it may aid the learner to get demanding jobs done. (Brown 1987,106; Skehan 1989, 115.)

Horwitz et al. (1986, 125-132) suggest that people with foreign language anxiety find classroom situations, in particular, highly stressful. The argument supports the assumption that students with high anxiety scores might suffer from classroom situations more than those with low scores. Anxiety is likely to have implications for achievement.

The present study deals with classroom learning, but anxiety was not assessed with regard to classroom situations. Horwitz et al. (1986, 125) state that when anxiety is limited to language learning situations, it represents specific anxiety reactions, which are different from general anxiety in a variety of situations. There are people who have a mental block against learning a foreign language, but who are good learners in other situations.

2.2.5 Studies of the influences of the factors

Individual studies are reported here with brief analyses of their importance, but they are finally linked up with the present study in Chapter 4. The purpose of this passage is to cast some light on the relationships between cognitive achievement and learner factors introduced earlier in the background section. The purpose is also to explore interdependencies between different affective and cognitive variables. The presentation includes

(1) studies of the relationships between achievement and affective/cognitive variables; and

(2) studies of the interrelationships between affective/cognitive factors.

Before introducing the studies, a brief summary of the findings is made to facilitate the linking of them to the present study. Most of the studies deal with several interrelationships simultaneously.

Motivational orientation - achievement

(1) Samimy and Lee (1997)

(2) Van der Walt and Dreyer (1997)

(3) Wen (1997)

(4) Ehrman and Oxford (1995)

(5) Clement et al. (1994)

(6) Short (1992)

(7) Grolnick et al. (1991)

(8) Chapman et al. (1990)

(9) Laine (1988)

Self-concept - achievement

- (1) Shameem (1998)
- (2) Ehrman and Oxford (1995)
- (3) Leondari (1993)
- (4) Sink et al. (1993)
- (5) Pintrich and De Groot (1990)
- (6) Zimmerman and Martinez-Pons (1990)
- (7) Laine (1988)

Strategy use - achievement

- (1) Bremner (1997)
- (2) Ehrman and Oxford (1995)
- (3) Pintrich and De Groot (1990)
- (4) Zimmerman and Martinez-Pons (1990)
- (5) O'Malley et al. (1985)
- (6) Wong-Fillmore (1976)

Personality - achievement

- (1) Robinson et al. (1994) -sociability
- (2) Short (1992) - sociability
- (3) Riding and Banner (1986) - sociability
- (4) Strong (1983) - sociability
- (5) Chastain (1975) - sociability
- (6) Van der Walt and Dreyer (1997) - anxiety
- (7) Ehrman and Oxford (1995) - anxiety
- (8) Aida (1994) - anxiety
- (9) Ganschow et al. (1994)
- (10) MacIntyre and Gardner (1994) - anxiety
- (11) Pintrich and De Groot (1990) - anxiety

Varying types of interrelationships among affective/cognitive variables have been reported:

Motivational orientation - self-concept

- (1) Noels et al. (1999)
- (2) Skinner et al. (1990)

Motivational orientation - anxiety

- (1) Noels et al. (1999)

Motivational orientation - strategy use

- (1) Finkbeiner (1997)
- (2) Pintrich and De Groot (1990)
- (3) Ely (1989)
- (4) Oxford and Nyikos (1989)

Self-concept - strategy use

- (1) Pintrich and De Groot (1990)
- (2) Zimmerman and Martinez-Pons (1990)
- (3) Nelson Le Gall et al. (1989)
- (4) Oxford and Nyikos (1989)

It must be noted that earlier findings cannot be directly interpreted in terms of the present study. The reported findings are only indicative of the potential findings in the present study. There are age, culture, gender, and language differences between earlier studies and the present study. Not all the reported studies deal with language learning but also with general cognitive functioning. It has an association with language learning. There is also variation in the psychological concepts. The purpose here is to indicate general patterns of behaviour and view matters from different angles.

Studies of the relationships between cognitive achievement and affective/cognitive variables

Many studies deal with several factors simultaneously. The studies are grouped in the following way according to the principal findings for the present purposes: (1) orientation and achievement, (2) self-concept and achievement, (3) strategies and achievement, and (4) personality and achievement.

Orientation and achievement. The influence of motivational orientation is important on proficiency. Many studies concerning motivation deal with several other individual differences simultaneously, because there are interrelationships between them. There is an earlier study that dealt with all four factors (including motivational orientation) relevant from the point of view of the present study. Ehrman and Oxford (1995, 67-79) found out in their study of adults' individual differences in language learning that cognitive strategies, anxiety, beliefs about self (as capable of learning languages), and intrinsic motivation were all significantly correlated with proficiency. Van der Walt and Dreyer (1997), Laine (1998), and Short (1992) have also found a connection between orientation and learning. These studies will be reported in other contexts.

It may be easier for adults to find intrinsic reasons for studying, but there are great differences in the sources of motivation among *children*, who also show differences in maturity. Those who take control to themselves seem to succeed. Chapman et al. (1990, 246-251) found out in their study of 8-12-year-old children's perceived control and *cognitive performance* that agency beliefs were correlated with cognitive performance. Cognitive performance was indicated by variables such as fluid and crystallized intelligence, short-term memory, and recognition memory. Correlations were significant between agency beliefs and cognitive performance across middle childhood.

Grolnick et al. (1991, 508-514), in turn, found out that that control understanding and perceived control had strong associations with achievement in grades 3 to 6. A self-report measure assessed internal sources of control, the feeling of powerful others, and the unknown source of control across cognitive, social, and physical domains.

The results of these studies support the view that intrinsic control is related to successful cognitive achievement. Grolnick et al. (1991) found out that general control understanding was associated with achievement, whereas Chapman et al. (1990) pointed out the importance of only one's own agency beliefs. It seems that also an awareness of control regardless of the source of control determines learning outcomes. The present study is based on Harter's (1980) model, but it is possible that an extra factor indicating an awareness of the

source of motivation indicating its existence might add to the understanding of the influence of the factor.

Beliefs of one's power appear important in terms of general cognitive functioning, but other control beliefs such as motivation and orientation might further enhance *language learning*, in particular. The study by Clement et al. (1994, 417-448) revealed an association between self-confidence motivational subprocess and achievement in English among Hungarian secondary school subjects. The most strongly endorsed reasons for learning by the respondents were xenophilic reasons (making friends with foreigners), sociocultural reasons (interest in cultural aspects of the English world), instrumental reasons (success in work), and media-use reasons, whereas an identification of orientation (identification and similarity with the American and the British) was rejected.

Self-confidence-related motivation might be a predictor of achievement in a common language, but intrinsic motivation might account for success in a less common language. Samimy and Lee (1997, 40-60) studied beliefs and motivational factors and found such positive evidence among 34 students, who participated in a university Chinese language class. The results indicated that high grades were related to a combination of integrative, instrumental, and intrinsic motivation, willingness to practice with native speakers, and confidence in language learning ability.

Correspondingly, Wen (1997, 235-251) found out in his study of university students learning Chinese in the United States that motivational factors correlated significantly with desired learning outcomes. Intrinsic interest in Chinese culture and the desire to understand one's own cultural heritage constituted the initial motivation to learn the language. In this study the importance of intrinsic interest as a motivational factor was again supported.

Intrinsic interest and perceived control are slightly different concepts. Perceived control points to perceived reasons for learning, either intrinsic or extrinsic. It is possible that intrinsic reasons become more influential when learning is voluntary, as in the case of Chinese, but extrinsic reasons may also contribute to learning outcomes in compulsory classroom situations.

Self-concept and achievement. Perceptions of competence seem to predict language learning, as was indicated in the study by Ehrman and Oxford (1995). First, achievement will be discussed in terms of general *cognitive performance*. Besides perceived control, classroom learning is also associated with perceived competence. Sink et al. (1993, 472-477), for example, revealed associations between an academic self-concept including perceived scholastic competence and achievement including reading in grades 6 and 7.

Pintrich and De Groot (1990, 33-38), in turn, examined classroom performance in relation to motivational factors such as self-efficacy, intrinsic value, and test anxiety, as well as cognitive engagement such as the use of cognitive strategies and self-regulation (metacognitive strategies). Academic performance was indicated by student performance in the classroom. The sample consisted of 12-year-old children from science and English classrooms. Self-regulation, self-efficacy, and test anxiety were the best predictors of performance. There was no direct relation between intrinsic value and performance, but the influence of this factor was indirect, because it was strongly associated with self-regulation and the use of cognitive strategies regardless of prior achievement level. (Pintrich & De Groot 1990, 33-38.) The study by Zimmerman and Martinez-Pons (1990) produced similar results (to be reported later in this chapter) about self-efficacy and achievement.

Pintrich and De Groot (1990) examined self-efficacy, while Sink et al. (1993) focused on perceived competence. If self-efficacy is seen as capacity beliefs for and management of effort rather than self-confidence, it is possible that the studies pointed to slightly different concepts. On the one hand, there is a difference between perceiving one's own competence generally as high and feeling that one's own competence is high provided that effort is made. On the other hand, high perceived competence may lead to effort, because it is considered influential. A student with low perceived competence may feel that it is not worth trying to make an effort, because still it would not lead to success. Both studies, however, pointed to the importance of perceived capacity for learning, and the learning outcome measures were in line.

The affective domain has so far been studied from the point of view of favourable learning. Focus can also be placed on overcoming an *affective*

barrier. Laine (1988, 13-48) studied the affective filter among 541 ninth graders (ESL) in the Finnish comprehensive school and pictured a combination of characteristics that end up reducing negative affective influence. The results suggested that self-concept was extensively related to personality. Motivation had a clear connection to positive achievement, which, in turn, contributed to self-concept and lowered inhibitions.

Assessing *self-reported proficiency* is one way of pointing to perceived competence. It is worth pointing out that self-reports of achievement are more concerned with learning tasks, whereas perceived competence is often a more general concept. The purpose of the study by Shameem (1998) was to validate self-reported first language proficiency in a study of teenage immigrants to New Zealand, who spoke Fiji Hindi as their first language. Self-ratings included scales for oral and aural proficiency, and a performance test was developed. The results of the performance test correlated strongly with the self-reports. The subjects, however, often reported their oral ability to be higher than what their performance level suggested.

This study resembles the present study in some respects: the self-report data of Shameem's (1998) study resembles the self-concept data of the present study. Shameem's self-report data consisted of *can do* statements, which were also applied in the present study in terms of self-concept. The relationship between the self-report data and performance in Shameem's study might suggest that there is a connection between foreign language self-concept and learning outcomes in the present study. It must be noted that the Fiji Hindi study dealt with first language learning, while the present study is concerned with a second language.

There are differences in the *methodology* of the studies. Correlation studies are common in explaining the relationships between affective factors and success, but certain group comparisons have also been applied. Leondari (1993, 357-369), for example, investigated the self-concept of 424 Greek third to sixth graders to find out whether there were differences between normal achievers, low achievers, and children with learning difficulties. The results showed that normally achieving children rated themselves more positively than children with learning disabilities on both academic and global self-concepts.

Low achieving children rated themselves better on academic self-concept than children with learning disabilities.

Strategy use and achievement. Several studies point out the importance of relevant strategy use for successful language learning achievement. A frequent use of strategies seems to relate to high achievement; the use of one strategy seems to promote the use of another. The role of cognitive, metacognitive, and social strategies, in particular, has been emphasized. The relationship between strategy use and achievement has been supported by the studies by Ehrman and Oxford (1995) and Pintrich and De Groot (1990), which were reviewed earlier.

Classroom learning requires a certain type of strategy use, which might be more conscious than strategy use in natural learning. O'Malley et al. (1985, 21-46) collected strategy data on the basis of interviews with high school ESL learners and teachers, as well as observation. The relationship between proficiency level and strategy use was examined. There was a tendency for intermediate students to use more metacognitive strategies. The beginning level students emphasized a more direct learning process, although the cognitive strategies were the most popular strategies among both groups. (O'Malley et al. 1985, 21-46.) This study suggested that beginners (like the present sample) might employ more cognitive strategies than other strategies.

Children may need specific types of strategies when learning a foreign language. Social strategies might be more emphasized when learning has a social purpose. Wong-Fillmore (1976) studied the development of communicative competence in English in five Mexican children (aged 5-7) who were attending an English-speaking school in California. Their interactions with American children were observed. In her study Wong-Fillmore focused on cognitive and social strategies. There was a difference among the children in the desire to be part of the social group and in the avoidance of contact. The importance of social strategies to success was supported by the findings. Some children were interested in establishing social relationships, and to accomplish that they had to learn English. Social preference and social confidence were related to language learning. (Wong-Fillmore 1976; Wong-Fillmore 1979, 220, 227.)

Methods also vary in strategy studies. Unlike correlation studies, group comparisons indicate the quality of strategy use at different levels of proficiency. After such analyses it is naturally useful to examine correlations to see more precisely whether frequent use contributes to success. Zimmerman and Martinez-Pons (1990, 51-58) conducted a study to investigate self-regulated learning. The subjects were from schools for gifted students and regular schools. A structured interview was used as the method to assess self-regulated learning strategies: self-evaluating, organizing, goal-setting, seeking information and assistance, monitoring, etc. Student efficacy was assessed by a scale with two interests: mathematical problem solving and verbal comprehension, the latter being more interesting in terms of the present study. The findings suggested that gifted students had higher scores in estimated verbal and mathematical efficacy than regular students, and they also displayed higher strategy use. Perceived efficacy measures were both associated with the use of self-regulated strategies.

A comparison of the reported studies in terms of their *data collection* gives rise to an interesting question of how strategy use should be assessed. Observation and interviews were often used as methods in the reported studies. This is an advantage if strategy use is unconscious. The choice of a measure (questionnaire) in the present study was based on the size of the sample, but it is possible that observation rather than questionnaires would result in a deeper knowledge of the phenomena involved.

Studies have also been conducted using questionnaires. Bremner (1997, 6-35) examined the relationship between language learning strategies and language proficiency among 149 students in Hong Kong. Several strategies were related to proficiency, including talking to native English speakers, practising English sounds, using English words in different ways, watching English television, writing in English, trying not to translate word for word, and asking questions in English. It must be noted that the items were from the same strategy inventory for language learning that was used in the present study.

Personality and achievement. Previous studies about cognitive achievement and personality factors seem to support the view that anxiety has a disturbing effect on achievement, whereas active social style tends to facilitate

learning. The connection between anxiety and cognitive achievement has already become evident on the basis of the studies by Ehrman and Oxford (1995) as well as Pintrich and De Groot (1990).

Different *aspects of social style* may have varying effects on language learning. Such findings were reported by Strong (1983, 241-258), who divided social style into talkativeness, responsiveness, gregariousness, assertiveness, extroversion, social competence, and popularity. These variables were measured and correlated with three second language criterion scores: structural knowledge, vocabulary, and pronunciation. The sample of subjects consisted of 13 kindergarteners. Talkativeness and responsiveness, which both refer to willingness to enter into conversations, generated significant correlations with all the language criterion scores. Assertiveness, extroversion, and popularity did not indicate any significant correlations. Gregariousness and social competence had one correlation each, the former with vocabulary and the latter with structural knowledge.

Extroversion is one aspect of social behaviour, and it has been more closely explored. Riding and Banner (1986, 366-370), for instance, examined relationships between personality, sex, and second language achievement. The subjects were British 13-14-year-old children studying French. The test consisted of comprehension, essay, and prose translation. The assessments revealed that extroversion contributed to achievement.

Robinson et al. (1994, 143-156), in turn, studied the connection between personality and the language learning of French among university students in Sydney. The results indicated that extrovert students did better on oral skills tests than on written tasks. Low extroversion had a positive correlation with writing skills.

The influence of extroversion seems a little contradictory, although the importance of social behaviour was supported in all the studies. Riding and Banner (1986) and Robinson et al. (1994) suggested that extroversion was related to achievement, but Strong (1983) found contradictory evidence and supported the importance of other aspects of social style. It is possible that extroversion was not as central among kindergarteners as it was among older students or that the measures were different emphasizing different things.

Robinson et al. suggested that extroversion might contribute to oral skills rather than writing skills. Riding and Banner, however, found a connection with written tasks. It must be noted that oral skills also contribute to written skills through vocabulary expansion, for example.

Active social behaviour has also been explored with regard to concepts other than extroversion. Chastain (1975), for example, found out that a high level of foreign language performance among college students was associated with *outgoing* personality. A questionnaire was used to measure the extent to which students were outgoing. The positive relationship between the personality test and grades was confirmed in terms of German and Spanish, but not French. The conclusion was drawn that affective characteristics have at least as much effect on learning as ability characteristics.

Adaptive behaviour represents another aspect of positive social behaviour. This behaviour is not active, but it represents flexibility. Short (1992, 229-237) found a link between this type of behaviour and achievement. Normally achieving fifth-graders displayed higher scores on cognitive skills, adaptive classroom behaviour, and lower scores on depression, and they accepted more responsibility for success (orientation) than their learning-disabled counterparts.

Anxiety represents negative and passive social behaviour. Because it is tied up with varying feelings, it has been studied in different situations and processes. The study by Ganschow et al. (1994), which was reported in terms of LCDH, also confirmed the relationship between anxiety and poor language skills. Furthermore, Van der Walt and Dreyer (1997, 212-225) conducted a study examining the relationship between personality and ESL proficiency measured with the TOEFL test. The 200 subjects were native Afrikaans-, Setswana-, and Sesotho-speaking university students of English. The results indicated that English use anxiety, foreign language classroom anxiety, risk-taking, instrumental orientation, and conscientiousness were related to English proficiency.

MacIntyre and Gardner (1994, 283-301) suggested in their study that language anxiety might be associated with language achievement, such as course grades. The participants (97) were university students learning French in

Canada. Proficiency in French was indicated by scores in different tasks and course grades. An anxiety scale was developed representing three stages: input anxiety, processing anxiety, and output anxiety. Besides these, general French class anxiety, French use anxiety (outside the classroom), and foreign language classroom anxiety were examined. The general findings suggested that students who were anxious in one context or at one stage were likely to be anxious in other contexts and at other stages. This suggests that somewhat generally felt anxiety at school might also be associated with foreign language learning in different situations. Significant negative correlations were found between proficiency and anxiety scores at each stage and in each context.

Anxiety is disturbing, but its *source* might remain unknown particularly among students with low intrapersonal skills. Aida (1994) studied 96 college students learning Japanese, and investigated these affective reactions. The results suggested that factors that had impact on students' anxiety were fear of failing, fear of negative evaluation, speech anxiety, degree of comfort when speaking with native speakers of Japanese, and negative attitudes towards the class. Language anxiety was found to be negatively connected to performance in Japanese.

Studies of anxiety evidently suggest that situational anxiety, in particular, has influence on learning. Besides situation, other predictors also exist. MacIntyre and Gardner (1991, 95) point out that foreign language anxiety may not be as relevant to language learning among children as it is among adults. More research has been done with adults. This argument suggests that a relationship between anxiety and achievement might not be found in the present study.

Studies of the interrelationships between affective/cognitive variables

There are many interrelationships between psychological factors. It is obvious that some factors work together to produce desired outcomes, and it is also possible that some factors do not contribute to proficiency directly, but they indirectly influence other factors, which, in turn, directly contribute to achievement. Brief summaries of some studies concerning the following

interrelationships will be reported. Most studies with reference to these interrelationships have already been introduced above. The presentation again includes only the principal findings that are relevant in terms of the present study: (1) orientation and self-concept, (2) orientation and anxiety, (3) orientation and strategies, and (4) self-concept and strategies. These interrelationships contain the most important combinations available in the present study design.

Orientation and self-concept. As was stated above, there is overlap among the concepts of perceived competence and orientational control. This alone suggests a close relationship. The study by Skinner et al. (1990) points out this relationship, whereas Noels et al. (1999) emphasize the significance of intrinsic orientation to perceived competence.

Skinner et al. (1990, 22-29) studied three sets of beliefs among children. These beliefs were: control beliefs, i.e. perceptions of one's own influence on success and failure *at school*, expectations about effective strategies in terms of desired outcomes, and perceptions of one's own capacities to use these strategies. The subjects of the study were elementary school children. There was a connection between engagement and self-efficacy (here capacity beliefs for effort), perceived competence (here capacity beliefs for ability), attributional style (here capacity and strategy beliefs for ability), and external locus of control (here strategy beliefs for powerful others, luck, and unknown causes). Furthermore, these factors were related to motivated behaviour. There was also interaction between capacity and strategy beliefs. (Skinner et al. 1990, 22-29.) The study pointed out the relationship between self-concept, perceived control, and motivation. In the present study perceived control is dealt with as motivational.

Noels et al. (1999, 23-34), in turn, found orientation and self-evaluated competence related to foreign language learning. The study also serves as an example of interrelationship between orientation and anxiety.

Orientation and anxiety. The subjects of the study by Noels et al. (1999, 23-34) consisted of 78 students participating in a summer French immersion course. The analyses revealed that intrinsic motivation predicted positive

learning outcomes including greater self-evaluated competence and reduced anxiety.

Orientation and strategy use. Orientation has also been found related to strategy use. It is usually the high degree of motivation and intrinsic value that have been found to contribute to strategy use. There is a link between certain determination and strategy use: students who have a strong desire to learn a second language make use of many learning devices, take an active part in the learning process, and have the desire to master difficulties (Prokop et al. 1982, 65-66).

There are also studies that indicate different types of strategy use patterns associated with *opposite types* of orientation. Ely (1989, 442) studied college students' strategy use in relation to motivation and attitude. He found out that students who were very concerned for grades (reflecting extrinsic orientation) seemed to consider the correctness of production, engaging actively in learning, and communicative attempts very important. High motivation seemed to contribute to internalizing language deeply and interest in encountering, mastering, and using new language items. It also promoted the willingness to create associations and openness to teacher correctness.

Strategy use is, however, usually studied directly in association with intrinsic orientation. Finkbeiner (1997), for example, found a relationship between students' interest and learning strategies among 9th- and 10th-grade German students of English. The amount and quality of reading strategies were positively connected with individual and situational interests.

Strategy use might also be a product of different affective *factors working together*. Oxford and Nyikos (1989, 292-296) studied the strategy use of about 1,200 university students studying foreign languages in the United States and found certain patterns of behaviour. The assessed strategies were formal rule-related practice strategies, functional practice strategies, resourceful strategies, independent strategies, general study strategies, and conversational input elicitation strategies. It was found that the degree of expressed motivation had a relationship with a frequent use of language learning strategies. A high self-perception of proficiency had significant effects on the frequency of strategy use. It was concluded that the frequent use of strategies is likely to lead

to high perceived proficiency, which in turn causes self-esteem, which creates strong motivation and influences the use of strategies again. (Oxford & Nyikos 1989, 294-296.) Considering the present study, the most important finding was that the overall use of strategies had a significant interaction with the degree of motivation. Similar findings were reported by Pintrich and De Groot (1990).

The studies discussed above suggest that motivation has a connection with strategy use at different *ages*. Ely (1989) as well as Oxford and Nyikos (1989) found the relationship among college students, whereas Finkbeiner (1997) examined younger students. Furthermore, it seems likely that orientation in its different forms contributes to the use of the different types of the strategies examined in the present study. One might expect intrinsic motivation to be associated with social strategies, in particular, because voluntary social contact requires a certain degree of motivation. Cognitive strategies involving practising and analysing might also be associated with extrinsic motivation, which also functions in classroom situations.

Self-concept and strategy use. Strategy use has also been found to be connected to self-concept. The studies by Oxford and Nyikos (1989), Zimmerman and Martinez-Pons (1990), as well as Pintrich and De Groot (1990) have generated evidence for the relationship concerning self-concept-related concepts and strategies. There is yet another study supporting the existence of the linkage.

Unexpectedly, Nelson Le Gall et al. (1989, 457-459) found a connection between a strategy and low self-concept. They investigated the relationship between children's self-perceptions of competence, help-seeking behaviour, and task-specific competence (a word task) among third and fifth graders. The results indicated that low objective and perceived competence was related to a more extensive degree of help-seeking (representing a social strategy). It was pointed out that because help-seeking is an adaptive achievement skill, it should be encouraged as a strategy, which can help children to cope with task difficulty.

2.2.6 Gender differences

Gender differences represent one perspective in the present study. On the basis of earlier findings, it is expected that there are different behavioural patterns between boys and girls, and these differences might generate differences in proficiency.

Differences in *proficiency* have been found in several studies. Huttunen and Kukkonen (1995, 57-59) reported that among Finnish sixth graders girls displayed higher scores than boys in a national test of English, and their grades were also better than those of boys. Earlier Takala and Saari (1979) reported similar results concerning 14-year-old students. Also, Riding and Banner (1986) found significant evidence for the superiority of females to males in learning French. This serves as evidence for the hypothesis that females are more successful language learners than males.

It is, however, interesting that in Finland males have had better scores than females in the matriculation examination (upper secondary school) of English (the first foreign language) since 1996 (Takala 2000). It must be noted that the data of the present study were collected 1995. The question remains whether affective characteristics have also gradually changed due to changes in education and expectations.

Proficiency differences should be explored in association with their causes. Clark and Trafford (1995, 315-325) have reported that there is a considerable gap between British boys and girls in the performance in modern languages at both the General Certificate of Secondary Education and Advanced Level: girls outperform boys. In the article attitudes were considered potential reasons for the differences. Teachers reported that because girls mature earlier, they take their work more seriously. Boys need a more active approach towards class work to avoid boredom. Interviews with pupils revealed that pupils with higher ability had higher career aspirations. The enjoyment of the subject was linked to success. In general, girls held more positive attitudes towards languages than boys.

Clark and Trafford (1996, 40-49) have a little later returned to the issue of gender and studied factors affecting boys' and girls' performance in second-

language classes. The results supported the idea that boys attached less importance to learning a foreign language, whereas girls were more conscientious about their school work. Also expectations for boys and girls were different.

Attitudes are not examined in the present study, but other psychological learner factors are also likely to account for gender differences in proficiency. *Orientation*, for example, can also be viewed with reference to gender differences. Frieze et al. (1983, 23) make the general point that boys are often agentic in their success values and consider money and power as signs of successful life, whereas girls are often communal and view helping others as important for success in life. Nevertheless, intrinsic motivation and perceived competence were not found to be subject to gender differences in the study by Vallerand et al. (1994, 172) of perceived competence and motivation among gifted and regular students of a French-Canadian elementary school.

Leondari (1993) suggests that boys tend to have a higher *perceived competence* than girls. The study by Leondari, however, did not generate differences in self-concept between males and females, which was interpreted by the influence of an early age. The finding paralleled that by Vallerand et al. (1994). The study by Zimmerman and Martinez-Pons (1990) produced contradictory evidence. Significant evidence was found that boys rated their verbal efficacy higher than girls. The differences in the findings might be due to the fact that the sample consisted of slightly older students, who are more likely to show gender differences. The findings might suggest that gender does not play an important role in the self-concept scores among sixth graders.

Gender can be examined from the point of view of *strategy use*, which seems to be a powerful predictor of success. There is significant evidence that gender differences in proficiency might emerge due to strategy use. Oxford and Nyikos (1989) found significant differences between males and females. Strategies reflecting social interaction were used more frequently by females than males. Zimmerman and Martinez-Pons (1990) reported a more frequent use of metacognitive strategies indicating self-regulated learning (record keeping and monitoring, environmental structuring, as well as goal setting and planning) by females. It seems that gender predicts variation in strategy use.

To sum up, the studies suggest that there might be gender differences in proficiency generated by individual differences in cognitive/affective factors. There is no strong evidence for gender differences in orientation. Gender differences might not be important in terms of self-concept either, because the subjects of the present study may be too young to show these differences. Strategy use, instead, is likely to have differences between males and females. Personality factors are not covered here with respect to gender, because the data on personality were collected of females only.

2.3 Twin Studies in language learning research

The major contribution of twin studies to the examination of individual differences lies in their potential for different types of unique study designs. They provide a new methodology and information about the area of variation from the point of view of multiple birth.

There are four reasons why it makes sense to involve twins in language and behaviour studies. The four types of twins studies include (1) those that involve studying the behaviour of twins themselves often with reference to twin-singleton between-groups differences, (2) those dealing with hereditary and environmental influences on the factors that are studied, with twins as a methodological choice and analyses involving twin-singleton within-pair differences, (3) those with the aim of controlling hereditary and environmental influences on the factors that are studied, and (4) those using twins as subjects because they are characterized by the qualities that are studied more frequently than singletons. The first two classes clearly constitute the main approaches of twin studies.

In language learning research, class (1) may include studies of twins' cognitive development, for example. Class (2) often involves studies focusing on disorders, such as heredity of language impairment. These two classes are examined in detail in the following two sections, which deal with studies of the cognitive and social development of twins and studies of hereditary influences in language learning. Consequently, the present study represents the first two

classes of twin studies. The former is addressed in section 2.4 and the latter in 2.5 in the theoretical background. The other classes, instead, are not represented in the present study design, and they are briefly discussed here.

Class (3) consists of studies where twins are used as a sample, because it is a way in which environmental and hereditary influences on the factors that are studied can be eliminated. Heredity and environment are not actually examined but controlled. Ando (1992), for example, has used a cotwin control method: members within a set of twins participated in classes with different teaching approaches. The outcomes of the approaches were examined. Ahonen et al. (1997), in turn, have used twins as a sample to control genetic and social background factors of developmental language disorder and study other influential factors. These studies are also referred to in other contexts later.

The study by Ahonen et al. (1997) is further discussed here as an example of studies in class (3). It dealt with language disorder among twins, but the aim of the study was to examine moderator variables and indicate how the disorder can be overcome. This particular study is also a representative of class (4), because it dealt with language disorder, in general. It aimed to clarify how the disorder can be compensated for by social interaction, which works similarly for twins and singletons.

Studies representing class (4) are conducted among twins because they often possess certain qualities more often than singletons. Language disorders are sometimes studied in a sample of twins simply because twins often show such disorders. These studies are not motivated by twins' unique behaviour, heredity, or the control method. The purpose is often to provide more general information about the characteristics rather than associate them to the twin situation. These studies are often case studies. The characteristics could be studied in singletons as well. Furthermore, it is easy to watch two children simultaneously and compare behaviour patterns between individuals.

Section 2.4 includes reports of twin studies of class (1) focusing on twin behaviour. Some of the reported case studies could also be representatives of class (4), because they could also have been conducted among singletons. They generally deal with different aspects of language delay, although they simultaneously reveal information on the linguistic behaviour typical of twins.

Such studies are those by Shopen and Shopen (1995), Clements and Fee (1994), and Levy (1997), which will be discussed later. The focus is not always clearly on twin behaviour.

Studies in class (4), where twins are used as a sample and representatives of the general population, must be further discussed in terms of some risks involved. According to Plomin et al. (1997, 74-75), it must be noted that twins are different from singletons in some ways: they are generally born three or four weeks premature and are about 30% lighter at birth than the average singleton. Their language development is often slower than that of singletons. It is useful to include nontwin siblings in the study to test whether twins are different from singletons and whether fraternal twins are more similar than nontwin siblings. (Plomin et al. 1997, 74-75.) Even in studies of language disorder it is possible that twins showing this type of deficits behave and develop differently from singletons with the same deficits because of their biological disadvantages and the twin situation, which will be discussed in section 2.4.1.

After the framework for the study of individual differences in language learning and the framework for twin studies have been introduced, the two approaches can be combined. In the following sections, studies and arguments are presented concerning the language learning and behaviour of twins.

2.4 Language learning of twins

The twin situation starts from the very beginning of life. *Identical or monozygotic twins* are created after the splitting of one single fertilized egg and share striking similarities or resemblances in appearance and behaviour, whereas *fraternal or dizygotic twins* have their origins in two separate fertilizations of two different eggs, and they remind of each other to a lesser degree, like siblings in the same family. (Loehlin and Nichols 1976, 1.) Nontwins are referred to as singletons.

The language learning of twins is characterized by the situation where there is a close relationship between two potential speakers. This is likely to

influence interactional patterns. Both positive and negative influences are possible. Whether it is important to second language learning remains to be seen. Investigating twins' linguistic behaviour is closely linked with individual differences in foreign language learning, in general. Certain factors causing variation might be more likely to be found in twins than in singletons. The affective learner factors constitute the focus of interest.

To my knowledge there is no research concerning the features of the second language learning of twins. Ando (1992, 335-352) conducted a study which aimed to compare different English language teaching approaches and to estimate the influence of hereditary factors on learning achievement. It was a study using twins as a method and also pointing to genetic influences in foreign language learning, but the behaviour of twins was not the focus.

The language learning of twins is here dealt with in two sections. The first section deals with the issue from the perspective of the influence of *first language learning deficits* on second language learning achievement. The second section deals with the implications of twinship for second language learning in terms of *social behaviour*. Both possible sources of twin-singleton differences have been found influential in second language learning, in general, as has been indicated in the previous sections. These are the units that are supposed to answer the important research question of the present study: whether being a twin is an advantage or a disadvantage in terms of second language learning. It is also possible that it has no clear influence.

2.4.1 Cognitive disadvantages in first language learning

Studies of variation in first language acquisition among singletons were introduced earlier to indicate factors that affect language development in general. The discussion is continued here, and this section explains the significant effects of twinning. The same factors that show variation in general, also apply to twins, but twinning also adds unique features to the situation. The influence of child-directed speech on language acquisition was earlier emphasized. The role of adult input is also highlighted with reference to twins'

language acquisition patterns, but twins' language development is also influenced by other factors that are not so relevant for singletons. Twins' language development has to be discussed as a part of psychological and general cognitive development. The purpose is here to examine in detail the features that are typical of twins' cognitive development and communication.

Being a twin can be predicted to be an early cognitive disadvantage, also involving language. In section 2.1.3 it was concluded that in first language learning both disadvantages might be related. The relevance of possible differences in the areas that are affected (possibly due to different causes) and modularity were also discussed, and it was concluded that regardless of modularity twins are likely to show both types of deficits, and they are likely to continue to some point in life. Accordingly, it is appropriate to focus here on linguistic problems, which are the core of the present study. Besides, language is the area where twins are the most likely to be impaired.

The *linguistic differences* in first language acquisition between twins and singletons have been accounted for by several factors. Some researchers consider biological factors such as neonatal state, gender, and zygosity important predictors of development, while other researchers emphasize the twin situation, the fact that twins talk to each other and their exposure to adult language is more limited than that of single-borns. The nature of twin language is also a controversial issue. Some researchers think that twins have an autonomous language typical of a multiple-birth set, while other researchers suggest that twin language is merely delayed language. (See Rutter & Redshaw 1991; Lytton et al. 1987.) Besides biology and the twin situation, other explanations for differences also exist.

Reasons for the deficits can be traced from different directions. They will be more closely analyzed and classified below. Rutter and Redshaw (1991) have searched for reasons for twin-singleton differences in psychological development. The reasons are divided into those connected to growth and rearing, including factors such as

- (1) biological differences;
- (2) differences in rearing patterns;
- (3) twin-twin interaction;

and those connected to psychopathology including factors such as

- (4) socio-emotional and behavioural characteristics; and
- (5) language and language-related functions.

Cognitive and linguistic twin-nontwin differences have their origin in psychological development. Linguistic behaviour, also in terms of affective factors, is connected to psychological development as well. Thus, the reasons given by Rutter and Redshaw (1991) are relevant for the present study.

The *biological* reasons consist of different problems caused by multiple-birth. Low birth weight, early delivery, high rate of congenital anomalies and abnormalities each constitute a risk for the development of the children. Most babies develop normally, but these factors can be a risk to psychological development. (Rutter & Redshaw 1991, 885-886.) The findings of McMahon and Dodd (1997), for example, did not support a link between communication skills and triplets' shorter gestation period or lighter birth weight.

There are clear differences between the *rearing* patterns of twins and singletons. It is possible that parents of twins use more help in caregiving than parents of singletons. Consequently, twins might spend more time with adults other than their parents in their infant years, as compared with single-borns. A considerable problem of the twin situation for parents is the division of attention between the twins. This has a clear influence on communication. Speech is often not directed to one child as an individual. Furthermore, contrasts between the children are often emphasized, which may lead to parental preference. The tendency to treat both children (too) identically is also possible. (Rutter & Redshaw 1991, 886-887.) Twins are in a different position compared with other siblings, because they share parental attention in crucial infant years. Also later in life they often run into problems of divided attention, because both twins need attention and experience things simultaneously. Other siblings are not treated as a unit.

Interaction between the twins constitutes a unique situation with regard to psychological development. Twins are forced to interact with someone of the same developmental level rather than with older children or adults. Rivalry and jealousy deriving from competition for the attention of parents may also constitute a threat to psychological development. Competition, the constant

presence of someone else, and dominance are also possible factors influencing psychological development. Being a twin may also contribute to psychological development positively. Because of a similar way of thinking, monozygotic twins have been found to be capable of efficient co-operation. (Rutter & Redshaw 1991, 888-889.)

Socio-emotional and behavioural characteristics are an interesting point with regard to the present study. Rutter and Redshaw (1991, 891-892) suggest that young twins are often socially immature as compared with singletons. Nevertheless, the problems do not extend to middle childhood or adolescence. The conclusion has been drawn that socio-emotional behavioural disturbance is no more frequent in twins than it is in singletons.

Language-related functions as reasons for cognitive and linguistic deficits are partly related to the twin-twin situation, but they emphasize its linguistic rather than psychological aspects. According to Savic (1980, 17), communication in the twin situation is characterized by the presence of three potential partners. There are two levels of communication: between the parent and the child, and between the children. The speech by the parent is either shared by both children or received by only one child. The children's reactions to speech may also be unique. The other child does not always have to join in, because there is the other potential speaker. There are also two potential recipients to the child's message: the fellow twin and the parent.

Lytton (1980, 86-92) argues that parents of twins speak less to their children, and their communication in form of commands, reasoning, affectionate behaviour, responding to the children's distress, etc. is lesser than that of singleton parents. Singleton children usually speak more. Within a twin set, the dominant twin talks more. This suggests that the amount of speech is related to the perception of leadership and competence in dealing with the environment.

Zygosity also plays a role. The intellectual characteristics of monozygotic twins are often inferior to those of dizygotic twins (Lytton 1980, 86-92). Multiple birth is also considered a risk for the central nervous system, and the risk for cerebral injury is higher with monozygotic twins than with a singleton fetus (De Vries et al. 1988). McMahon and Dodd (1997) also found that

monozygotic triplets had poorer communication skills than dizygotic triplets, which may be a result of parents treating identical children as a unit rather than individuals in communicative interaction.

Linguistic differences between twins and singletons start from the very beginning of life. *Babbling* is the first object of research with reference to twins' linguistic skills. Zlatic et al. (1997) found out that twins were good babbling models for each other, although they are poor speech models. They studied a bilingual family: the father spoke English and the mother Serbian. It was hypothesized that the advantage of twins' babbling could be indicated by an increase in the frequencies with which they produce sounds that they have in common. It was found out that alveolar consonants and lower left quadrant vowels were produced with a high frequency, which was assumed to result from the twin situation. The vocalizations of the twins were produced in an interactive manner. It was concluded that because a twin gets twice as much babbled input as a solitary infant and this input is congruent with the twin's own output propensities, the simulation of it increases the relative frequency of common sounds.

It was revealed that twins' disadvantages might not yet be apparent at the babbling age. The results of one single case study in one family cannot provide conclusive evidence in the area. It is possible that the problems start a little later.

Four types of studies are reported concerning twins' linguistic skills after the babbling age. Firstly, twins' language has been studied as part of general intellectual skills. Secondly, linguistic skills have been studied with a direct reference to twin language, which is often referred to as private language between two individuals. A child demonstrating twin language resulting from the twin situation does not have to show other intellectual deficits. This language is not considered a stylistic variation of normal language either, since twin language is often characterized by deviant features. Another interpretation of twin language actually points to a deviant or retarded language. Thirdly, some case studies have been conducted with focus on language delay and specific aspects related to it. These studies also serve as evidence of twin language according to the interpretation that it is delayed or impaired language.

The fourth type of studies is also concerned with the language delay, but the focus is on examining whether the delay is overcome at some point of life.

The study by Fischbein (1979, 4) is one of the early studies of twins' *intellectual* characteristics. Fischbein reported on the basis of the findings of a longitudinal study of Swedish twins that at grade 5 twins got lower scores on verbal and inductive tests than their controls, and boys also scored lower on clerical tests. On standardized achievement tests in grades 3 and 6 girls were poorer than their controls, but no difference between twin and singleton boys was evident.

Three studies are reported of *twin language*. Bishop and Bishop (1998) reported that early twin language was an indication of later language impairment. Dodd and McEvoy (1994), instead, found evidence against twin language. McMahon and Dodd (1997) studied higher multiple birth sets and found specific patterns of language. It is even more difficult for parents to interact with three children than with two, which may affect development.

Twin language can be examined with reference to *phonology*, which is often considered abnormal among twins. On this basis, Dodd and McEvoy (1994, 278-287) studied interactions of 17 twin sets and 2 triplet sets aged between 2 and 4 years from Australian-English background. The assumption that multiple-birth sets share an idiolect was not supported by the study, but it was found out that siblings within a set were more likely to understand each other's mispronunciations than non-sibling children from the control group. The articulation of most multiple-birth children was quite normal for the age, although many children were using phonological processes characteristic of younger children. The hypothesis that the phonological systems within a multiple-birth set are similar was not supported. The second hypothesis that the pattern of phonological errors differs according to companion was confirmed, but the results were unexpected: fewer unusual phonological processes were used when multiple-birth children were interacting with their siblings than in their interactions with adults. This represents evidence against the twin language hypothesis.

It is important to cast some light on the association of early twin language with *later language problems*. Bishop and Bishop (1998, 150-160) found such

a connection. Two groups of twins from the United Kingdom were included in the study: the first sample consisted of 82 twin pairs, in which at least one twin had a speech-language impairment, and the second control sample consisted of 94 twin pairs, between ages 7 and 13 years. The measures included parental reports of earlier twin language and an individual psychological assessment of each twin concerning speech-language status. Six twin language types were discovered: jargon (fluent utterances unintelligible to anyone), comprehensible (language understood by at least one family member), private (switching between normal and own language), selective mutism (one or both twins speak only to each other), unspecified, and no twin language. According to the results a parental report of twin language was higher for children with speech language impairment than for those with normal language. Children with twin language got lower language scores, although their nonverbal IQ was equivalent. Jargon, in particular, unlike private language, was associated with language problems. It was concluded that twin language interferes with the learning of a native language. Twin language was considered an early indication of language impairment rather than a cause of language delay. The findings also suggested that twin language was characterized by the use of *immature* or deviant speech patterns by two children at the same developmental level rather than private language.

Twin language appears to be *deviant* rather than invented language. McMahon and Dodd (1997, 328-345) arrived at a similar conclusion. They also examined the linguistic characteristics of higher multiple birth sets. The differences between twins and triplets are not important in the present study, but it is useful to discuss them to indicate the importance of child-directed speech, which is even more reduced among triplets than among twins. It became obvious that the deviations of twin language may vary according to the number of children. McMahon and Dodd investigated the communication skills of 17 triplet sets aged from 2 years and 4 months to 4 years and 5 months as well as 20 sets of twins and 19 singletons. The findings suggested that triplets' early communication skills were different from those of singletons and twins: triplets had delayed syntactic development, reduced expressive language development, reduced use of language, and delayed phonological development.

A possible strength was the area of vocabulary. Twins, in contrast, had disordered phonological development.

Several case studies have been conducted among twins. They provide detailed information about the area of language deficits. *Delayed* language development is an area where twins are often examined, because twins often show such deficits. These studies indicate ways to compensate for or overcome language delay, which is often regarded an indication of twin language. Shopen and Shopen (1995, 28-32) conducted a case study of twins' communication involving 2 twin boys at the age of 5. The boys had delayed language development, but they were said to be articulate and successful students in kindergarten. It was argued that the delay was due to their interaction with each other, but the fact that boys became acquainted with the discourse activities in the family provided compensation, and these skills were valued at school.

Members in a set may show different language status. Accordingly, Clements and Fee (1994, 213-231) conducted a case study of a set of twins, one of whom had specific language impairment. The phonological systems of the fraternal opposite-sex twins were assessed at the age of 6 years and 1 month and again at 7 years and 6 months. The language impaired twin had a language delay of about 4 years in terms of segmental acquisition, whereas the delay was 5 or more years in the acquisition of syllable structures, unlike in the case of the normally developing twin. The affected twin omitted consonants most frequently in syllable-final position and consistently reduced consonant structures.

Levy (1997, 206-230), instead, has reported a four-month longitudinal study of the acquisition of selected aspects of Hebrew syntax and morphology in a pair of dizygotic fraternal twin boys, one of whom had congenital brain abnormality. The boys were 3 and a half years old at study onset. Both boys were delayed in the onset and progression of language development according to mean length of utterance measures, but the twins followed a normal developmental course. The study supported claims for brain plasticity for language and the fact that brain-injured children might unexpectedly acquire formal linguistic systems with the relative ease.

On the basis of case studies, general conclusions cannot be drawn concerning the whole population of children with language delay. An advantage of case studies on language delay is that they provide possibilities of longitudinal studies, which reveal new aspects in the area. It is possible to examine the qualitative properties of the deficits, which in studies of populations often receive less attention.

It has been indicated that twins' linguistic behaviour is different from that of singletons. Evidence has been reported of twin language as well as of disadvantages in general verbal skills and different communication styles. It seems that twin language is different from what is generally assumed. Dodd and McEvoy (1994) found no phonological basis for twin language and McMahan and Dodd (1997) found no secret language among multiple-birth sets. Bishop and Bishop (1998) concluded that twins' language is immature language rather than private invented language. Twin language appears to be deviant or delayed language rather than autonomous language, although the latter alternative is also possible.

An important question arises whether the *deficit is overcome* at some age. The present study is based on the question whether the lag is overcome by the age of 12. The study by Lytton et al. (1987) provided evidence that twinship was not influential in verbal ability at the age of 9 any more. McMahan et al. (1998), instead, argue that deficits in early phonological skills among multiple-birth children contribute to poor performance in later literacy.

In their follow-up investigation of 9-year-old twins, previously studied at age 2, Lytton et al. (1987, 359-366) studied whether twins had overcome their initial verbal lag during the intervening years. The sample consisted of 43 twin pairs and a comparison group. The research group was interested in ability and achievement assessed at school and social characteristics, which were rated by teachers. Twins had fully overcome the handicaps in their physical development. Twins showed lower verbal ability, but it was explained by mother's education and birth weight, not by twinship. There were no differences between twins and singletons in social characteristics including compliance, independence, teacher dependence, and peer relations.

The major finding of this study is that mother's education and birth weight appear to be stronger predictors of achievement than twinship. (The influence of family background was indicated in section 2.1.1.) At age 2 the twin situation was a strong factor in terms of verbal development, but by age 9 it did not account for the differences between twins and singletons.

There is, however, a study that indicates linguistic problems among twins also at the onset of puberty. The relationship between multiple birth children's early linguistic skills and their later literacy has been studied by McMahan et al. (1998, 11-23). They examined 20 multiple-birth children at the age of 7-8 and 20 control subjects. They found out that the phonological processing of multiple birth-children was significantly poorer than that of controls. Deficits in early phonological skills were correlated with poor performance on later literacy measures: visual rhyme recognition, word repetition, and phoneme detection, which were assessed five years later. (McMahan et al. 1998, 11-23.) It must be noted that twins were still young when they were reassessed. The same applies to the study of Bishop and Bishop (1998), who argued that twin language is related to later language problems.

The study by Lytton et al. (1987) involved a higher number of subjects than the study by McMahan et al. (1998) and may be slightly more reliable in this respect. Furthermore, Lytton and associates focused on predictors of language ability, whereas there is no knowledge what caused twins' later language problems in the study of McMahan and associates. Obviously there are two approaches to the issue of the duration of twins' deficit: one that assumes that the lag is overcome before puberty and the other that expects problems to continue later in life. It is assumed that the influence of biological factors may last longer than that of environmental factors. The latter are more probable among twins.

There is one problem in many studies of twins' communication. Child-directed speech is expected to influence language development, but maternal language was not assessed in most of the studies that were reviewed above. Adult input was assessed in many studies reported of singletons' language variation. It is not always evident whether parents really use language differently when speaking to twins. If assessment of adult input were not

overlooked with reference to twin language, it would be possible to draw conclusions on the source of the deficits. It must be noted that the purpose of all twin studies is not to indicate the role of child-directed speech, but it would be useful to study the origins of impairment, because it would contribute to elimination of difficulties. The study by Lytton et al. (1987), instead, suggested that mother's education as a social background factor influenced language development. The view that mother's education is an important predictor has been acknowledged, in general. It seems that the perspectives of language variation studies among singletons and the perspectives of twin studies should be combined, because language development can be explained by means of several factors.

To sum up, twins' linguistic problems are referred to using different terms. Twin language is a characterization of an early language. It may be deviant, delayed, or secret. However, after early childhood the concept twin language is not normally used any more, because it has an association with an invented language (which must have disappeared by then), although this language more often seems to be impaired than secret. At school age the problems of multiple birth children, if they exist, are often referred to as language impairment, which may also be found in singletons. Phonological problems are frequent among twins at different ages, but difficulties have been found in several areas of language including structure and language use. There is also stylistic variation between twins and singletons, which will be discussed in terms of social style in the next section, but it does not represent a disadvantage: it may even be an advantage for multiple birth children.

The question arises which constructs twins' deficit represent in relation to learner factors that are considered influential in second language learning. Evidence has been found pointing to the construct of *general intelligence*, which is likely to be just another area of impairment besides language development, not necessarily related to first language learning, but it may affect second language learning.

If anywhere, delayed language development points to low language *aptitude*, since the rate of first language acquisition may also be related to aptitude, which may be subject to early language experiences to some extent;

the rate of first language acquisition and foreign language aptitude have been found related (see Skehan 1998, 194, 205). An underlying explanation could be that maturation is disturbed.

Deviant language also points to aptitude. This construct will be discussed in terms of heredity, which may be its major origin. It is possible that low aptitude due to genetic influence cannot be controlled, but if aptitude is weak due to environmental causes, the deficits are overcome, and they mainly affect the rate of development including the rate of overcoming deviant forms. Development rather than outcome may be affected. In the case of twins it can rarely be said that they end up having lower aptitude; twins usually catch up singletons later.

Delay and early deviation thus do not necessarily affect or reflect any constructs. Evidence has been found concerning aptitude-related language learning problems in later language learning among nontwins, too (see Sparks & Ganschow 1991; 1993a; 1993b; 1995), and these disorders are often genetic. Twins' linguistic problems are environmental: they cannot be genetic in general. However, twin language in severe cases may lead to language impairment extending even to puberty.

If twins' language is secret, it is not likely to point to any of the constructs that have been introduced provided that the language is logical, although in severe cases this feature may slow down language development in general and even affect aptitude. The influences might be related to those of disturbing early semi-bilingualism.

The affective learner factors, instead, that are influenced by the environmental advantages of twinship are more easily defined. Sociability seems an obvious candidate.

2.4.2 Sociability in second language learning

There are arguments to support the advantageous nature of twinship for second language learning. These arguments are based on the socially oriented nature of twinship, which offers rich opportunities for interaction and communication.

The possibilities of sociability become apparent particularly later in life in second language learning, while in first language learning social behaviour might not be as relevant, because interaction is burdened by the fact that communication partners are at the same (low) developmental level and that twins are sometimes immature.

Sociability could become obvious in the present study through the use of social strategies and the personality type representing active prosociality. *Social behaviour* also involves other features, which are likely to be associated with the psychological aspects of language behaviour.

Social opportunities are not equivalent among siblings at different ages and twins at the same age. Co-operation, empathy, closeness, and sensitivity are more likely to arise among twins, because they go through all stages of their early lives and grow up together. They share practically everything: they constantly do the same things and go to the same places. They have a shared environment also outside the home. Furthermore, identical twins are also genetically similar, which emphasizes common experiences.

The sociability of twins is discussed below by highlighting its controversial aspects. A classification of twins by Schave and Ciricello (1983) will be introduced to make the point that social aspects are emphasized in twinship and different types of twins might even show different patterns of social behaviour. The twins are classified according to their *identity* into six types:

- (1) interdependent identity twins;
- (2) split identity twins;
- (3) idealized identity twins;
- (4) unit identity twins;
- (5) competitive identity twins; and
- (6) sibling attachment twins.

The importance of identity for social behaviour and language learning will be demonstrated.

Twins with interdependent identity live in a symbiotic identity, which is considered very positive in nature. These twins enjoy keeping in touch with

each other, talk with each other very much, and give advice to each other even after separation. (Schave & Ciricello 1983, 78.)

Split identity twins are often labelled as "the good" and "the bad twin". "The bad twin" often suffers from anxiety caused by the feeling of inferiority. "The good twin" is sometimes overinvolved with himself/herself. "The bad twin" may have a very poor self-concept. These are things that may influence an individual's future relationships. (Schave & Ciricello 1983, 51-79.)

Idealized twins often feel that the separation is a relief, and they do not represent twins who are especially understanding of other people's feelings. They value their twinship as very special and tend to dominate their future relationships. (Schave & Ciricello, 1983, 54-81.)

Unit identity twins find it hard to separate from each other. Later in their lives it may be difficult for them to find satisfactory relationships with other people, because of the particularly close relationship with the co-twin. Expectations are too high, and these twins find it hard to understand the ego boundaries of people. (Schave & Ciricello 1983, 77-78.)

Competitive twins may find it hard to find other adequate relationships, but because of their positive experiences of closeness they seek out other relationships. They are very empathetic to each other and other people, although they compete with each other. They are usually very successful in their lives. (Schave & Ciricello 1983, 82-83.)

Sibling attachment twins are different genders. They experience their co-twins as siblings. They are compassionate, but not dependent or competitive. (Schave & Ciricello 1983, 58-84.)

The classification by Schave and Ciricello (1983) suggests that there are also individual differences among twins. The sociability of twins is a controversial issue, just like early cognitive development. The study by Lytton et al. (1987), for example, suggested that there are no significant twin-nontwin differences in social characteristics.

Several points have also been made of twins' positive sociability. Twins are, according to Schave and Ciricello (1983, 101-103), particularly aware and sensitive to communication. They also have a sensitivity to nonverbal communication. The argument parallels that by Zani et al. (1991). Twins

understand how other people feel. They can be empathetic towards other people, and maintain a close relationship to their co-twins simultaneously. This may even be expressed by career choices. Twins often prefer jobs where the ability to understand other people in relationship to the self is needed. (Schave & Ciricello 1983, 101-103.)

Rutter and Redshaw (1991, 888-889) also stress the co-operative skills of twins. The argument about co-operation might point to frequent use of social strategies and active prosociality by twins. Co-operation may prove particularly important in classroom situations, where group work is also valued.

There are also arguments in favour of the sociability of twins particularly with reference to *communication*. Savic (1980, 19), for example, maintains that twins have been found to have a special capacity for *verbal co-operation*. They are more social, because they enter into conversation with other people spontaneously.

Some investigations have also revealed stylistic differences in the communicative behaviour between twins and singletons. These findings suggest that twins have good interaction skills with reference to social behaviour. Some studies are reviewed below more closely.

There is evidence of advanced conversational skills among twins at an early age. Conversational interaction in mother-twin-twin triads was examined by Barton and Strosberg (1997, 257-269). The subjects were 4 sets of American twins aged 2 years and 3 months. The results indicated that triadic conversations in the twin environment had unique dynamics different from dyadic conversations. Triadic conversations were remarkably longer and elicited more turns from all speakers than dyadic conversations between a mother and a single twin. Twins could make their own contributions to exchanges between the other two speakers. Twins were able to respond as often to comments and requests directed to another person as to those made to themselves. They responded more often to questions directed to themselves than to others, which indicated that they understood who was being addressed. These findings suggested reliable monitoring of language which was not addressed to them. About one-quarter of twins' conversations were triadic, which suggested that twins were able and willing to participate in a complex

form of conversation. When the results of the study were compared to those of a related study reported for mother-infant-sibling triads, it turned out that the unique effects of triadic exchanges were not dependent on the relative linguistic levels of the child partners. However, the triadic conversations of twins were longer than those of siblings. This may be a result of similar interests and needs due to the same developmental level. The study indicated that triadic contexts provide good opportunities for learning early conversational skills, and this is an area of language where twins are not delayed. On the contrary, twins may be advantaged in triadic conversational skills.

It is worth examining *reasons* for good conversational skills among twins more closely. Zani et al. (1991, 341-355) found closeness to be one potential explanation. They studied the linguistic behaviour of 28 twins and 28 singletons aged 5-6 years in Italy expecting some differences in communicative behaviour. They were interested in communicative referential tasks during a game which the children played. The research group concluded that twins' referential communication skills were quantitatively equivalent to those of nontwins, but qualitatively different, i.e. twins had different interactive styles and strategies. They had a tendency to intervene in the interaction to support and complete the co-twin's performance. Sensitivity and sympathetic feelings towards each other were characteristic of twins' interaction, while singletons' interactive style was characterized by a tendency to engage in really informative exchanges and expansion of informative messages.

Consistent with the study by Barton and Strosberg (1997), Hoff-Ginsberg (1998) argued that later-borns (singletons) are successful socially and in conversation skills because of experience in multiparty conversation. There is also a link between the study by Zani et al. (1991) about twins and the study by Bornstein et al. (1998) about singletons, which suggested that children who show responsibility and sensitivity are also highly verbal. This type of behaviour might be more apparent in twins.

Some studies point out *general social behaviour* without a reference to communication. The study by Koch (1966) is one of the basic studies of twins' behaviour. The study examined 5-6-year-old American twins. There was no

evidence of social disadvantage for twins; on the contrary, twin girls were on an average more advantaged than singleton girls in their social skills.

The study by Loehlin and Nichols (1976, 23-86) did not produce strong evidence for the higher sociability of twins as compared to nontwins, but the alternate hypothesis about the lesser degree of sociability could be rejected. On the basis of their research on 850 twins, Loehlin and Nichols concluded that social differences between all twins and nontwins were small, and they were small or they did not exist at all between fraternal and identical twins. Twin males were, however, generally better socialized than singleton males.

It is, however, interesting that *co-twins in a set* may benefit from social skills to different extent according to their role and personality. Ahonen (1997) reported that positive social and interactional moderator variables made one twin outperform the other in school achievement. In this case study, developmental language disorder was studied in monozygotic twins across age. There were increasing differences between the twins in later school achievement and behaviour. At the end of the second school year one twin started to outperform the other. At the age of 12 both had severe difficulties in reading and language function, but one twin was more independent and talkative and interpreted for the other, whose dependence, passivity in interaction, and school behaviour problems were assumed to be connected with frustration and decreased self-confidence. Consequently, social and interactional moderator variables were at work. It is possible that the twins of the present sample might also be able to use social moderator variables to get rid of their cognitive disadvantages.

When *zygosity groups* are compared, it seems that identical twins are inferior to fraternal twins in language skills. With reference to social differences, the study by Loehlin and Nichols (1976) pointed out that they were small, although Rutter and Redshaw (1991, 888-889) point out the co-operative skills of identical twins, in particular, because of a similar way of thinking.

To sum up the reported studies, they point out different qualities of social behaviour. Twin-singleton group differences are the most relevant from the point of view of the present study. Zani et al. (1991) suggested that twins are oriented to interaction and their communication is characterized by a certain

degree of sensitivity and empathy. This study points out the different quality of twin communication as compared to singletons. Similarly, Barton and Strosberg (1997) implied that twins' conversational skills are advanced. Conversational skills are important in second language learning, because willingness to use language is essential for learning. Koch (1966), instead, directly pointed to the more advanced social skills of female twins compared to singletons. Loehlin and Nichols (1976) suggested that male twins were better socialized than singleton males.

There is evidence for good social skills among twins, but the issue is slightly controversial. It is clear that twinship alone does not account for sociability, but there are identity types among twins. Nevertheless, twinship might constitute an overall social advantage when twins and nontwins are compared. Furthermore, besides personality characteristics reflected by sociability, "twinness" also provides twins with potential for second language interaction. The use of social strategies might be a characteristic which is of importance in this respect.

2.5 Hereditary factors in language learning

The role of heredity in language learning has always been found interesting. Besides trainable psychological factors, genetic endowment also causes variation among learners. It provides a contrast to affective predictors of success, which can be manipulated. Heredity is discussed in terms of unconscious cognitive functioning, a stable linguistic talent. Hereditary factors actually represent *learner factors*, but they are of a quite different type as compared with the psychological learner factors introduced above: inheritance is untrainable. Some of these factors may also be partly subject to language experiences very early in life, which means that they might initially be controllable, but in second language learning these factors are already fixed.

Hereditary influences have been studied particularly in first language learning. Impaired language has been emphasized in this type of research. The heredity of normally developing language has also been examined, but such

studies concerning second language are rare. This is why the present research design opens up another unique opportunity for studying language learning in a twin sample.

Several concepts are associated with heredity. The role of aptitude in second language learning is interesting with regard to heredity, since it points to innate language talent. General intelligence is also likely to play a role in the inheritance of foreign language ability. There are also universalist theories that point out the innate capacity for language in human beings (see 2.1.1). To understand research on hereditary influences, some basic concepts have to be clarified and the distinction between heredity and environment will be discussed.

In the present study, co-twin resemblance is contrasted with similarity or difference in control pairs, and identical-fraternal twin differences within sets are explored. Thus it is convenient to introduce some research using the same methodology and contrast it with other types of studies concerning hereditary and environmental influences. The relationship between heredity and environment is often referred to as a relationship between nature and nurture.

2.5.1 Relationship between heredity and environment

The present study is mainly motivated by learner factors. This is why heredity is examined, rather than environment, in the context of twin resemblance. Similarity in twins is examined primarily to explore similarities in language talent/ability characteristics, which seem to be affected by genetics.

The purpose concerning environmental influences is to control them: school environment and some affective characteristics related to foreign language learning (and greatly influenced by environmental factors) are controlled in the analyses. The results may still point to environmental factors, and these influences have to be discussed.

Genetics will be discussed first. As far as the genetic basis of normal and deviant language is concerned, Plomin and DeFries (1998, 45-46) state that genes might be involved in cognitive *disorders*, but the question remains

whether they are the same genes that are involved in *normal* cognitive functions. The possible difference does not mean that there are no genes involved in normal language development. Plomin and DeFries conclude on the basis of studies that have been conducted that there could be a genetic link between normal and abnormal ability concerning reading disability, even if such links may not be found universally for other disabilities.

Tomblin and Buckwalter (1998, 198) state that the genetic basis of deviant language may or may not be different from that contributing to individual differences within the full range of language performance. The augmented multiple regression model in their study indicated that the heritability of normal levels of language may be similar to the heritability of deviant language and possibly the genetic basis for heritability may also be similar.

The hereditary basis of *first language* may at least partly be the same as that of *second language* learning. Linguistic Coding Differences Hypothesis (Sparks & Ganschow 1991) points out that native language learning and foreign language learning are related: problems in native language learning predict problems in second language learning. Dyslexia was mentioned as an example of native language difficulties. Sladen (1981, 22-33) argues that there is genetic influence on the appearance of dyslexia in a high proportion of the studied cases. The hereditary basis of native language skill and LCDH imply that also second language learning difficulties might be genetically based, since there is a connection between first and second language difficulties reflecting aptitude for both languages. Other arguments of the relationship were also presented above (see 2.1.3): the inherited language universals of a native language may also operate in early SLA. The question arises again whether second language difficulties are based on variation in the same genes that cause variation in advanced learning.

When the heredity of foreign language learning is examined it has to be considered that both the cognitive ability to learn languages and the affective factors related to it can also be inherited. If the heredity of language learning is examined strictly in terms of language ability, the role of *language aptitude* becomes important.

It seems likely that there is a link between aptitude and the genetic basis of language. Recently it has been argued that this construct might also be affected by environment in early life, i.e. mother-child interaction (see Skehan 1998, 194). Still, aptitude is usually referred to as an innate talent that is fixed at birth. Gopnik (1990), for example, found an inherited native language disorder which was manifest in syntactic-semantic aptitude. The findings of Ando (1992) also pointed to the inheritance of aptitude with reference to second language learning. LCDH (Sparks & Ganschow 1991; 1993a; 1993b; 1995) is also based on aptitude, which is supposed to be connected to several learning problems, which are often genetic. Further, some twin studies point to the heredity of grammatical features that are within the scope of aptitude (see Munsinger & Douglass 1976; Ganger et al. 1998). The heritability of aptitude seems also possible, because those who are good at one language are often good at other languages as well, regardless of language-specific affective factors such as attitudes and motivation. This, of course, does not rule out the influence of early language exposure. Environment might in some cases modify genetically driven learning.

There are several definitions of aptitude. Aptitude implies that there is a talent for language learning, and some learners are blessed with this talent. According to Skehan (1991, 276), aptitude denotes that this talent is independent of intelligence, it is not only a result of previous learning experiences, and the talent is relatively stable, although variation in it exists between people. According to Krashen (1981b), aptitude is only relevant in conscious language learning in formal learning contexts, and is not a strong predictor in children acquiring a second language. Carroll (1981, 84-86) also argues that aptitude is distinct from general intelligence and also separate from achievement, possibly genetic. An individual's aptitude can be assessed before learning, whereas achievement differences arise after some learning. Aptitude implies that an individual may possess a state of capability of learning a language related task easily and quickly, whereas achievement points to acquired capabilities as a result of actual performance.

The relationship between aptitude and learning outcomes is interesting. Harley and Hart (1997, 379-400) examined whether different components of

aptitude are linked with learning success at different ages. They found a positive relationship between proficiency and an analytical dimension of aptitude in late French immersion, whereas there was a positive relationship between proficiency and memory ability in early immersion.

Carroll (1965; 1981) has divided aptitude into four factors: phonemic coding ability, rote learning ability for foreign language materials (memory), inductive language learning ability, and grammatical sensitivity. Variation between learners may exist with any of these factors separately. There are learners with aptitudinal strengths and weaknesses, not only talented learners and those without the talent.

Skehan's (1998) components of aptitude are related to information-processing stages. Phonemic coding ability works at input stage, language analytic ability at central processing stage, and memory at output stage. Language analytic ability includes both grammatical and inductive features.

Skehan (1998, 211, 233) poses the question whether there can be exceptional talent for learning languages, which is different from merely high aptitude. He also raises the question of explaining this type of talent by neurolinguistics. On the basis of research on the area Skehan concludes that exceptional learners are characterized by exceptional memories, particularly with assimilating new material. Weak learners, instead, are characterized by weak input skills and have weak ability with respect to phonemic coding ability. An interesting question arises whether the described talent and its possible neurological basis are genetically driven.

General intelligence might be another heritable cognitive factor that is associated with the heredity of language learning. It might influence second language learning, in particular, because language universals may not function later in life any more, and second language learning often takes place in a formal context that requires effective cognitive processing.

Besides aptitude and intelligence, some theories of *language universals* can be discussed in terms of genetics. There is an assumption that language learning is biologically determined. The biological factors point to the lateralization of the brain in terms of language learning and the maturation of language. Wexler (1999, 55) and Ritchie and Bhatia (1999, 12-13) suggest that

maturation is controlled by a genetic program. Bates et al. (1995, 96-98) and Pine (1995) argue that the rate of first language development is partly influenced by genetics.

Language Acquisition Device and Universal Grammar represent a different approach with respect to heredity. They point to an innate language faculty, which also might influence both first and second language learning. The innate language device and the grammar involved may be determined by genes. Grammar genes have been traced, and Fisher et al. (1998) eventually located a language gene. Gopnik (1990) also argues that the origin of genetic specific language impairment is probably in the underlying grammar rather than in a peripheral processing system. It is possible that early input may modify the development of these inherited constructs, too.

In conclusion, it seems probable that there is a genetic basis for language acquisition. Whether a language gene directly affects grammar or the course of language development more generally is also an interesting question. The extent to which genes are influential in language learning is a controversial issue. Social factors are also likely to be central in determining learning.

There is a *contrast* between the possible hereditary basis of aptitude causing variation, on the one hand, and of the innate language faculty reflecting universal learner similarities, on the other hand. UG is considered more relevant in natural first language learning (Cook 1988, 176). According to some views, aptitude is considered more important for second language learning in formal contexts than in informal contexts (Gardner 1985; Krashen 1981b), but Skehan (1998, 206) argues that recent evidence does not support this view. Both UG and aptitude are related to inheritance, but they may work in different *situations*. Nevertheless, Gardner (1985, 23) argues in terms of aptitude that sensitivity to grammar in a native language is related to similar behaviour in second language learning. The inheritance of language aptitude has been studied with reference to natural native language as well (see Gopnik 1990). These points suggest that the two concepts might still have something in common.

Another perspective might be the *level* of achievement where variation emerges. Aptitude may primarily account for variation in the normal course of

development. A disruption of a gene involved in UG might result in variation only expressed by deviant development, because this language faculty is normally regarded as similar among all human beings. However, LCDH asserts that aptitude is also associated with learning difficulties. Accordingly, the inheritance of aptitude is more likely to affect the full range (not only normal) of learning due to variation in DNA.

It seems that UG determines naturalistic native language learning and is fairly similar among all learners, whereas aptitude is a factor causing individual differences primarily in second language learning, but the role of formal or informal learning in this is unclear. Inherited aptitude might be associated with variation in the full range of learning, whereas UG might normally function fairly similarly among all learners and explains variation only with respect to learning difficulties. Different genes might be involved in these two concepts. It is probable that the genetic basis of all language learning is highly complex and there is overlap in the concepts.

It could also be asked whether aptitude is partly a product of the functions of a universal language device. It could also be a product of maturation, because both concepts are associated with the rate of acquisition. Research in the area is contradictory: there could be a genetic program for the maturation of language and another genetic endowment for grammatical knowledge. These both could be reflected on aptitude. It must be noted that language universals and aptitude are not entirely comparable. LAD is referred to as an equipment (similar among all learners, or exists in all learners) but aptitude is regarded mainly as an ability (subject to differences). Language universals explain how language develops, aptitude is the degree of talent associated with this, and it has explanatory power also in later learning. Language learning may involve a special capacity during an early sensitive period, but it may later resemble the acquisition of any skills in all learning. The aptitudes for both first and second language may be close to each other.

Hereditary and environmental influences are often contrasted. Some study designs also enable researchers to examine both influences. *Heritability* is the degree to which variation among individuals on a particular trait, in a particular population, can be explained by genetic differences among those

individuals (www.psych.ualberta.ca 1999). The concept directly points to individual differences.

Environmental influences can be divided according to *shared and nonshared environments*. Shared environment is the environment shared by siblings growing up in the same family. Socio-economic status and parent education are examples of shared environment. Nonshared environment is the environment unique to the individual, including peer group, for instance. Experiences outside the family are considered important sources of nonshared environment. The fact that family environments are experienced differently by children reared in the same family suggests nonshared environment: it is evident that all environmental effects tend not to be shared by family members. Some studies of identical twins emphasize the importance of nonshared environment. Studies of adoptive siblings often indicate that shared environment is not important. (Plomin et al. 1997, 272; Plomin & DeFries 1998.)

Earlier in this century environmental explanations for variance in cognitive abilities were dominant in psychology. During the past few decades studies of genetics have pointed out the role of heredity. It is assumed that people's genes affect how easily they learn and environmental factors shape the learning process. It is concluded that nature and nurture interact in cognitive development. Experiences are affected by genetic factors. (Plomin et al. 1997, 272-273; Plomin & DeFries 1998, 40.)

Attempts to examine heritability began with family studies. Similarities between parents and their children and between siblings were analyzed, and it was indicated that cognitive abilities run in families. (Plomin & DeFries 1998, 41.) Family studies, however, do not define whether cognitive abilities run in families because of genetics or environmental effects.

To explore the distinction between genetics and environment, twinning and adoption provide areas for research. Plomin and DeFries (1998, 42-43) clarify that the resemblance of identical twins with the same genetic makeup is compared with the resemblance of fraternal twins, who share only about half of their genes. Identical twins should be more alike on tests of cognitive skills, if heritability is involved. (Plomin & DeFries 1998, 42-43.) Nevertheless, genes

may work in combinations rather than independently, which means that fraternal twins have only a quarter of two-gene-combinations in common, which, in turn, causes greater difference (Portin 1998, 37).

In adoption studies, genetic and environmental relatives are compared. Adoption creates pairs of genetically related individuals who do not share a common family environment and pairs of genetically unrelated individuals who share a family environment. The correlations among the former pairs allow researchers to estimate the contribution of genetics and the correlations among the latter pairs make it possible to estimate the contribution of shared environment to resemblance. (Plomin et al. 1997, 76.)

In many studies it is still difficult to indicate whether the source of influence is hereditary or environmental. Plomin et al. (1997, 76) propose adoption twin-combination studies as powerful designs. They involve twins adopted apart and twins reared together. The study by Bouchard et al. (1990), which will be reported later, indicated that identical twins reared apart were almost as similar in terms of general cognitive ability as identical twins reared together suggesting strong genetic influence and weak environmental influence. Environments may not, however, always greatly differ.

Twin, adoption, and laboratory studies are based on some *genetic principles and facts*. A gene is a sequence of bases in the DNA string located in a chromosome. It affects a characteristic (e.g. the colour of eyes), which can be expressed in different phenotypes (e.g. blue). One characteristic is affected by two alleles of a gene. People have two copies of chromosomes, and thus they have two alleles for any given DNA marker, one from each parent. A sex cell (gamete) of each parent has only one copy of chromosomes, and one allele per a DNA marker. This allele can be either of the parent's two alleles for this marker. Thus after a fertilization the child gets two alleles, which determine his phenotype. Each allele represents a certain phenotype, and one allele can dominate the expression of the other. Consequently, siblings can share one, two, or no alleles of a marker. Accordingly, monozygotic twins share 100 % of their genes, whereas dizygotic twins share 50 % of their genes, which is the same percentage as nontwin siblings have. (Pinker 1995; Plomin et al. 1997, 18; Plomin & DeFries 1998, 47; Tast et al. 1998.)

Thus, in twin studies to the extent that a trait is genetic, identical twins should be more alike than fraternal twins. In adoption studies to the extent that shared environment is influential, siblings reared in the same family should be more alike than adopted-away siblings reared apart. In genetics studies of twins, same-sex fraternal twins provide an ideal comparison group to identical twins, because the environmental experiences of fraternal twins are more similar than those of other siblings due to the same age, shared interests and activities, and similar treatment.

According to Plomin et al. (1997, 73), twin studies are based on the *equal environments assumption* suggesting that environmental similarity is approximately the same for both types of twins reared in the same family, but nonshared environment is also possible. Greater similarity in identical twins might partly be a result of shared environment, not only genetics, because they tend to be treated similarly. Fraternal twins, instead, may experience nonshared environment. Thus, postnatally, twins may be treated similarly or differently according to zygosity. Prenatally, however, identical twins may experience greater environmental differences than fraternal twins, because identical twins have greater birth weight differences than fraternal twins, which might be a result of greater prenatal competition, particularly for the majority of identical twins who share the same chorion. (Plomin et al. 1997, 73.) A greater environmental similarity of monozygotic twins is also emphasized by Portin (1998, 36). According to Plomin et al. (1997, 73), the assumption has been tested by examining differences within pairs of identical twins: the possible differences are only due to environmental influences. Another test is to examine twins who are misclassified by their parents or by themselves. If parents think that their identical twins are fraternal, the misclassified twins should be as similar as correctly labelled identical twins, if the equal environments assumption is valid.

It is also interesting to consider possibilities that the children of adult identical twins provide for genetic research. In the families of male identical twins nephews are as related genetically to their uncle as they are to their own father and cousins are genetically as similar as normal half siblings. (Plomin et al. 1997, 77.)

To sum up, similar behaviour in twins or other relatives in comparison to e.g. unrelated singletons indicates family resemblance due to genetic-environmental influences. In twin studies the resemblance of identical twins indicates hereditary influences, but it may also reflect an influence of shared environment. If heredity is involved, identical twins should be more similar than fraternal twins. Shared environment is influential if the similarity of members in monozygotic and dizygotic twin sets is the same. If fraternal twins are compared with nontwin siblings, and fraternal twins are more similar, twinning has resulted in an influence of shared environment. Dissimilarity between identical twins reflects nonshared environment. In adoption studies the influence of shared environment is indicated by similarity among genetically unrelated individuals, whereas a genetic influence is indicated by resemblance among genetically similar individuals reared apart. On the basis of this information it is easier to understand genetics research.

Heredity has to be studied by comparing relatives, but environmental effects have also been indicated in general by different types of studies. The role of socio-economic status and child-directed speech in language acquisition, which were dealt with in terms of variation in first language learning, also represent an examination of environmental influences. These studies do not, however, contrast heredity and environment, and they lack the appropriate methodology. In order to compare nature and nurture, twin and adoption methods provide the best perspectives. The emphasis is placed on heredity in the following discussion, because the present study provides a ground for an analysis of heredity rather than environment. This will be more closely discussed later. Language experiences of the subjects cannot be examined in the present study.

2.5.2 Studies of hereditary and environmental influences

There is a variety of studies of heredity and environment in the field of language learning. Five types of studies will be reported: (1) family studies of the heredity of language learning, (2) twin studies of the heredity of language

learning, (3) adoption studies of the heredity of cognitive functioning, (4) studies focusing on identifying genes and chromosomes associated with language, and (5) studies of the hereditary and environmental language-related factors of personality, which is different as an approach from the other types, because it does not directly point to an inherited language ability.

Edelman (1992, 33) points out that psychology should be linked to biology. Some studies of the genetic basis of phenotypes are successful in this. Studies dealing with chromosomes and genes have a medical perspective, but the rest of the studies deal with heredity from the point of view of psychology and language. Some family studies are also oriented to finding evidence for genes and examining inheritance patterns. Further, different types of studies are related, because adoption studies, for example, may also involve twins. Personality is briefly discussed, because it also contributes to language learning. Its hereditary basis may influence the heredity estimates of language learning. The studies concerning language mainly deal with native language learning, but it is also related to second language learning, as was indicated before. The genetic bases of both types of learning are likely to be related.

Besides the four main types of research concerning the inheritance of language, there is also slightly different evidence. The Darlington-Brosnahan Hypothesis (Darlington 1947; Brosnahan 1961; as cited in Lenneberg 1967, 248-254) proposed that the sound complement of a natural language is an expression of its speakers' vocal preference, which is controlled by genes. It was suggested that there might be slight structural differences in the vocal tracts of various speaker-communities and that the present phonetic inventory of a living language is ultimately associated with the speakers' desire to minimize their vocal efforts.

Family studies of the heredity of language learning

The study of family aggregation of a particular disorder is often used to investigate genetic influences on language. Felsenfeld et al. (1995) found evidence pointing to the genetic basis of phonological disorder, whereas the study by Lahey and Edwards (1995) detected a genetic basis of specific

language impairment. The family studies of language disorder by Gopnik (1990) and Hurst et al. (1990) were oriented to finding evidence for a language gene. Instead of examining heredity in general, the patterns of inheritance were also examined in both of these studies.

Felsenfeld et al. (1995, 1091-1107) found out that speech language disorders occur in families with an affected first-degree relative. Their study included two groups of subjects: 24 adults with a documented history of moderate *phonological* language disorder and 28 adults with normal articulation as children, as well as their children, who were administered a battery of tests. The children of the proband subjects (affected) performed significantly more poorly on all tests of articulation and expressive language functioning compared with the children in the control group. Two models of causes were introduced. The view of interaction between genes and environment represents a multifactorial-polygenic model. The single major locus model relies primarily on the inheritance of a pathological genotype. The results of the study confirmed that within proband families there were some members who were clearly affected and some who had adequate or even superior abilities, which as an inheritance pattern was consistent with the latter model.

Family aggregation concerning *specific language impairment* has also been studied by Lahey and Edwards (1995, 643-657). This disorder means that a child has problems in learning a language in the absence of hearing impairment, mental retardation, or problems in other cognitive abilities. In this study children with deficits in only expressive language had more affected family members than children with both expressive and receptive language deficits or mild problems.

The study designs by Felsenfeld et al. (1995) and Lahey and Edwards (1995) are different in some aspects. Felsenfeld et al. compared the children of an affected group and a control group and drew conclusions on heredity on that basis. The study of Lahey and Edwards was based on examining only affected children and comparing family backgrounds. The focus was actually on examining different types of disorder. Nevertheless, the results of the two studies are consistent. Genetics was considered influential in language

disorders. Lahey and Edwards found out that 60% of children with specific language impairment had affected family members, whereas in the study of Felsenfeld et al. phonological disorder was demonstrated by 40 % of proband children, which suggests a genetic basis for both disorders.

The *distributions* of affected members have also been studied more closely to find out information about the genes involved. Felsenfeld et al. (1995) discussed the origin of the disorder, but several generations were not examined. Gopnik (1990, 715), instead, found a Mendelian pattern of specific language impairment expressed in one grammatical aptitude faculty in a study of a family in three generations. She examined developmental dysphasia in the family. It is the inability of normal children to acquire language normally. Four tests required aptitude with syntactic-semantic features. The responses of dysphasic individuals to these tests were significantly different from those of unaffected members. Other tests measuring different skills showed no significant differences. There were significant differences in the ability to change tenses, to construct regular plurals for nonsense words, to detect a particular class of grammatical errors, and to correct them. Dysphasics had to learn each word as a separate lexical item. It was suggested that because the deficits were apparent in all aspects of language, their origin is probably in the underlying grammar rather than in a peripheral processing system. Those language skills that were not affected were as complex as the impaired ones, which suggests that the deficit is not one of cognition. It was concluded according to the distribution of dysphasia in the family that it may be due to one dominant gene.

Pedigrees have also been examined by Hurst et al. (1990, 347-355), who found a dominantly inherited speech disorder. They state that both genetic and environmental factors are involved in speech disorders. The genetic contribution, in turn, involves more than one gene, which represents polygenic inheritance. They reported a study of one family of three generations with a dominantly inherited speech disorder. Affected members had the same type of speech and language difficulty but to varying degrees of severity. The problem was classified as developmental verbal dyspraxia. Unaffected members had no

affected children. According to the pedigree, inheritance was found to be autosomal dominant, with full penetrance.

The studies by Gopnik (1990) and Hurst et al. (1990) differ from other family studies, because they focus on identifying inheritance patterns: the distribution of disorder in the family. They have additional medical and biological research perspectives, but they do not extend to identifying genes as some more advanced studies do; no blood samples were collected. The studies by Gopnik and Hurst et al. provide basic information about the genes involved. Family studies of psychology and linguistics such as the studies by Felsenfeld et al. (1995) and Lahey and Edwards (1995) are usually limited to stating heredity on the basis of the existence of a disorder among relatives.

Twin studies of the heredity of language learning

There are several twin studies establishing genetic findings in the field of language learning. Only one study was found concerning the heredity of foreign language learning. Ando (1992) found a genetic association in foreign language learning. Various studies have been conducted on first language learning. They can be divided into those dealing with normal and impaired language. Family studies usually focus on distinct language disorders, because impairment can be examined in several relatives, but twin studies are also used to investigate normal language, because similarity is easier to indicate among twins at the same age.

Foreign language learning. Ando (1992) conducted a rare study of foreign language learning among twins. The study serves as an example of studies dealing with heredity and the control method. Although the sample was not large, the study is primarily exceptional because of its links to the hereditary basis of foreign language. It did not, however, focus on the foreign language learning behaviour of twins and twin-singleton differences, which constitute the focus of the present study. The study by Ando dealt with the effects of teaching approaches and genetic influences upon learning aptitudes. The sample of twins consisted of 7 sets of Japanese identical twins and 4 sets of fraternal twins. The cotwin control method was used in the study: co-twins

were given different treatments. One twin in each set was taught English according to the grammatical approach and the co-twin according to the communicative approach. The aptitude measures involved intellectual abilities, cognitive styles, personality, and intrinsic motivation. It must be noted that some aspects of aptitude were approached in a different way here as compared to the approaches presented earlier. The assessment of achievement included observation and several tests. It was predicted that intraclass correlations would demonstrate either similarity in terms of hereditary influences (and shared environment) or difference in terms of environmental influences (teaching approaches).

Ando (1992) reported that in terms of the aptitude variables there were relatively high similarities between identical co-twins. The behaviour of fraternal twins ranged from very similar to very different. With reference to achievement tests, intraclass correlations were higher in identical than fraternal twins, which indicated that genetic rather than environmental factors result in individual differences in learning outcomes. The similarities between fraternal co-twins were very different.

Normal first language learning. There are several reports of genetic influences on normal first language development. The inheritance of *school achievement* is the first step to indicate the heredity of language learning. Fischbein (1983) studied biosocial influences on sex differences in school achievement in grades 3 and 6. The study was conducted by means of opposite-sex twin sets and singleton controls in the same class. Twin-singleton comparisons suggested that twin pairs were more similar in achievement test results in Swedish and mathematics than their controls. This was more pronounced for Swedish, which was explained by the fact that Swedish might be more determined by the heredity-environment interaction.

Studying the inheritance of *general cognitive functioning* is one approach to the study of the genetic endowment for language. It provides more information about language learning than an examination of school achievement. Emde et al. (1992, 1437-1455) reported the findings of the MacArthur Longitudinal Twin Study, in which the heritability of cognition/language was also examined. For the reported part of the study 200

pairs of twins were assessed at 14 months. Heritable influences were evident on the basis of the comparisons between identical and fraternal twin correlations. With reference to cognition and language, genetic influence was significant for behavioural indices of spatial memory, categorization, and word comprehension. Shared rearing environments (twin resemblance not explained by hereditary resemblance) played a role at 14 months.

Studying *syntactic features* of a language is a more advanced way of indicating the specific genetic endowment for language. Ganger et al. (1998, 224-234) conducted a longitudinal study of the genetic basis for the optional infinitive stage. The sample consisted of 9 sets of English-speaking twins aged from 1 year and 7 months to 3 years and 10 months, but results were available for two fraternal and two identical sets only. The development of the third person singular *-s*, copula *be*, present auxiliary *be*, dummy *do*, and regular and irregular past tense forms were assessed from spontaneous speech data. The comparisons between identical and fraternal twins provided evidence for a genetically driven stage of acquisition: the optional infinitive stage of child grammar was more similar in identical than in fraternal twins.

Correspondingly, Munsinger and Douglass (1976, 40-50) carried out much earlier a study of specific linguistic characteristics. The sample was composed of 37 pairs of monozygotic twins, 37 pairs of same-sex dizygotic twins, 11 siblings of the monozygotic twins, and 18 siblings of the dizygotic twins. The results indicated that identical twins were very similar and fraternal twins much less similar and closely resembling sibling pairs in a language comprehension test and a syntax screening test. Consequently, shared environment in terms of twinning was not the primary cause of similarity.

All studies reported of the heredity of normal first language learning are very different. The studies were concerned with different aspects of language. School achievement, cognitive functioning, and syntactic development are linked, as there was overlap in the measures. Similarity among identical twins in language comprehension was supported by Emde et al. (1992) concerning cognition and Munsinger and Douglass (1976) concerning linguistic development. The study by Fischbein (1983) is congruent to some degree with the present study, because heredity was looked at in school achievement,

although the study involved native language ability. An advantage of the study by Munsinger and Douglass was that it also included nontwin siblings, which were compared with fraternal twins. This enabled the researchers to study the effect of shared environment. The other studies, except Fischbein's, involved only twins, and no such environmental effects could be examined. Fischbein compared fraternal twins and singleton controls, who were not siblings. This makes the heredity estimates less reliable than comparisons between identical and fraternal twins. In the latter comparisons the role of environment can be controlled with reference to the equal environments assumption. It must be noted that Fischbein's study concentrated on identifying gender differences and educational impact, and it is not possible to find nontwin siblings in the same class. Also, gender could not be examined in a sample of identical twins, who are always of the same sex.

First language disorders. The rest of the studies reported here deal with language disorders. Stromswold (1996, 736-747) documented genetics studies involving both families and twins. An advantage of this report was its magnitude. Family aggregation studies (14) indicated that the incidence of language disorders was greater among relatives of language-impaired children than among normal controls, which suggested heritability. It was also found among 212 monozygotic and 199 dizygotic twins in which at least one member of the set had a language disorder that monozygotic twins were linguistically more similar to one another than dizygotic twins. Differences were measured for verbal IQ, phonology, vocabulary, reading, spelling, and morphosyntactic comprehension. It was concluded that genetic factors are important, but language disorders may involve interactions between genes and environment.

Different study designs are required to distinguish more closely between the influence of *nature and nurture*. A comparison of nontwin siblings and fraternal twins makes it possible to indicate the influence of shared environment resulting from twinning. Tomblin and Buckwalter (1998, 188-199) conducted a study with such a benefit. They examined the heritability of poor language achievement in a sample of twin pairs and same-sex sibling pairs with at least one affected member. Monozygotic pairs were highly alike, and dizygotic twins demonstrated a reduced level of resemblance, which pointed to

genetic influence. It was found out that dizygotic twins were more similar in terms of language achievement than singleton pairs, which suggested that twinning had resulted in twin resemblance.

It is interesting that in normal language development Munsinger and Douglass (1976) found no influence of shared environment and twinning, which as a finding does not parallel that of Tomblin and Buckwalter (1998) concerning impaired language. It is possible that the effects of environment are greater on potential disorders than on normal language.

With reference to language impairment, the distinction between modular and nonmodular views brings up the distinction between impairment of a language module and a particular component of grammar or deficits in general cognitive functioning. A third explanation exists. Bishop et al. (1998) argue that the *origin* of language impairment is not based on either of them: the deficit is lies in the phonological loop of working memory.

Bishop et al. (1996, 391-403) assumed in their study that specific language impairment is caused by a deficit in the component of working memory specialized for the processing of verbal material. Thus the study involved children's nonword repetition test. Twin subjects included both monozygotic and dizygotic twin pairs, in which at least one twin met the criteria for persistent language impairment in individual assessment. The results confirmed that the children with persistent and resolved language impairment were impaired in the test. The comparisons of monozygotic and dizygotic twins indicated the heritability of the deficit in the test. According to the results there might be a genetic component to the deficit in the phonological loop of working memory.

General considerations. Plomin and DeFries (1998) summarize that twin studies of specific cognitive abilities over three decades and in four countries have produced consistent results: correlations for identical twins exceed those for fraternal twins on verbal and spatial abilities in children, adolescents, and adults. Calculations based on the combined findings suggest that genetics accounts for about 60% of the variance in verbal ability and about 50% in spatial ability.

Studies of twins' linguistic skills reported in section 2.4.1 clearly indicated that communication deficits are influenced by the twin situation with two individuals of the same developmental level communicating with each other as well as rearing patterns including a reduced amount of child-directed speech. This type of twin studies make it evident that also environment has an impact on language development. But potential disorders are the most strongly affected areas where circumstances have any influence. In the study of Bishop and Bishop (1998) concerning twin language, the role of genetic influences was also discussed, and it was argued that children with genetic predisposition to language delay might become impaired if they had a sibling close in age. It seems that language acquisition is a rich combination of both nature and nurture.

Adoption studies of the heredity of cognitive functioning

Adoption studies may involve singletons or twins. On the one hand, adopted children and their birth-parents can be compared with a control group of children raised by their biological parents. On the other hand, twins reared apart can be compared with twins reared together. Both types of studies indicate the role of genetics by exploring similarities among relatives in spite of different environments.

Plomin and DeFries (1998, 41-46) examined the relationships among specialized aspects of intellect, such as verbal and spatial reasoning by *adoption method*. The correlations between over 200 adopted children and their birth and adoptive parents were compared with the correlations of a control group of children raised by their biological parents. By middle childhood birth mothers and their children who were adopted by others were just as similar as control parents and their children in both verbal and spatial ability. The scores of adopted children were not similar to those of adoptive parents. The results pointed to heritability and indicated that common family environment did not contribute to similarities. Genetic influence on school achievement was also found in the study. Genetic effects overlapped between different categories of

achievement, and these overlapping genes were likely to be the same genetic factors that influence cognitive abilities.

Portin (1998, 379), however, points out that adoption is not often a random choice: there are correlations between birth and adoptive parents, which increases similarity. Early years spent unseparated may also increase similarity in biological relatives. In Plomin and DeFries's (1998) report, adoption age was not mentioned.

Bouchard et al. (1990, 223-228) reported the results of the Minnesota Study of Twins Reared Apart using *twin-adoption method*. The study included more than 100 sets of twins reared apart. Both medical and psychological assessment was carried out to measure genetic and environmental differences. The results indicated that about 70% of the variance in IQ was accounted for by genetic factors. Identical twins reared apart were as similar as those reared together.

Portin (1998, 37) has also commented on the problems of this type of research. Despite separation twins often remain best friends, and they are often adopted by relatives. Further, separation age is not often reported in studies. This denotes that environments might not be quite separate. In the study of Bouchard et al. (1990) twins were, however, separated in infant years.

Both studies indicated that genetics was stronger than environment. The study by Bouchard et al. (1990) also pointed out the heredity of personality, which will be discussed below. Both studies are remarkable, because they involved a considerable number of subjects in a rare and demanding study design.

Studies focusing on identification of genes and chromosomes associated with language

The concern of some research on language impairment has been to identify genes and chromosomes associated with language functions. These studies are also family studies, but they have a different approach. An examination of language is associated with an examination of DNA. One way to do this is to *correlate DNA variations with differences in quantitative traits* (Plomin and

DeFries 1998, 46). A direct verification of grammar genes is difficult, but the identification is the easiest when genes correlate with some difference between individuals (Pinker 1995). This type of studies are much more powerful than studies of heredity in which DNA is not examined. A DNA analysis enables researchers to locate affecting genes and draw reliable conclusions on heredity. In other studies it cannot often be concluded whether genes are really involved or whether environmental factors are influential. Studies examining inheritance patterns on the basis of the distribution of disorders in pedigrees and the knowledge of genetic laws, such as the study by Gopnik (1990), provide the basis for further research and indicate the existence of a gene, but DNA analyses are needed to locate the gene. An examination of a pedigree distribution is a less developed way of analysing genetics.

Evidence has been found as early as in the 1960s by Moorhead et al. (1961; as cited in Lenneberg 1967, 248-254) in an examination dealing with chromosomes. The study was conducted in a family in which a mother and four of her five children had low intelligence and disproportionately poor speech. The father and a fifth child were normal in this respect. The behaviourally aberrant individuals also had a chromosome abnormality which was absent in the normal members in the family.

More recently Grigorenko et al. (1997, 27-39) conducted a study among six dyslexic families and analyzed five *reading-related* phenotypes: phonological awareness, phonological decoding, rapid automatized naming, single-word reading, and discrepancy between intelligence and reading performance. Three chromosomal regions were examined: 6, 15, and 16. The subjects were administered a battery of tests assessing reading-related skills, and their blood was drawn for DNA analyses. The analyses of chromosome 6 markers revealed an association with phonological awareness. With chromosome 15 markers, a linkage was found to single-word reading. An interesting finding is that two very distinct reading-related phenotypes appear to be linked to two different chromosomal regions.

Fisher et al. (1998, 169-170) located a language gene called SPCH1. They reported their findings concerning one family. The family suffered from a defect in the use of *grammatical* suffixation rules. The existence of genes

specific to grammar was the focus of interest. The pedigree indicated a simple genetic basis for the disorder. The research group identified a region on chromosome 7, which co-segregates with speech and language disorder. Autosomal dominant inheritance with full penetrance was confirmed. The results supported the view that the disorder segregating in the family was likely to have resulted from the disruption of a single gene. The located gene was assumed unlikely to be one specifically involved in grammar, but crucial for the normal acquisition of language skills.

It is interesting, however, that several *disorders* are supposed to be linked with *one single gene*. Fisher et al. (1998) suggested an influence of a single gene on speech and language disorder. Gopnik (1990) also assumed that dysphasia was due to one dominant gene. Plomin and DeFries (1998, 46) argue that impairment in cognition is often due to single-gene mutations, whereas *normal* cognitive functioning is influenced by *several genes* acting together. Barnet and Barnet (1998) also point out that language genes are likely to be members of a complex construction with a specific operation. Plomin and DeFries (1998, 46) state that finding subtly acting genes is much more difficult than identifying single genes responsible for disorders. Research on genetic disorders serves as a starting point for research with focus on identifying genes involved in normal learning.

The view of UG theory that there is an innate faculty of language in human beings is interesting with reference to genetics. Cowie (1998) has speculated on the issue and posed the question whether the gene identified by Fisher et al. (1998) is a grammar gene that would confirm Chomsky's theory of language acquisition. The researchers themselves concluded that the gene was not likely to be a specific grammar gene, although it was involved in grammar. The fact that normal language development is considered dependent on multiple genes serves as evidence against the theory of a single grammar gene pointing to LAD. UG and LAD should also account for normal language development, although a disruption of one gene involved might cause a disorder. One gene may cause abnormal development in grammar, but normally language functioning requires subtly acting genes working together. The modern research methodology of medical sciences makes it possible to perform

advanced DNA analyses and compare them with language test results. Perhaps more light will be cast in the future on specific genes involved in language learning.

Studies of hereditary and environmental influences on personality

Certain personality characteristics are closely associated with language learning. It is essential to distinguish between the heritability of language and personality contributing to it. Personality is supposed to be influenced by both genetics and environment. Eysenck (1990) points out the role of genetics, whereas Vernon et al. (1997) emphasize nonshared environment. Loehlin (1997) has investigated particularly the role of peer influence, which is an example of nonshared environment.

The adoption-twin study by Bouchard et al. (1990), which was reported above, also pointed out the genetic basis of personality and temperament and the fact that personality influences environment by eliciting a particular type of parenting responses. More importantly, Ando (1992), whose study was discussed above, indicated a genetic basis for foreign-language-related behaviour.

Eysenck (1990, 245-261) argues that genetic factors determine many personality factors including extroversion, which is interesting in terms of the present study. Eysenck also argues that *inherited variance* is the most important component of personality, whereas between-family environmental factors have almost no influence on differences in personality. Within-family environmental influences are powerful, but they are not under the control of society, schooling, for example. They include influence such as accidental factors affecting neural and hormonal balance during pregnancy. It was stated that a desire to influence the development of children's personalities through social action often leads to ignoring genetic factors, although they explain more than half of the influences which determine intelligence and personality.

According to Eysenck (1990), *environment* is not central in determining personality, but Vernon et al. (1997, 177-183), instead, found contradictory evidence. The study included 143 adult twin pairs and 66 pairs of same-sex

nontwin siblings. Correlations were found between differences in twins' and siblings' perceptions of their environments and differences in their personalities. Personality and some environmental measures themselves were also affected by genetic factors.

Loehlin (1997, 1197-1201) conducted a study of peer influence on personality and examined whether the members of 839 late-adolescent twin pairs who shared more friends were more similar in personality than those who shared fewer friends. The findings provided modest support for the theory of peer influence on personality. The relationship between peer-group overlap and similarity in personality was stronger than the corresponding prediction from similarity of parental treatment. Parental treatment, however, seemed to affect both personality and achievement variables, whereas peer-group overlap primarily affected personality. It was noted that personality may also affect shared peer groups.

The genetic basis of affective characteristics is also considered in the present study. It is assumed that possible similarity between co-twins in terms of language proficiency might partly result from genetic similarity in the affective domain associated with language behaviour, which is assumed to contribute to achievement. Not only language ability but also social behaviour connected to it is genetically based. To avoid the problem of indirectly indicating affective similarities instead of language ability similarities, affective factors are controlled, when proficiency comparisons are made. Control pairs are chosen so that they resemble each other in affective factors.

2.6 Emotional intelligence as a key to success

Intelligence is usually considered a *stable* and heritable characteristic (Portin 1998, 30). Human mind is also considered modular: information processing consists of different modules that are specialized for different functions (Fodor 1983). As was discussed before, foreign language learning has also recently been considered modular, distinct from general cognitive functioning. The stable characteristic of language learning talent is referred to as language

aptitude and considered independent of general intelligence. Nevertheless, there are different interpretations of the role of modularity in language learning: on the one hand, there are several abilities (modules) in general intellectual functioning, and one may be associated with language and equivalent information-processing; on the other hand, there may be a more specific talent for language learning, distinct language aptitude, which is often associated with a different knowledge system (see Skehan 1998, 187).

First language learning should have very little to do with intelligence, because variation in outcomes is minor: aptitude may be involved in first language learning or it may develop/mature to its full potential (possibly determined in genes) during it, but its role, and the role of linguistic intelligence, is likely to be more central in second language learning. The language module that operates in first language learning may be entirely different, possibly involving UG or the maturation of grammar during a critical period.

Studies have also indicated that there are intercorrelations between specialized cognitive skills (Plomin & DeFries 1998, 44), which suggests that the constructs may work together.

Skehan (1991), Naiman et al. (1978), Gardner (1985), and MacIntyre (1995b) consider both aptitude and IQ to be separate factors predicting variation in language learning. *Language aptitude* and *general intelligence* might be two important *genetic* endowments for language, just like motivation and sociability might be two important affective bases. Aptitude may also be influenced by the environment to a minor degree. Ultimately also UG requires input, the early quality of which may make a slight difference.

The concepts of aptitude and intelligence represent *traditional* views on talent and have a common characteristic, they reflect the *cognitive* domain, which is often contrasted with the affective domain. The definitions of intelligence have traditionally emphasized cognitive endowments and neglected affective and social talent. However, the *affective* domain is currently also included in the definition of intelligence. In fact, in the modern world this type of intelligence is recognized as an important factor of intelligence, and it is called *emotional intelligence*. Genetics does not exclusively determine this

talent. The role of such an endowment is considered more and more significant for success in different aspects of life: career, learning, and human relationships.

Language learning is closely associated with interaction between people. There are social and affective factors that have impact on language learning and language use and which also reflect emotional intelligence. These are the psychological learner factors that have been discussed above with reference to individual differences. Emotional intelligence is another way of describing the positive pole of these factors. It is practical, because it is also known to have positive influence on success in other areas of life, and language learning has ultimately a social function and a close relationship with all functioning in the society. For example, ability to negotiate and common understanding are conditions for successful communication. Language learning can thus be observed from a wider perspective. The concept is also useful, because it is often contrasted with traditional intelligence, and the difference between these concepts provides a ground for contrasting innate language learning talent and affective factors in new - perhaps more practical - light.

The affective domain is the emotional side of linguistic behaviour (Brown 1987, 87). The affective factors of learning and emotional intelligence are thus basically the same. The former is used in linguistics, and the latter is a psychological concept and also used to explain other behaviour besides learning. With reference to language, variation in classroom learning is influenced by affective individual differences, and variation in language skills in the real world is explained by variation in emotional intelligence. The former is associated with the process of learning, whereas the latter not only explains learning but also exploiting skills and language use. Affective learner factors naturally also contribute to real communication, but the chosen factors of the present study are quite closely associated with the learning situation. Personality factors make an exception, because they were not assessed with reference to language learning. In every case, emotional intelligence may also be used to describe the affective domain of learning.

Accordingly, a view of *multiple intelligences* has been acknowledged. Intelligence has traditionally been associated with linguistic and logical

mathematical endowments that can be tested by intelligence tests: ability that earlier learning or experiences do not affect (see Malin & Männikkö 1998, 8; Portin 1998, 30; Goleman 1997, 12, 59). Besides *linguistic* and mathematical-logical *intelligence*, Gardner (1983) also distinguishes musical, spatial, bodily-kinaesthetic, and personal intelligence (which points to emotional intelligence). They are genetically unrelated. There is *intra- and interpersonal intelligence*: access to one's own feelings and ability to notice other people's emotional states. A view of multiple intelligences is based on the assumption that there is an information-processing device at the core of each intelligence: phonological and grammatical processing in the case of language.

Individual differences caused by different cognitive/linguistic processes and consistent learner characteristics might reflect linguistic intelligence, whereas variation caused by the factors of the social process and consistent learner characteristics might reflect variation in emotional intelligence. Regardless of the possible difference or association between language aptitude and the linguistic module of general intelligence, linguistic skills are and can be discussed in terms of the general division between linguistic intelligence and emotional intelligence, because intelligence is a very broad term.

Emotional intelligence should be discussed with regard to its potential. It determines many aspects of life. Goleman (1987) argues that emotional intelligence needed in different life situations is characterized by controlled behaviour, motivation, enthusiasm, optimism, empathy, positive thinking, and social skills, among other things. Salovey and Mayer (1990, 189; as cited in Goleman 1997, 65-66) argue that emotional intelligence consists of being aware of one's own feelings and also controlling them, the ability to become motivated, recognizing other people's feelings and also managing human relationships.

There are also other classifications of emotional skills. De Beauport (1996) distinguishes mental, emotional, and behavioural intelligence. Emotional intelligence consists of affectional intelligence (developing the ability of closeness), mood intelligence (controlling moods), and motivational intelligence.

Competence in foreign languages is becoming more and more important in a career, and it requires multiple intelligences. Emotional intelligence is often considered the most important in the exploitation of different skills. Emotional skills are very important also in work life, where new aspects of intelligence are required: practical intelligence, different working styles, motivation, and collaboration (Gardner et al. 1996, 295-298). Goleman (1999, 35-36) argues that success at work is dependent on IQ, emotional intelligence, and know-how, which is a combination of expertise, specialized knowledge, and practical skills: one has to keep up with development and have insights.

The best thing about emotional intelligence is that it is *controllable*: it can be learnt and developed. A foreign language learner may, for instance, improve his use of appropriate strategies. Emotional intelligence is originally a *result* of several factors. It is evident that rearing exerts a powerful influence on how a child develops emotionally, although inherited characteristics may create the ground. Männikkö (1998, 44) points out that the interaction between the child and the caregivers is the basis for the development of emotional intelligence. Children have to be raised so that their needs are understood and fulfilled, and they must be encouraged to express their feelings, which contributes to the understanding of one's own and other people's feelings. (Männikkö 1998, 44.) The emotional intelligence of parents contributes to the development of these skills in children; parents' reactions to other people (not only the child) also influence children (Goleman 1997, 232). This is important also in communication. The development of emotional skills is particularly sensitive among *twins*, whose emotional skills may be positively affected by interaction with the co-twin and negatively affected by parents' rearing problems arising from "twoness".

Studies do not indicate a close *relationship* between traditional intelligence and emotional intelligence (Männikkö 1998, 49). This is why it is interesting to contrast these endowments. IQ does not predict success in life in the modern world (Goleman 1997, 56). Similarly, good knowledge of a language and success in tests does not always lead to successful language use because of different barriers pointing to problems in the emotional side. It is, of course, possible that a learner is talented in both ways. In language learning the

conflict is reflected by the contrast between intelligence/aptitude, on the one hand, and affective factors, on the other hand, which both cause variation. Accordingly, inherited language skills reflecting traditional intelligence and affective factors reflecting emotional intelligence are both separate sources of individual differences. But they also interact with each other. On the one hand, a traditionally intelligent student becomes even more successful, if he also shows emotional intelligence: in language learning this is indicated by motivation, a positive and good sense of one's own abilities, an understanding of ways to develop one's performance, and social and co-operative behaviour - all factors explored in the present study. On the other hand, good language genes cannot be fully exploited without these favourable affective factors. In fact, disadvantages in the affective domain may result in performance that is below the intelligence potential. Furthermore, a traditionally less intelligent student may succeed thanks to good emotional and social skills. It is also possible to improve these skills with age.

Language learning is likely to be influenced by interactions between different factors. Inherited talent is the basis for learning and causes variation also later in life. Environmental factors including rearing shape experiences and may either support or disturb development: different personalities react differently to different environments. Learning is also related to learner-centred social skills, and the basis of social behaviour is also developed early in life and influenced by environmental factors. The importance of the affective domain for learning seems to become even more important later in life. The importance of affective learner factors increases in foreign language learning. Successful foreign language learning requires a certain amount of emotional intelligence.

3 METHOD

Having dealt with the theoretical background of language learning and its associations with twin-singleton differences, the present study design will be introduced. The purpose of the study will be discussed first. It will be followed by all the necessary information about the method.

3.1 Aim and research questions

The *aim* of the study is to investigate the influence of certain individual differences on the second language learning of English and to include a new perspective of twin-singleton differences. This is the core of the study, and it is a research area where very little has been done so far. On this basis, five major *research questions* were formulated.

- (1) What is the influence of affective and cognitive factors on second language learning outcomes?**
- (2) Is twinship an advantage or a disadvantage in second language learning at the age of 12?**
- (3) What is the influence of heredity on second language learning outcomes?**
- (4) How does gender affect different aspects of second language learning?**
- (5) What kind of interrelationships between affective and cognitive factors operate in second language learning?**

3.2 Research design

The research questions were designed against a certain *background*. They were based on the connection between language learning and social behaviour. Evidence has been found to support this relationship. Twinship is considered a social advantage, and thus twins were taken as a part of the sample to explore their linguistic behaviour. Sociability was considered an issue of special interest, and in the present study, it could be expressed by active prosociality and use of social strategies, for instance. Besides sociability, most of the psychological factors in the study also reflect social behaviour.

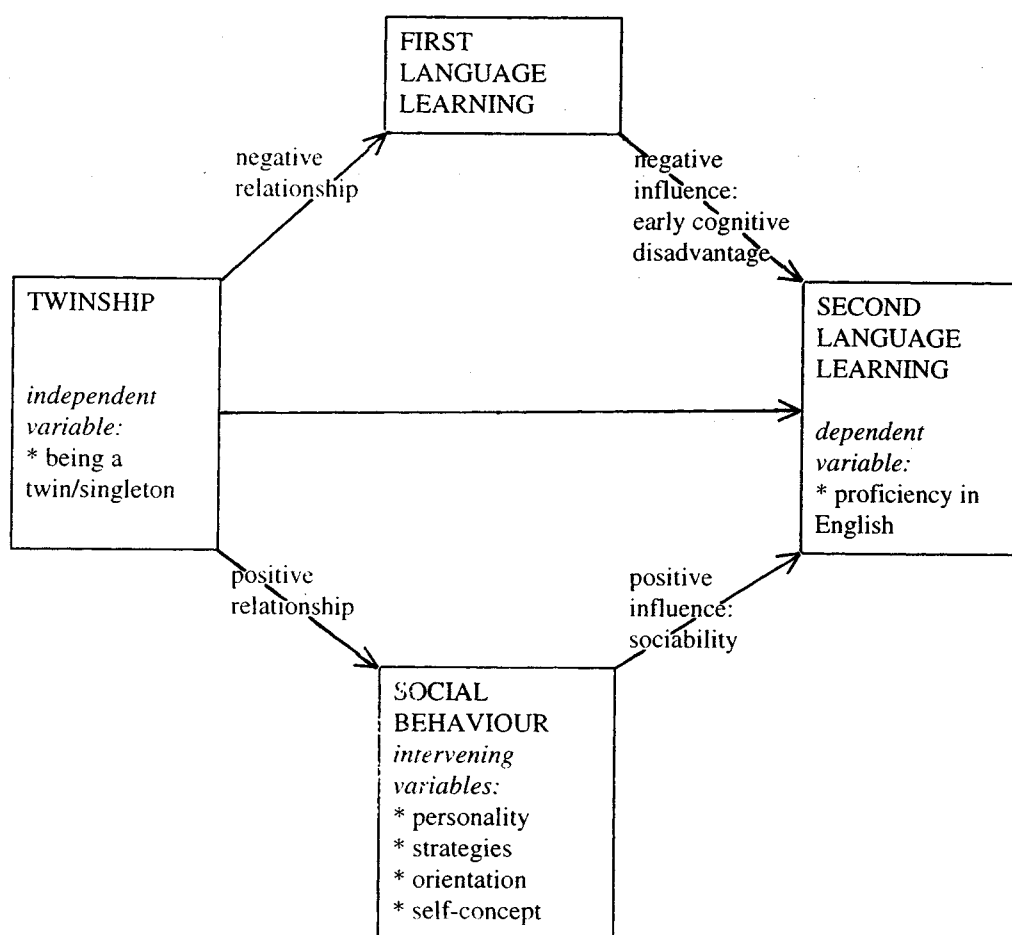


Figure 1. Basis of the research design.

The situation of twins is also interesting as concerns first language learning, because twinship can be considered a cognitive/linguistic

disadvantage at an early age. This might also affect second language learning. Evidence has also been found to support the relationship between first and second language learning, and thus intellectual/linguistic deficits might have an influence on second language learning.

Accordingly, 12-year-old twins could benefit from the social advantage or suffer from the early cognitive disadvantage in learning outcomes at this point of their lives. Twin-singleton comparisons are required to explore the direction of influence resulting from twinning. Figure 1 illustrates the *basis* of the research design.

Furthermore, an examination of the influence of heredity also becomes possible in a twin sample. Although a twin study in the present context primarily provides an opportunity to explore the influence of psychological differences, an examination of the influence of heredity provides an interesting contrast to it. *Twin-singleton* comparisons are required for both analyses, and they are central in the present study.

There are several types of twin-singleton differences, and they are thus summarized below. The research area offers various opportunities for comparison:

- (1) twin-singleton differences (between-groups differences);
- (2) identical-fraternal twin differences (between-groups differences);
- (3) within-pair differences between twin and nontwin sets; and
- (4) within-pair differences between identical, fraternal, and nontwin sets.

In the present study, differences between groups deal with psychological differences in language learning, and differences within pairs deal with hereditary influences. The first two differences represent research question (2) about psychological differences in linguistic behaviour, and the last two differences represent research question (3) about heredity.

Thus, twin-singleton differences will be dealt with at two levels: *between-groups differences* and *within-pair differences*. Between-groups differences deal with differences in the sample consisting of different subgroups of twins and singletons. Within-pair differences deal with differences in selected pairs in these subgroups, which are then compared with regard to average co-twin/nontwin differences/similarities; they involve two

analyses. Within-pair differences ultimately also involve between-groups differences. They are, however, referred to as within-pair rather than between-groups differences, because all group differences do not involve within-group comparisons. In within-pair differences, the emphasis is on the difference between members in each set rather than differences between groups. However, in some within-pair analyses, also groups have to be compared.

The present study was not limited to only twin-singleton differences. Other examinations are required to *supplement* twin-singleton differences. The general relationships among affective/cognitive factors and second language learning achievement were also examined. Gender differences constituted one further interest. In summary, individual differences were explored (1) in general, (2) with reference to twins, and (3) by contrasting hereditary and psychological factors.

All five research areas will be more closely discussed below. They can be subcategorized further.

(1) The influence of psychological affective and cognitive factors on second language learning outcomes

Research question (1) aims to explain the other four questions. The findings are naturally interesting in their own right, too. This question forms the basis for the study. It deals with four relationships:

- those between orientation and proficiency;
- those between foreign language self-concept and proficiency;
- those between language learning strategies and proficiency; and
- those between personality and proficiency.

Previous research has shown the influence of these factors on second language learning, although considerable variation in the results also exists.

(2) *Twinship in second language learning at the age of 12*

With reference to research question (2), possible group differences in learning outcomes are explained by possible differences in intervening psychological variables. The question is whether twins and singletons are different in these respects, which may cause variation in general. Group comparisons are made between identical and fraternal twins as well. The research question has two directions. On the one hand, the research design is based on the question of twins' potential advantage in the affective domain resulting in a possible advantage in learning outcomes. All aspects of psychological foreign language behaviour are intriguing, because they have not been studied in a sample of twins before. On the other hand, a disadvantage in learning outcomes may also be detected. The study seeks to examine which has more influence on success at the age of 12: the early cognitive disadvantage or the possible social advantage of "twoness".

(3) *The influence of heredity on second language learning outcomes*

Possible hereditary influences concerning research question (3) are studied by means of within-pair differences in proficiency. Possible findings with reference to heredity would also point to the fact that psychological (affective and unstable cognitive) factors alone do not explain language learning success (no factor alone can do it). Heredity is examined only with reference to proficiency, and some affective variables are controlled in these analyses. Control pairs were selected so that they were very similar in some affective features. This is why contrasts can be discussed between affective and hereditary influences. If control pairs are more similar in the affective characteristics than co-twins, it is possible to examine which influence is stronger on proficiency in this case: affective similarity or family background (pointing to heredity).

Similarity in twins points to genetics, but it may also reflect family environment. The interest of the present study is in heredity, because it reflects learner factors, which are emphasized throughout the whole research design.

This is why attempts were made to control some environmental influences (school environment and affective characteristics which are greatly affected by the environment). But the results may also reveal environmental effects, which may be expressed in effort, for example, rather than directly in language ability. They may also be expressed in other affective characteristics that were not controlled. Similarity in identical twins in contrast to fraternal twins clearly points to heredity, but similarity in twins in contrast to nontwins may point to both nature and nurture.

In language learning, school environment, which is controlled in the present study (members in twin and singleton control pairs are in the same classes), is likely to be more influential than family environment. This is also why the role of heredity is emphasized in the question. There is also evidence for a less powerful influence of the environment. During the past few decades, studies of cognitive skills have pointed out the role of heredity (Plomin et al. 1997, 272-273; Plomin & DeFries 1998, 40). There is also evidence concerning school achievement: in Fischbein's (1983) study, co-twins tended to become less similar in the school achievement of language from grade 3 to 6, and the educational impact experienced by subjects did not make them more similar.

(4) Gender differences in second language learning

Research question (4) supports research question (1). This question resembles question (2), because possible gender differences also deal with possible differences in the affective and cognitive domains. Possible gender differences in proficiency can be explained by possible gender differences in the intervening variables. On the basis of earlier research, it is likely that girls and boys engage in different social behavioural patterns, which may also explain the differences in success in English studies. For instance, if girls are found to be more social in their behaviour and more successful in English, a predictor of gender differences will have been found. It must be reminded that the relationship between personality and proficiency cannot be dealt with in terms of gender differences, because the data on personality were collected from the (female) control group (1) and the twins only.

(5) Interrelationships between affective and cognitive factors

The aim of research question (5) is to gain insight into the interrelationships and interactions between different potential predictors of success. These relationships involve linkages among the four psychological factors that are examined. The aim will be to trace possible patterns and indirect influences. These results supplement the results of research question (1). The interrelationships are finally combined with achievement, when learner types are identified with the help of cluster analyses. Twins are also studied in this context.

Rationale of the research questions

To sum up the rationale of the research design, the relationship between proficiency and the psychological factors serves as the basis for the study: a ground for group differences. It is important to know the general relationships between proficiency and intervening variables, before twin-singleton or gender differences concerning these variables can be analyzed. Another important justification for studying the general relationships between the factors is that the control pairs for twin-singleton within-pair comparisons must be chosen on the basis of the affective characteristics that predict learning outcomes. These predictors must first be determined.

Twin-singleton differences including between-groups differences and within-pair differences are, of course, the focus of the study. The two-way question concerning the behaviour of twins is the core of the study.

Gender differences are studied to explore possible relationships between proficiency and the intervening psychological variables, on the one hand. Twin-singleton comparisons also provide similar considerations. On the other hand, if gender differences are found, excluding male twins (or the other sex) from the study becomes justified. Gender differences are naturally interesting as such.

Interrelationships among the affective/cognitive factors are examined to find behaviour patterns that are important in language learning and might also

explain other results, and add to the understanding of the influence of affective and cognitive differences on learning outcomes. They might also explain the language behaviour of twins.

3.3 Variables and instruments

A great deal of *variables* were included in the study. They can be divided into:

- those dealing with proficiency
- those dealing with the affective and cognitive factors: orientation, self-concept, strategies, and personality variables; and
- those dealing with group memberships: twinship and gender.

Table 1. Proficiency variables and measures.

<i>Variable</i>	<i>Measure/scoring</i>	<i>Reliability</i>
• Grade	<i>Teacher rating (4-10):</i> 4= fail 5-6= pass 7-8= fair knowledge 9-10= excellent knowledge	not applicable
• Written English	See above (similar to grades)	not applicable
• Spoken English	See above (similar to grades)	not applicable
• Language test	<i>Test:</i>	
Total	0-70 points (consisting of scores in the subtests):	Alpha .8657 (N=183)
Listening	0-12 points	
Reaction	0-20 points	
Reading	0-14 points	
Grammar	0-24 points	

The variables that were used in statistical analyses are displayed in Tables 1, 2, and 3. The Tables also contain information concerning the instruments. The *psychological* variables were based on reliability analyses. In other words,

some of the items that were on the questionnaires had to be left out when the variables were composed. The psychological variables are also called *intervening* variables (see Figure 1) because of their relationship with proficiency in different groups.

Table 2. Affective and cognitive variables and measures.

<i>Variable</i>	<i>Measure/scoring</i>	<i>Item numbers</i> (see Appendix 2)	<i>Reliability:</i> Alpha
<ul style="list-style-type: none"> • Orientation in the classroom 	<i>Self-report questionnaire:</i> 1= intrinsic orientation: really true 2= intrinsic orientation: sort of true 3= extrinsic orientation: sort of true 4= extrinsic orientation: really true	1, 5, 7, 10 (preference for challenge vs. easy work assigned) 2, 3, 8, 11 (curiosity/interest vs. pleasing the teacher/getting grades) 4, 12 (independent mastery vs. dependence on the teacher)	.8006 (N=178) 10 items
<ul style="list-style-type: none"> • Foreign language self-concept 	<i>Self-report questionnaire:</i> 1= fully disagree 2= slightly disagree 3= difficult to say 4= agree to some degree 5= fully agree	2 (general foreign language self-concept) 11, 12, 15 (target language self- concept) 7, 8, 10, 13, 14 (task self-concept)	.8862 (N=178) 9 items
<ul style="list-style-type: none"> • Direct strategies 	<i>Self-report questionnaire:</i> 1= never or almost never true 2= usually not true 3= somewhat true 4= usually true 5= always or almost always true	1-7 (memory strategies) 8-15 (cognitive strategies) 18, 21 (compensation strategies)	.8538 (N=175) 17 items
Continued below...			

...Table 2

continued

• Metacognitive strategies	See above (similar to direct strategies)	22-28	.7874 (N=184) 7 items
• Socioaffective strategies	See above (similar to direct strategies)	29-34 (affective strategies) 35-41 (social strategies)	.7975 (N=176) 13 items
• Active prosociality	<i>Teacher ratings:</i> 0= not observable 1= sometimes observable 2= clearly observable but not emphasized 3= very true	1-7	.9038 (N=42) 7 items
• Anxiety	See above (similar to active prosociality)	8-11	.6871 (N=39) 4 items

Note. N= Number of cases.

The *proficiency* variables were ready as such: they were simply the four measures that were used. In addition, the test could be broken down into four parts.

Group membership variables do not require further discussion. Most analyses were made using these three types of variables. Some extra variables such as cluster membership were also produced on the basis of computed analyses.

Besides analyses based on the variables that were introduced above, the research design also included another type of examination. Heredity was also studied, but there was no variable for the factor of inherited language talent. Heredity was examined on the basis of within-pair comparisons among twins and nontwins. Within-pair comparisons were made concerning the proficiency variables.

Table 3. Group membership variables.

<i>Twinship</i>	<i>Zygosity</i>	<i>Gender</i>
• twins ($N=22$)	• identical twins	• males ($N=86$)
• nontwins:	($N=10$)	• females ($N=104$)
⇒ control group (1)	• fraternal twins	
($N=22$)	($N=10$)	
⇒ control group (2)	• zygosity unknown	
($N=22$)	($N=2$)	
⇒ control group (3)		
($N=22$)		

Note. N= Number of cases.

The *reliability* of the *psychological measures* will be discussed more closely. The aggregated variables were actually composed of several item variables, whose numbers are also displayed in Table 2. The items represented different aspects of the main variable (e.g. task self-concept is one aspect of foreign language self-concept).

The reliability analyses revealed that the original scales had to be slightly altered. Some subvariables had to be combined, and some items had to be excluded from the variables. The original items of the questionnaires are presented in Appendix 2, and the selected items are more clearly presented in Tables 15-20 (in the context of twin-singleton differences).

Finally, the statistical tests were run on the basis of 7 variables that remained. Some variables were given new titles reflecting the general nature of the factors. The new variables and their reliability indexes (Alpha) were also displayed in Table 2.

The reliability of all variables except anxiety was quite satisfactory. The low reliability of the anxiety scale might be due to the small number of items

included. Anxiety results must be interpreted with caution. The other variables provided reliable bases for further analyses.

Four types of psychological variables were found, which was consistent with the idea of the original scales. Only the content of these groups changed in some cases. *Orientation* and *self-concept* are factors in their own right. Three types of strategies represent one factor group: *strategy use*. Similarly, active prosociality and anxiety belong to the same factor group: they represent *personality*.

The *proficiency* measures also proved reliable. The test including 4 parts yielded Alpha .8657. The test was primarily dealt with as one variable (total score). Nothing was excluded. The other three proficiency measures, the grades as well as written and spoken English evaluations, were used as such. Further statistical analyses (group comparisons and correlations) indicated similar patterns with each of the four proficiency measures.

The instruments require further discussion. The *questionnaires* and proficiency measures are described in detail below. With reference to psychological instruments, factors are first discussed in terms of the original scales (questionnaires) and after that in terms of the new empirically extracted *variables*.

The measures will be introduced in the following order: (1) language behaviour: orientation in the classroom, foreign language self-concept, language learning strategies (data collected by the present writer), (2) personality factors (data received from the Department of Psychology), and (3) proficiency in English (data collected by the present writer). Language behaviour was assessed by means of self-report questionnaires, personality by teacher ratings, and proficiency by teacher ratings and a test.

3.3.1 Orientation in the classroom

To assess orientation in the classroom, Harter's (1980) scale of intrinsic versus extrinsic orientation in the classroom was used. Motivational orientation is the focus of perceived control in the present study partly because of its interesting

and close relationship to other factors which contribute to language learning outcomes.

The scale was revised; the English version of the *questionnaire* used can be seen in Appendix 2, Part C. It was translated into Finnish and slightly revised to be suitable for English classrooms of Finnish sixth graders (see the Finnish version of the questionnaire in Appendix 1, Part C). Harter's scale was not used as such but the number of variables was cut down to deal with only three groups of orientation:

- preference for challenge versus preference for easy work assigned;
- curiosity and interest versus pleasing the teacher and getting grades; and
- independent mastery versus dependence on the teacher.

The number of items in the questionnaire concerning each variable was also cut down to four. The whole scale by Harter (1980) was not administered, because the study involved a great deal of other material. The subjects had to fill the questionnaire, which covered items on three factors, during one lesson, so it was not possible to include everything in the questionnaire.

The two poles in the variables represented the intrinsic and extrinsic motivational orientations. The variables were chosen because of their potential connections to other affective and cognitive variables. Self-concept, different strategies, and personality factors might be connected with these orientation biases.

The statements about orientation in the classroom in the questionnaire were slightly different from those of foreign language self-concept and language learning strategies. There were actually two opposite statements in each question unit. One item consisted of two statements. The statements were about two kinds of pupils. The *student* had to decide first whether he was more like the pupil on the left side or more like the pupil on the right side. Then he had to decide whether the chosen statement was really or sort of true of him and mark the chosen alternative. In other words, the subject had to choose between four alternatives, which included two types of statements at two levels of agreement. It was pointed out that all the statements were about the learning of English, even if it was not mentioned in each statement. The structure of this part of the questionnaire is introduced below; one example of the statements is

given. The rest of the items (in English) can be seen in Appendix 2. There were 12 items in this part of the questionnaire.

Except for some converse items (which were corrected), the scoring of the poles is consistent with the structure of the questionnaire as follows:

Intrinsic pole			Extrinsic pole	
1	2	(score)	3	4
really	sort of		sort of	really
true	true		true	true
()	()	Statement 1	OR	Statement 2
				() ()

An example:

Statement 1: Some kids like hard work because it is a challenge.

Statement 2: Other kids prefer easy work that they are sure they can do.

Reliability analyses suggested that Harter's (1980) orientation subgroups could not be used as separate *variables* in the present study. In the new aggregated variable, only one subgroup, independent mastery vs. dependence on the teacher, included some items that had to be excluded (see Table 2).

The new empirically extracted variable included 4 items of preference for challenge vs. easy work assigned, 4 items of curiosity/interest vs. pleasing the teacher/getting grades, and 2 items of independent mastery vs. dependence on the teacher vs. (See Table 2.)

3.3.2 Foreign language self-concept

Foreign language self-concept measurement was made by administering a scale developed by Laine and Pihko (1991, 119-124). The scale was chosen because it was found to be an appropriate measure for Finnish comprehensive school students, and it involved interesting aspects of self-concept.

The chosen items (in English) can be seen in Appendix 2, Part A. The Finnish version of the *questionnaire* used can be seen in Appendix 1, Part A.

The scale dealt with perceived competence as a foreign language self-concept, which consisted of three variables:

- general foreign language self-concept;
- specific target language self-concept (English); and
- task self-concept.

The scale by Laine and Pihko also measured many other potential predictors of second language success, but only a limited number of items was included in the present study for the reasons mentioned in the connection of the orientation questionnaire.

The chosen part of the original scale consisted of 15 statements: 4 measuring general foreign language self-concept, 4 measuring target language self-concept, and 7 measuring task self-concept. The items could be included as such in the language learning behaviour questionnaire of the present study, because they were originally in Finnish. They were, in fact, designed for upper level comprehensive school students, but the pilot study suggested that the items were suitable for the present purpose.

The *students* had to evaluate the truth value of each statement by marking one of the five alternatives:

- (1) fully disagree;
- (2) slightly disagree;
- (3) difficult to say;
- (4) agree to some degree; or
- (5) fully agree.

The foreign language self-concept was introduced to the subjects as the first part of the questionnaire, before the other two parts also dealing with language learning behaviour. The strategy inventory resembled the self-concept inventory in its structure, which is why it was introduced right after the self-concept scale. The subjects did not even notice that the questionnaire had changed. Orientation was slightly different and the last part of the questionnaire.

Laine and Pihko's (1991) model did not work as such, if reliability was to be high enough. Some items were excluded for the purposes of the present study. The aggregated *variable* of the present study consisted of 1 item of

general foreign language self-concept, 3 items of target language self-concept, and 5 items of task self-concept. (See Table 2.)

3.3.3 Language learning strategies

Language learning strategies were measured with the help of a revised version of Oxford's (1990, 294-296) strategy inventory for language learning. This scale was chosen because of the research design. A questionnaire was considered necessary for a relatively large sample, and the chosen scale covered a wide range of strategies that were found interesting.

The English version of the *questionnaire* used can be seen in Appendix 2, Part B. The scale was again revised for the purposes of the present study - for the same reasons and in the same way as the orientation scale. It was also translated into Finnish (see Appendix 1, Part B).

Oxford's original scale includes some strategies and items other than those included in the present study. The strategies dealing with specific tasks were not chosen, because sixth graders were likely to use a limited number of such strategies after three years of English studies. The chosen 41 items (in English) can be seen in Appendix 2.

The chosen strategy inventory involved six variables:

- memory strategies;
- cognitive strategies; and
- compensation strategies;

which represented direct strategies, as well as three indirect strategies:

- metacognitive strategies;
- affective strategies; and
- social strategies

(Oxford 1990).

The *students*, again, had to mark one of the five alternatives concerning the frequency of their strategy use:

- (1) never or almost never true;
- (2) usually not true;

- (3) somewhat true;
- (4) usually true; or
- (5) always or almost always true.

With reference to reliability in the present study (see Table 2), Oxford's (1990) compensation strategies did not function together. It was evident that the *variables* should consist of direct and indirect strategies instead of six subgroups, and only metacognitive strategies representing indirect strategies were reliable as such.

The aggregated variable of direct strategies in the present study was composed of 7 items of memory strategies, 8 items of cognitive strategies, and 2 items of compensation strategies. According to Oxford (1990), these three strategy groups represent direct strategies. Oxford's metacognitive strategies remained unchanged: the variable consisted of 7 original items. Oxford's social and affective strategies were combined, and they became the aggregated variable of socioaffective strategies consisting of 6 items of affective strategies and 7 items of social strategies. (See Table 2.)

3.3.4 Personality factors

The data on personality factors were received from the Department of Psychology, University of Jyväskylä. They were *teacher* ratings. The scale was chosen at the Department of Psychology, and the items used in the present study were chosen according to their potential connections to language learning. Social behaviour was a focus of the study. The items of the *questionnaire* can be seen in English in Appendix 2 (see p. 356). The original Finnish outline is displayed in Appendix 1 (see p. 351).

The selected personality data that were used in the present study were consistent with Pulkkinen's (1980) view on social behaviour. The items concerning personality represented two factors:

- active prosociality; and
- anxiety.

The data had been collected for the research project in which the Department of Psychology participated.

The questionnaire used to assess the teacher ratings of children's personality was composed of items from several different sources. In the present study, items (1), (2), (3), (4), (5), and (9) were from the source by Pitkänen (1969, Appendix 5), item (7) from Weir and Duveen (1981), and items (10) and (11) from Rutter et al. (1981, Appendix 4). The rest of the items had been developed for the twin project in which the Department of Psychology participated.

The descriptions of the items were to be assessed as

- (0) not observable;
- (1) sometimes observable;
- (2) clearly observable but not emphasized; or
- (3) very true.

For the purposes of the statistical analyses of the present study, active prosociality scale was reliable, but anxiety items did not fully fit together. The personality *variables* were not changed. The variable of active prosociality included 7 original items, and the anxiety variable was composed of 4 original items. (See Table 2.)

3.3.5 Proficiency in English

The aim of foreign language learning in the Finnish comprehensive school is to develop students' abilities and willingness to use languages. The motivated use of language for different purposes is also encouraged. (Kouluhallitus 1985, 75.) These statements serve as the basis for both teaching a foreign language and testing it.

Four different measures were used to assess proficiency in English. Three of the variables,

- the *grades* given by the English teachers in the spring of 1995, and the separate evaluations of
- *oral skills* and

- *writing skills*

in the autumn of 1995, do not need extensive clarifications. They were numeric, from 4 to 10. Grades 9-10 indicate excellent knowledge and 7-8 fair knowledge. Grades 5-6 denote that the student has passed, but grade 4 is so poor that the student has failed. The separate evaluations of oral and writing skills concerned production skills, whereas grades also reflect comprehension. In only one class the same teacher evaluated both language skills and personality.

The fourth measure,

- the *test* in English,

was a slightly different variable and requires further reporting. At this point of their lives, the subjects had studied English for three years. The test had to be designed with this fact in mind. The aim of the test was to set a common measure for all the subjects, because teacher ratings may be subject to individual differences. The test was to be fairly simple, because there were already three other measures available, and the purpose of the study was not to develop a test.

The test was also meant to have much in common with those held in the schools, because it was to be an equivalent measure to the grades. This is why most parts of the test were almost identical to those drawn up by the people who write the English textbooks used in schools.

The test was divided into four parts, which in some analyses could be used as separate variables:

- listening comprehension;
- reaction;
- reading comprehension; and
- grammar.

Parts (1), (3), and (4) were taken from the tests included in the school book *OK English 5* written by Heino et al. (1988, 23-70), and the idea for part (2) was taken from the spoken reaction task of the national English examination held 1994 (see Huttunen & Kukkonen 1995, 146). For the present study, the reaction task was converted into a written form, and the background story was changed. The nature of part (2) is clarified below when the test procedure is described.

This part was included in the test, because the purpose of the test was to bring in an aspect of creativity.

The test measured production and reception skills in English primarily in *written language*. The listening comprehension (and reaction) also involved the reception of *spoken language*. The production of spoken language was not measured. The grammar and reaction tests involved *production* and the comprehension parts *reception*.

Because the test resembled those held in the classes before, no further instructions were needed. The listening comprehension was carried out first. The pupils heard a story on a tape twice, and they answered the six questions during the pauses given during the second time of listening. After this they were asked to answer the reaction part, which was the only task that was not familiar to them. The idea was that the teacher was acting as an Irish tourist whom the student met in a zoo. They had a conversation. The teacher said the Irish man's lines, which consisted of questions. The students answered the questions by writing the lines on the papers. The subjects' readiness to react to English speech, politeness, comprehension of the questions, and linguistic imagination were tested. The teacher repeated each line once if needed. There were ten answers altogether. The teachers reported that this part was generally found inspiring. After the reaction the pupils answered the reading comprehension with seven questions and the grammar test, where they had to form six questions and answers, the *do*-verb being tested among other things.

The scoring system of the test was based on the original instructions concerning the subtests (see Heino et al. 1988; Huttunen & Kukkonen 1995). The comprehension subtests were based on similar criteria. The maximum was 12 points in the *listening* test, which included 6 questions. The student got 2 points for an entirely correct answer and 1 point for an answer with a small mistake. The maximum was 14 points in the *reading* test, which was composed of 7 questions. The criteria of the scoring system were similar to those of the listening test.

In the *reaction* test, the maximum was 20 points. This subtest included 10 questions. The idea was that points were given for correct reactions to the questions. Points were given only if the student answered the question that was

posed (i.e. understood). The student got 2 points for an inventive, polite answer reflecting communicative skills and 1 point for a short correct reaction.

In the *grammar* test, the maximum was 24 points. This subtest included 6 sets of questions and answers. The student got 4 points for an entirely correct question and answer, 3 points for grammatically correct sentences with (a) small spelling mistake(s), 2 points if only the question was correct (small spelling mistakes allowed), and 1 point if only the answer was correct (small spelling mistakes allowed). In all the subtest, no points were given if the mentioned criteria were not met.

The test was also subject to some intervening influences. There was some variation in the test dates. In some classes the test was held soon after another English test. In one class it was held fairly close to Christmas holidays. In both cases the degree of concentration may have been slightly lower than normally. Furthermore, it is possible that in two schools one part of the test was familiar (the teachers' feeling), but it was not likely to affect the results, because the pupils could not confirm this. These teachers had possibly used these test parts as models for their own tests. The test can be seen in Appendix 3, and some further clarifications in English are presented in Appendix 4.

3.4 Sample

The *sample of all subjects* consisted of 190 sixth graders in the lower level of ten Finnish comprehensive schools: 104 girls and 86 boys learning English as a second language. The pupils were (11 to) 12 years old. They had started studying English as third graders. The classes were chosen so that there was at least one twin pair in each class. The classes that met the criteria were to be as close to Jyväskylä as possible. Eight schools were located in small towns in Central Finland and two in Tampere, which is a more urban city.

Thus, the sample of all 190 subjects was chosen according to the location of twins. Several sub-samples were also chosen among the sample of all

subjects. The criteria for the whole sample and sub-samples can be seen in Table 4.

Table 4. Criteria for the sample.

<i>Group</i>	<i>Criteria</i>
<ul style="list-style-type: none"> • Whole sample ($N=190$) 	<ul style="list-style-type: none"> • classes with twins in them (see the criteria for twins below)
<p><i>Sub-samples:</i></p> <ul style="list-style-type: none"> • Twins ($N=22$) 	<ul style="list-style-type: none"> • gender: female • English as a second language (in the class) • sixth graders • zygosity: an equal number of identical and fraternal twins • unseparated pairs: both members in the same class • twins living as close to Jyväskylä as possible
<ul style="list-style-type: none"> • Control group 1/ Singletons ($N=22$) <p>Purpose: for group comparisons between twins and singletons</p>	<ul style="list-style-type: none"> • gender: female • two control subjects per one twin pair in each class • age of each control subject: as close to the age of the twins (in the same class) as possible
Continued below...	

...Table 4 continued

• **Control group 2/**

Singletons ($N=22$)

Purpose:

for comparing within-pair differences between twins and singletons

- gender: female
- one control pair per one twin pair in each class (if possible) *
- two classmates whose scores in orientation in the classroom were as similar as possible **
- no missing proficiency data

• **Control group 3/**

Singletons ($N=22$)

Purpose:

for comparing within-pair differences between twins and singletons

- gender: female
- one control pair per one twin pair in each class (if possible) *
- two classmates whose scores in foreign language self-concept were as similar as possible **
- no missing proficiency data

No other criteria were needed for any of the groups.

Note. N = Number of cases. All the required criteria had to be met. Additional criteria for control groups (2) and (3):

* if control females without missing data were not found in the same class with the twin pair, a control pair was formed in another class: a pair with the minimum difference in the required affective variable was chosen among all the classes,

** if two control pairs with the same differences in orientation scores were available, subjects who were not in the other Control group (2 or 3) were preferred.

The *sample of twins* consisted of 11 sets of female twins in the sixth grade, 22 subjects altogether. The members in pairs were in the same classes, and the pairs came from 10 classes. There were 5 sets of identical twins, 5 sets of fraternal twins, and one set of twins, whose zygosity was unknown. This 11th pair became a part of the twin sample, because these twins were in the same class with another twin pair. Data on this particular pair were to be used in the part of the study that concerned twin-singleton group differences, where zygosity was not relevant.

Control pairs had to be chosen for the purposes of twin-singleton analyses. Three control groups were required: one for group comparisons and two for within-pair comparisons. Control group (1) (for the purposes of group comparisons) had different criteria from control groups (2) and (3) (for the purposes of within-pair comparisons). The main difference was the fact that age determined the choice of control group (1), whereas affective variables determined the choice of control groups (2) and (3): the former was based on orientation and the latter on self-concept. In other words, each control pair in the class was as similar as possible in terms of age or the required affective characteristic. Control group (1) had earlier been formed at the Department of Psychology, University of Jyväskylä. The other control groups (2 and 3) were formed by the present writer.

In group comparisons, age was considered an important factor in terms of psychological assessment. It has influence on learning. Affective variables could not be controlled, because they were studied. In within-pair comparisons, affective variables were considered to provide the best available contrast to hereditary language ability, because correlations indicated that they had influence (see below). The control groups (see Table 4) will be more closely analysed below.

Control group (1)

With reference to control group (1), there was a twin pair and a control pair per each class (two sets in the 11th class). Thus school environments were the same. As was stated above, age was controlled: it was as close to that of their control twins as possible. Gender was also held constant in the present study: all the twins and their control pairs were girls, because the influence of gender was to be eliminated when twin-nontwin differences were concerned. Girls mature earlier, and comparisons among them are not likely to be subject to extra intervening factors that would confound the results. This choice of a control group was necessary for the study of personality differences, because such data were collected only from the twins and controls chosen at the Department of Psychology.

Control groups (2) and (3)

With reference to control groups (2) and (3), the choice of the subjects was based on two affective variables: orientation in the classroom and foreign language self-concept. It was made sure that the scores of the two members in each control pair were as close as possible. The degree of orientation or self-concept was not relevant here. These variables were chosen, because correlations indicated that they were significantly related to achievement (see Tables 9 and 10). Strategies were not chosen, because they did not have equally strong associations with proficiency as the chosen variables. Personality factors could not be chosen, because the data were collected from control group (1) and the twins only. Gender was controlled all the way: all the subjects were females. The school environment of these sixth graders was also controlled: the members in a pair were always in the same class. It was also considered important that the same teacher evaluated both members in pairs.

Control group (2) consisted of pairs chosen according to their scores on *orientation* in the classroom. The maximum score of orientation in the classroom was 40 points (the total score; the aggregated variable consisted of 10 items). The differences between the members in the pairs ranged from 0 to 3 points. The mean difference was 1.0 point. The difference in four pairs was 0 points, in five pairs 1, and in two pairs 3. The members in each pair were always chosen from the same class to control the school environment. All the 10 classes were included (one control pair in each of the 10 schools with at least one set of twins in the same class), if it was possible. The aim was to include all the schools to balance the evaluations of the twins and singletons, in this way the contribution of one teacher was not to be too great but equal among the groups of twins and nontwins. Exceptions were made only if it was absolutely necessary. In terms of orientation, the 11 control pairs were chosen from 9 classes. In one class a control pair could not be formed, because no teacher evaluations were available from a sufficient number of female students, since the teacher had taught some of them only for some time and did not know them all well enough to evaluate them. The sample was to include only students whose all proficiency scores were available, since the sample could

not be limited any further. In another class there were two sets of twins, but only one set of controls could be found. The other control pair was found in another class. If a control pair could not be found in the same class as the twin pair, it was formed in a class where a pair with a minimum difference in orientation could be found.

Control group (3) was formed on the basis of the scores on foreign language *self-concept*. The maximum score was 45, and the differences between the members in the pairs varied from 0 to 4. The mean difference was 1.2 points. The difference in three pairs was 0, in five pairs 1, in two pairs 2, and in one pair 4 points. The 11 control pairs were found in 8 classes. In two classes enough controls could not be found due to the same reasons as in terms of orientation. Another class had also to be excluded, because it was so small that two female students whose self-concept scores were available could not be found.

To make the within-pair comparisons more interesting the control groups were chosen so that as few students as possible belonged to both groups: seven individuals were members of both groups, but only one pair was included in both groups. The overlap could not be avoided, because the classes were so small that several pairs with similar profiles could not be found. Similarity in the affective variables was the first criterion, and if there were several options of pairs, the same subjects were not chosen twice.

This choice that was made concerning the control subjects for within-pair comparisons would not have been appropriate in terms of between-groups comparisons, because the purpose there was also to examine the differences in the affective variables, and these variables could not be controlled.

Research areas in relation to the sample

In conclusion, the sample can be divided into different groups contrasting twin-nontwin, identical-fraternal twin, and male-female differences. The whole sample of 190 subjects was used to test research questions (1), (4), and (5):

- the relationship between proficiency and orientation, self-concept, and strategies;

- gender differences; and
- interrelationships between the affective and cognitive variables (except those concerning personality).

An exception was made concerning the connection between personality and proficiency in research question (1) because of the availability of the data.

The sample of 22 twins and their two types of control groups of the same size were used to test

- the general relationship between personality and proficiency (the twins and control group (1));
- between-groups differences among twins and nontwins (the twins and control group (1)); and
- within-pair differences among twins and nontwins (the twins and control groups (2) and (3)).

Within-pair analyses involved different controls (the groups chosen by the present writer) than the other two analyses (the group chosen at the Department of Psychology). The control groups and the group of twins consisted of females only, so the findings of these research questions will not be concerned with gender differences.

It must be added once more that personality data were available only for the sample of twins and control group (1). Data had been collected on the personality factors of the twins and this control group for the research project in which the Department of Psychology was involved during the spring of 1995. These particular data were also used in the present study. Data on other variables involved in the study were collected from all 190 subjects for the present study. These data were collected by the present writer and dealt with proficiency in English, orientation in the classroom, foreign language self-concept, and language learning strategies.

The entire sample was big enough for credible findings. The sample of twins was, however, smaller, because it was difficult to find subjects who met all the required criteria (age, gender, zygosity) and were within reach. The sample, however, was adequate for the purpose of the present study.

3.5 Pilot study and data collection

The data collection procedures including the pilot study were carried out in many phases, each of which will be here dealt with. Each school was visited to collect data on the affective and cognitive variables of orientation, self-concept, and strategies. The data were collected by means of questionnaires, and this was done by the present writer. The data on personality factors and background information about the twins and their original control pairs, which had been collected earlier, were received from the Department of Psychology. The data on proficiency were collected by the present writer by asking the teachers to write down the lists of grades in English given in the spring of 1995. The teachers were also asked to evaluate the pupils' written and oral language skills separately in the autumn of 1995. Furthermore, a test was arranged by the present writer to assess the proficiency of the whole sample by one method and to control individual differences in evaluations by the teachers.

To summarize, the data were collected on five groups of variables:

- (1) orientation in the classroom;
- (2) foreign language self-concept;
- (3) language learning strategies;
- (4) personality factors and background information; and
- (5) proficiency in English.

Variable groups (1), (2), and (3) can be defined by the term language learning behaviour. Each data category will be dealt with in detail later.

The *background information* about the locations of the chosen schools and the identifications of the twins and their control pairs were received *before the data collection of language learning behaviour* and achievement. The information about zygosity was also necessary. At this point the data on personality factors were also available. The data were collected by the Department of Psychology, University of Jyväskylä, during the spring of 1995. The Department participated in a Finnish-American research project, whose aim was to study all 12-year-old twins in Finland. The teachers and parents of the twins had filled questionnaires concerning the personality of the children. The teacher ratings were available for the twins and their control pairs, but the

parental ratings were available for the twins only, so they were not used in the present study. Peer evaluations were also made, but at the time they were not all available. The personality data was only a small part of all the data used. The purpose of the study was not to concentrate on comparing personality measures. Teacher ratings were considered appropriate for the purposes of a study concerning school achievement.

Before the language behaviour questionnaire could be introduced in the ten classes in the sample, it had to be *pilot tested*. This initial questionnaire consisted of three parts: orientation in the classroom, foreign language self-concept, and language learning strategies. It was actually a combination of three different questionnaires. The pilot study was undertaken to make sure that each part was suitable for sixth graders. The pilot study was necessary to add to the credibility of the study.

The sixth class where the questionnaire was tested was located in Jyväskylä, which is bigger than the towns where the eight other schools also in Central Finland were located and smaller than Tampere, the town where the other two schools were located. The students in the test class were asked to fill the questionnaire, and mark each item that they considered difficult or did not understand, and write down comments. They were encouraged to comment on individual statements, the whole parts of the questionnaire, and the entire questionnaire, in general. They were also allowed to write down positive comments.

The general finding was that the pupils found the questionnaire interesting, and they confirmed that a child at their age was able to complete a questionnaire like that. Each pupil was asked to comment on this question, and none of the 14 pupils considered the questionnaire too difficult for a 12-year-old pupil. The pupils found, however, a few individual items in the questionnaire strange. They were either removed from the questionnaire or revised and simplified, so that there were no difficult words or phrases in them. No data analysis was made of the pilot study, the purpose being just to test the suitability of the questionnaire.

More precisely, the *data collection* of the language behaviour variables with the help of the revised questionnaire was carried out by making ten trips to

the schools in the autumn semester of 1995. This was done by the present writer. The schools were contacted, and arrangements were made with the English teachers. All ten classes agreed to devote one lesson to the filling of the questionnaires. Through this arrangement it was made sure that all the pupils who were at school at the time of the lesson returned the questionnaires. The twins were not aware of being a special interest group. Thus responses were not affected by this group membership. In other words, a nonintrusive method was used. All the possible questions arising from the questionnaire were answered, and instructions were given to avoid misunderstandings. The general finding was that most pupils were quite excited to participate in the study. Also, most teachers found the change in the routine welcome.

Before starting to fill the questionnaire, the pupils were given information and instructions concerning it. They were told to read the statements carefully and mark the best alternatives. They were also advised to mark the immediate reaction and not to think about them too long. They were encouraged to ask for advice, if they had any problems. They were also told to be honest, because there were no right answers and all the opinions were equally valuable. They were also told that their teachers would not read the answers.

The data on proficiency in English were collected during the autumn semester of 1995. The lists of the students' English grades and the separate grades of oral and writing skills were received at the time of the trips to collect language behaviour data. A few weeks later a common test was designed and sent to all the schools. The test will be dealt with in detail when the structure of the measure will be reported. The teachers were given instructions as to how to mark the test, and they sent the results of each part back. Some of the teachers did not have the time to correct the test, but all the teachers agreed to administer it.

After the collection, the data were processed to be statistically analysed. The 190 questionnaires, background information, grades, test results, etc. were converted into figures and saved in files. Some items in the questionnaire were converse: the ratings were converted. The data were finally analysed statistically.

4 RESULTS

The results of the study consist of a wide range of statistical data. To follow the order of the research questions the findings are divided into seven groups:

- (1) distributions of variables;
- (2) those concerning the general relationships between achievement in English and affective or cognitive variables;
- (3) those concerning twin-singleton and twin differences in these relationships;
- (4) those concerning within-pair differences;
- (5) those concerning gender differences;
- (6) those concerning interrelationships between affective and cognitive variables; and
- (7) those concerning learner types (supplementing the knowledge of interrelationships).

Each group will be dealt with in detail, and tables will be used to illustrate the results. In the context of (inter)relationships, both correlation coefficients and p-values are shown (e.g. .4310, $p=.000$). Both Pearson's and Spearman's correlations are reported. Group comparisons are illustrated with the help of means, standard deviations, and p-values. All reported p-values refer to two-tail significance. It must be noted that if a subject had any missing points in an aggregated variable, he was excluded in the analyses. This affected the total number of cases in some analyses. Cluster analyses will be illustrated with the help of mean scores. Histograms and bar charts will be used to illustrate the results. The frequencies in the graphs always indicate the number of cases. It must be noted that the histograms of psychological variables display the average scores of the aggregated variables (consisting of several items). The findings will be reported with reference to earlier studies. The analysis will continue in the discussion.

4.1 Distributions of variables

Normality of distributions forms the basis for statistical analyses. Firstly, distributions will be analysed in the subgroups. Secondly, they will be viewed in the whole sample.

Subgroups

The sample was divided into groups of twins vs. singletons, identical vs. fraternal twins, and males vs. females. Before group comparisons, the *normality of distributions* was analyzed in *each group* by means of Kolmogorov-Smirnov Goodness of Fit Tests. The results of the distribution tests are displayed in Tables 5 and 6. The significance level was higher than .05 in terms of almost all the distributions suggesting that there was no significant difference between a normal distribution and the distributions of the separate groups of the present sample in most cases. The exceptions were the distributions among the singletons in course grades and written English evaluations, and the distributions among both the females and males in course grades and spoken English evaluations as well as the distribution among the females in written English evaluations.

A probable explanation for the non-normal distributions is that the proficiency measure did not differentiate between learners normally, and variation between normal and non-normal distributions was random.

Table 5. Normality of distributions among the twins and singletons.

K-S Z	Twins	Singletons	Identical	Fraternal
<i>N</i>		<i>i.e. control</i>	<i>twins</i>	<i>twins</i>
		<i>group (1)</i>		
Grades	.9917 (<i>N</i> =22)	1.4884* (<i>N</i> =21)	.9563 (<i>N</i> =10)	.5455 (<i>N</i> =10)
Written English	1.1344 (<i>N</i> =22)	1.4629* (<i>N</i> =21)	.9563 (<i>N</i> =10)	.5455 (<i>N</i> =10)
Spoken English	1.1686 (<i>N</i> =22)	1.1485 (<i>N</i> =21)	.7740 (<i>N</i> =10)	.8783 (<i>N</i> =10)
Test	.6375 (<i>N</i> =22)	.4961 (<i>N</i> =21)	.5670 (<i>N</i> =10)	.7513 (<i>N</i> =10)
Orientation	.7642 (<i>N</i> =21)	.6903 (<i>N</i> =20)	.9484 (<i>N</i> =10)	.3540 (<i>N</i> =9)
Self-concept	.5624 (<i>N</i> =20)	.5812 (<i>N</i> =18)	.3435 (<i>N</i> =9)	.5039 (<i>N</i> =9)
Direct strategies	.8290 (<i>N</i> =20)	.4495 (<i>N</i> =19)	.6151 (<i>N</i> =10)	.7212 (<i>N</i> =9)
Metacognitive strategies	.6175 (<i>N</i> =21)	.6141 (<i>N</i> =21)	.4122 (<i>N</i> =10)	.5411 (<i>N</i> =9)
Socioaffective strategies	.5185 (<i>N</i> =21)	.4752 (<i>N</i> =20)	.4354 (<i>N</i> =10)	.4738 (<i>N</i> =9)
Active prosociality	.6754 (<i>N</i> =22)	.6049 (<i>N</i> =20)	.6656 (<i>N</i> =10)	.6325 (<i>N</i> =10)
Anxiety	.5772 (<i>N</i> =20)	.6874 (<i>N</i> =19)	.5823 (<i>N</i> =8)	.6142 (<i>N</i> =10)

Note. K-S Z= value of the test variable, N= Number of cases, * Significance level .05.

Table 6. Normality of distributions among the males and females.

K-S Z	<i>Males</i>	<i>Females</i>
<i>N</i>		
Grades	1.5742* (<i>N</i> =86)	2.2059*** (<i>N</i> =104)
Written English	1.2326 (<i>N</i> =79)	2.4030*** (<i>N</i> =90)
Spoken English	1.5793* (<i>N</i> =79)	2.0108*** (<i>N</i> =90)
Test	.9979 (<i>N</i> =81)	1.2495 (<i>N</i> =102)
Orientation	.8859 (<i>N</i> =100)	1.1571 (<i>N</i> =78)
Self-concept	.6306 (<i>N</i> =82)	.5650 (<i>N</i> =96)
Direct strategies	.9954 (<i>N</i> =78)	.7396 (<i>N</i> =97)
Metacognitive strategies	1.0091(<i>N</i> =82)	.8296 (<i>N</i> =102)
Socioaffective strategies	.6094 (<i>N</i> =77)	.8365 (<i>N</i> =99)

Note. K-S Z= value of the test variable, N= Number of cases, * Significance level .05, *** Significance level .001.

Accordingly, only some proficiency results of some groups had non-normal distributions, but the affective and cognitive factors had normal distributions among all the groups. If the distribution of either of the compared groups was not normal with reference to the examined variable, nonparametric median tests of independent samples were computed instead of t-tests of independent samples, which were computed in other cases. Consequently, the normality of distributions was considered to select appropriate statistical tests

of significance and obtain reliable results. Median tests had to be used in grade and written English comparisons between the twins and singletons and all the proficiency comparisons, except the test results, between the males and females. T-tests were applied only after analysing the normality of distributions and the equality of variances.

Table 7. Normality of the distributions of within-pair proficiency differences.

K-S Z	Grade	WE	SE	Test
<i>N</i>				
<i>Twins</i>	1.1721 (N=11)	1.3294 (N=11)	1.7498** (N=11)	.5495 (N=11)
<i>Identical twins</i>	1.0569 (N=5)	1.0569 (N=5)	no variance***	.5037 (N=5)
<i>Fraternal twins</i>	.8215 (N=5)	.8215 (N=5)	1.0569 (N=5)	.4442 (N=5)
<i>Nontwins of control group (1)</i>	.6897 (N=11)	.9590 (N=11)	.7260 (N=11)	.7345 (N=11)
<i>Nontwins of control group (2)</i>	.9495 (N=11)	.9495 (N=11)	.9280 (N=11)	.7576 (N=11)

Note. WE= Written English, SE= Spoken English, K-S Z= value of the test variable, N= Number of cases, ** Significance level .01, *** no variance, i.e. a very non-normal distribution.

The normality of distributions was examined also for within-pair proficiency comparisons¹. Consequently, the normality of within-pair differences had to be studied in each group. The distribution tests were run among all the groups including the twins and control groups (see Table 7). The distributions of two groups were not normal in spoken English: all the twins in general and the identical twins separately. This gives indication of the within-pair results to be reported later, i.e. great similarity in twin pairs. The

¹ In these comparisons, the difference between the co-twins was computed in each pair, and this procedure was also carried out concerning the within-pair difference between the members in

distributions of the two singleton groups and the fraternal twins were normal. The other proficiency measures had normal distributions. Thus, median tests were computed instead of t-tests in terms of the twin-singleton comparisons of within-pair differences in spoken English (except for comparisons between the fraternal twins and controls).

This advance knowledge of the displayed distributions helps in reading the results. In some additional cases such as item comparisons, the group comparisons of clusters, and sub-test comparisons, the distributions also had to be checked out to choose appropriate statistical tests. This information is not essential throughout the thesis, so the results of these tests will be reported in appropriate contexts later.

Whole sample

The *proficiency* results are the basis of the study. Their distributions have to be discussed separately. It is useful to see the distributions and other values in the *whole sample*. They were earlier discussed in terms of the subgroups of the sample. The proficiency data consisted of the grades given by the teachers in the spring of 1995 (from 4 to 10), numeric evaluations (from 4 to 10) of the students' writing and oral skills given by the teachers in the autumn of 1995 for the purposes of the present study, and the test in English (the maximum of 70 points in total scores) held during the autumn semester of 1995. The test results consisted of four parts: listening comprehension (maximum 12 points), reaction (20 points), reading comprehension (14 points), and grammar (24 points). The mean scores are shown in Table 8. The scores indicate that the test was rather easy, the grammar being the most difficult part and reading comprehension the easiest part on an average.

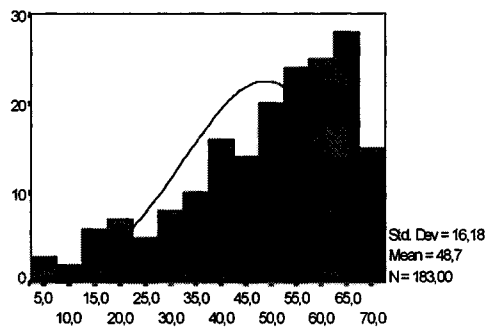
each singleton control pair. After this, the average within-pair differences were compared between the twins and singletons and some subgroups.

Table 8. Mean scores on sub-tests and their percentages of the maximum points.

<i>Test results</i>	Mean	SD	Percentage
Listening	8.213 (N=183)	3.32	68.4 %
Reaction	13.721 (N=183)	5.35	68.6 %
Reading	10.831 (N=183)	3.53	77.4 %
Grammar	15.978 (N=183)	6.30	66.6 %
Total	48.743 (N=183)	16.18	69.6 %

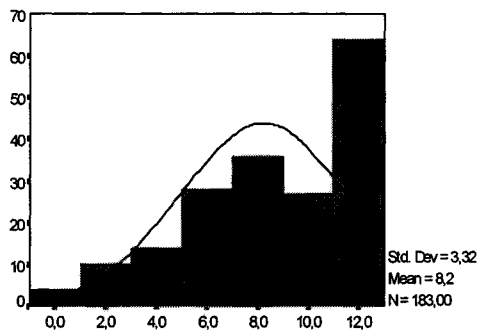
Note. SD= Standard Deviation, N= Number of cases.

The normality of the *test* score distribution in the whole sample can be further analyzed with the help of histogram graphs (see Figures 2-6). Analysing this measure more closely is important, because it included several parts. The graphs show the distributions in the test. As can be seen from them, the distributions were not normal in the whole sample. In fact, they were far from normal concerning some parts of the test. There was a tendency of too many good points, which suggests that the test was too easy and did not differentiate between good and highly excellent students according to the normal curve. Instead, reading and listening, in particular, had far too many excellent scores. There was a clear tendency of good points also in the reaction part. These non-normal distributions were also reflected in the distribution of the total scores. This problem was solved by using nonparametric (median) tests when required.



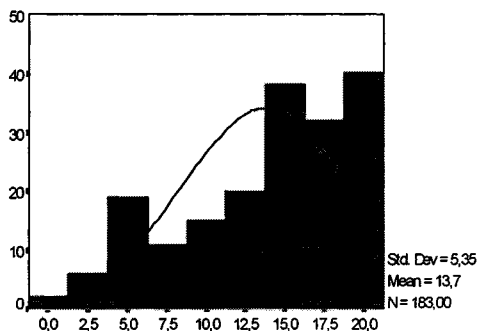
Note. Scale: 0-70 points, Std. Dev= Standard Deviation, N= Number of Cases.

Figure 2. Frequency distribution of total test scores.



Note. Scale: 0-12 points, Std. Dev= Standard Deviation, N= Number of Cases.

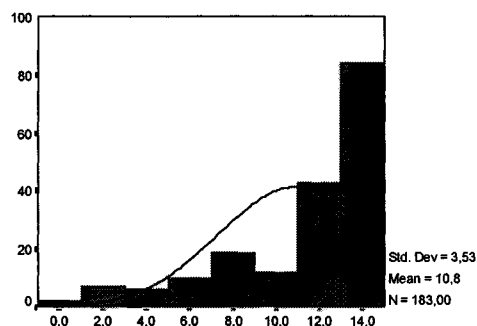
Figure 3. Frequency distribution of listening scores.



Note. Scale: 0-20 points, Std. Dev= Standard Deviation, N= Number of Cases.

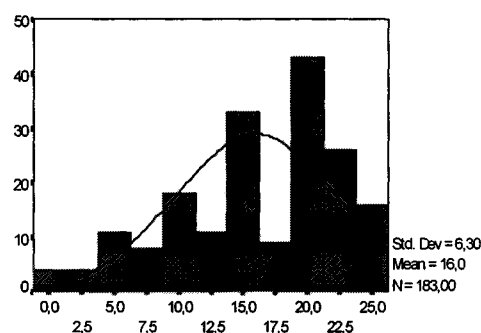
Figure 4. Frequency distribution of reaction scores.

The frequencies were distributed so that 4.4% of all the students who participated in the test scored 1-14 points, 8.7% scored 15-28 points, 18.0% scored 29-42 points, 27.3% scored 43-56 points, and 41.5% scored 57-70 points.



Note. Scale: 0-14 points, Std. Dev= Standard Deviation, N= Number of Cases.

Figure 5. Frequency distribution of reading scores.

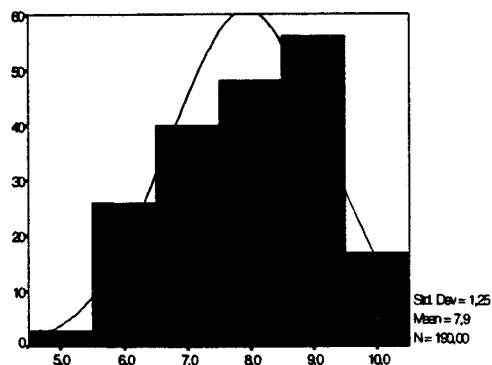


Note. Scale: 0-24 points, Std. Dev= Standard Deviation, N= Number of Cases.

Figure 6. Frequency distribution of grammar scores.

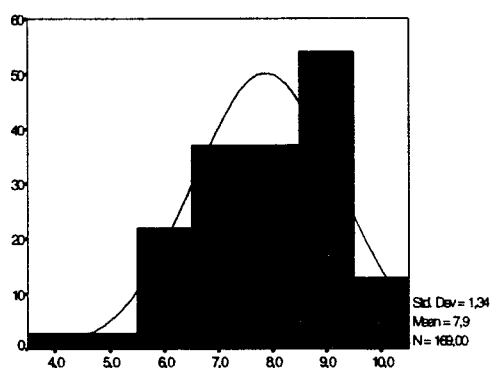
Figures 7-9 display the normality of distributions of the grades, written English, and spoken English. The frequency of grades was distributed so that 15.3% of the subjects got the grade 5-6, 46.3% the grade 7-8, and 38.4% the grade 9-10. Written English had the percentages 1.8% for the rating 4, 14.8% for 5-6, 43.8% for 7-8, and 39.6% for 9-10. The equivalent percentages of spoken English were 1.2%, 14.8%, 47.3%, and 36.7%. The distributions were

not normal in the whole sample, although most of the subgroups displayed normal distributions.



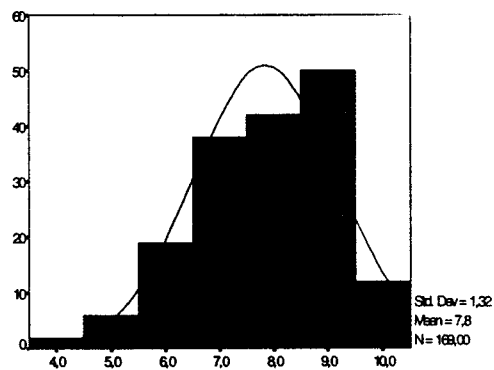
Note. Scale 4-10.

Figure 7. Frequency distribution of grades.



Note. Scale 4-10.

Figure 8. Frequency distribution of written English evaluations.



Note. Scale 4-10.

Figure 9. Frequency distribution of spoken English evaluations.

4.2 General relationships between proficiency in English and affective/ cognitive factors

The analysis of the relationships between achievement in English and affective/cognitive variables is divided into four aspects. The proficiency in English is viewed in relation to:

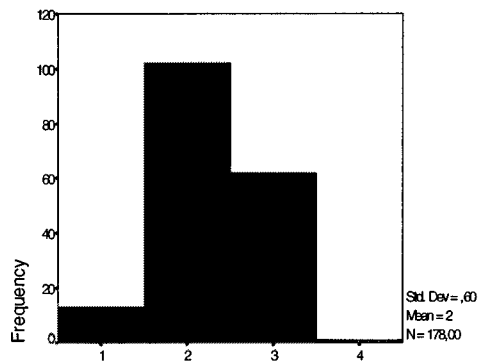
- (1) orientation in the classroom;
- (2) foreign language self-concept;
- (3) language learning strategies; and
- (4) personality factors.

The findings will be first reported and then analysed. Pearson's correlations are mostly used, but Spearman's correlations are also reported here, since the affective/cognitive variables had ordinal scales. The results will be interpreted according to the general tendency indicated by the two correlation types. It must be noted that anxiety is the only variable that indicates negative influence, and thus the correlations with positive variables are likely to be negative. Orientation, in turn, indicates positive influence, but the scale was converse (from positive to negative). Thus a high degree of intrinsic orientation indicates negative values with high scores in other positive variables. This also applies to interrelationships between orientation and other psychological variables in section 4.5. Mean scores and other figures remained unchanged.

4.2.1 Orientation in the classroom and proficiency

The general finding concerning orientation in the classroom suggests that sixth graders are not clearly more intrinsically than extrinsically oriented, although the intrinsic pole was somewhat more common. The orientation scale consisted of four points (1-4). The first two points represented the intrinsic pole, and the last two points reflected the extrinsic pole. Unlike the other scales, this was from positive to negative. The *mean score* was 2.23, which reflected the view that the intrinsic statement was "sort of true" of the subject. The fact that the

average score was over 2.00, something between intrinsic and extrinsic poles, implies that orientation does not seem particularly strong, but at this age students' own interests and preferences do not seem particularly strong as yet either. The findings do not replicate those by Chapman et al. (1990), who found out that in the sixth grade perceived control was considerably high.



Note. 1= intrinsic orientation: really true, 2= intrinsic orientation: sort of true, 3= extrinsic orientation: sort of true, 4= extrinsic orientation: really true; Std. Dev= Standard Deviation, N= Number of cases.

Figure 10. Frequency distribution of scores on orientation in the classroom.

Figure 10 indicates the *frequency* of the average scores (of the items in the variable) of the subjects: 57.3% evaluated themselves as "sort of" intrinsically oriented and 34.8% as "sort of" extrinsically oriented. The percentage of "really" intrinsically oriented subjects was 7.3% and of "really" extrinsically oriented 0.6%. Only a few subjects perceived themselves as clearly intrinsic or extrinsic, although somewhat intrinsic motivation was on an average more common.

Although the general orientation was not strongly intrinsic, the *correlation* results indicated (see Table 9) that the students who were intrinsically oriented were significantly more successful in all four proficiency measures than the students oriented to the extrinsic poles. The associations were significant but not very strong according to the coefficients. The correlations ranged from $-.3973^{***}$ to $-.4757^{***}$. Written English had the weakest associations. Spearman's correlations generated slightly stronger associations than Pearson's correlations.

Table 9. Correlations between orientation and proficiency measures.

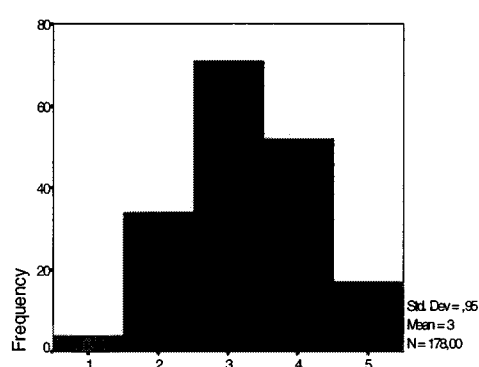
<i>Orientation</i> <i>in the</i> <i>classroom</i>	Grade (N=178)	WE (N=158)	SE (N=158)	Test (N=171)
Pearson	-.4310***	-.3973***	-.4388***	-.4217***
Spearman	-.4408***	-.4283***	-.4643***	-.4757***

Note. WE= Written English, SE= Spoken English, N= Number of cases, *** Significance level .001.

Although the relationships were not remarkably strong, the findings parallel those by Samimy and Lee (1997), Van der Walt and Dreyer (1997), Wen (1997), Ehrman and Oxford (1995), Clement et al. (1994), Short (1992), Chapman et al. (1990), Grolnick et al. (1991), and Laine (1988) of the significance of control and motivational orientation. The subjects in the studies by Chapman et al., Grolnick et al., and Short were elementary school children, like the subjects in the present study. The findings by Samimy and Lee, Van der Walt and Dreyer, Wen, Ehrman and Oxford, as well as Short, in particular, are comparable with the findings in the present study, because they dealt with intrinsic motivational orientation. The other studies had slightly different biases: they measured either the degree of motivation (Laine), agency beliefs (Chapman et al.), means-end-related beliefs (Grolnick et al.), or self-confidence motivational processes (Clement et al.). The studies by Laine as well as Van der Walt and Dreyer are relevant here, because they dealt with motivational orientation in relation to the second language learning of English. The studies by Ehrman and Oxford, Samimy and Lee, Wen, and Clement et al. were also associated with language learning. The other studies measured general cognitive performance at school. Nevertheless, all the studies have something in common: the positive relation of a high degree of motivation or intrinsic control to cognitive performance was supported.

4.2.2 Foreign language self-concept and proficiency

Foreign language self-concept was assessed by a 5-point-scale (1-5). The findings indicate that foreign language self-concept among sixth graders is fairly positive on an average: at least rather positive than negative. The *mean score* was 3.26. The score 3.00 would reflect the answer "difficult to say" and the score 4.00 the answer "agree to some extent" to a question of the degree of perceived competence.



Note. 1= fully disagree, 2= slightly disagree, 3= difficult to say, 4= agree to some degree, 5= fully agree; Std. Dev= Standard Deviation, N= Number of cases.

Figure 11. Frequency distribution of scores on foreign language self-concept.

The 5-point-Likert-scale that was used is slightly problematic, because it measures the degree of behaviour (unlike the orientation scale, in which there were two distinct opposite categories), and score 3 points to the inability of the subject to answer the question. The *frequencies* of the self-concept ratings, however, indicate that a great many of the students actually reported a high degree of perceived competence, since the average score 4 was reported by 29.2% and the score 5 by 9.6% of those who answered the questions, although the average score 3 was reported by 39.9% of the subjects. It must be noted that these subjects did not have low perceptions either. Low perceptions were not reported very frequently: the score 2 was reported by 19.1% and the score 1 by 2.2% of the students. (See Figure 11.)

Foreign language self-concept was, as was assumed, an important predictor of success in English (see Table 10). All four proficiency measures generated statistically significant *correlations* with the self-concept variable. The correlations ranged from .5795*** to .6344***. Spoken English had the strongest associations in both Pearson's correlations and Spearman's correlations. The coefficients indicate that the correlations were quite high: the association was stronger than that between orientation and proficiency.

Table 10. Correlations between foreign language self-concept and proficiency.

<i>Foreign language self-concept</i>	Grade (N=178)	WE (N=160)	SE (N=160)	Test (N=172)
Pearson	.6035***	.5795***	.6245***	.5809***
Spearman	.6125***	.5976***	.6344***	.6171***

Note. WE= Written English, SE= Spoken English, N= Number of cases, *** Significance level .001.

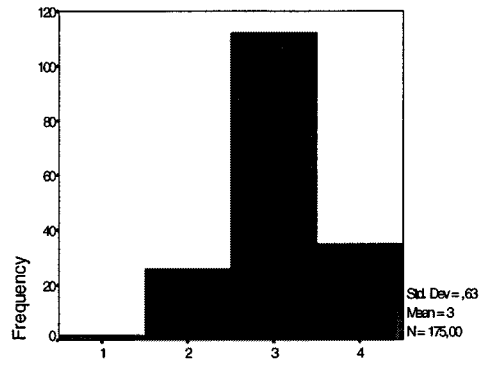
The results can be interpreted in the light of several other studies. The effects are in accord with previous related findings of Shameem (1998), Ehrman and Oxford (1995), Laine (1988), Leondari (1993), Sink et al. (1993), Pintrich and De Groot (1990), and Zimmerman and Martinez-Pons (1990). The samples of all the studies but those of Shameem, Ehrman and Oxford, as well as Laine consisted of elementary school students. The study by Laine is important in terms of the present study results, because it dealt with English language learning in relation to perceptions of competence, like the present study. The concept of perceived competence was slightly different in some studies; the studies by Pintrich and De Groot as well as Zimmerman and Martinez-Pons concentrated on self-efficacy, which is a task-related perception

of competence (Berry & West 1993, 351-356). Nevertheless, the conclusion can be drawn that there is a relationship between self-concept and learning outcomes, indicated by the proficiency in English, for example.

4.2.3 Language learning strategies and proficiency

The overall use of strategies seems rather frequent among 12-year-old students. The use of strategies was assessed by a 5-point-scale (1-5). The rating 3.00, which was the *average score* of all the strategies, reflected the view that the strategy use was "somewhat true" of the subject. Metacognitive strategies were on an average the most frequently used strategies in the study (mean=3.11). The argument by O'Malley and Chamot (1990, 118-122) that beginning level students use more direct strategies and intermediate students use more metacognitive strategies was not fully confirmed, if sixth graders are considered beginners. There was no big difference between the variables. Besides metacognitive strategies, also the use of socioaffective strategies (another group of indirect strategies) was fairly frequent (mean=2.91). The statement that the use of certain direct strategies is high across all levels (see O'Malley & Chamot 1990, 118-122) was confirmed at least concerning the students with elementary knowledge. The findings of the present study indicated a frequent use of direct strategies (mean=3.02). Finnish sixth graders seem to be something between beginning and intermediate level students in terms of strategy use.

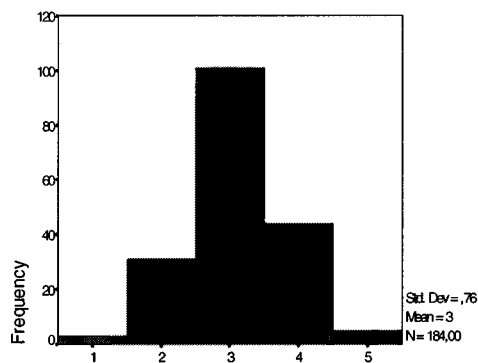
Oxford (1990, 140-143) predicted a minor use of affective strategies. The minor use of the affective strategies in the present study may be the reason why the scores on the use of socioaffective strategies were relatively low. Social strategies might be employed more often than affective strategies. An examination of different items in Table 19 (discussed later) shows that the scores on some individual social strategies were around 3.5 among the twins and singletons.



Note. 1= never or almost never true, 2= usually not true, 3= somewhat true, 4= usually true, 5= always or almost always true; Std. Dev= Standard Deviation, N= Number of cases.

Figure 12. Frequency distribution of scores on direct strategies.

The *frequencies* also indicate that the statement 3 was the most popular answer, whereas the statement "usually true" (4) also attained a certain percentage. For example, in terms of direct strategies (see Figure 12) the score 3 was reported by 64.0% and the score 4 by 20.0% of the students. The score 2 was reported by 14.9% and the score 1 by 1.1% of those who answered the question.

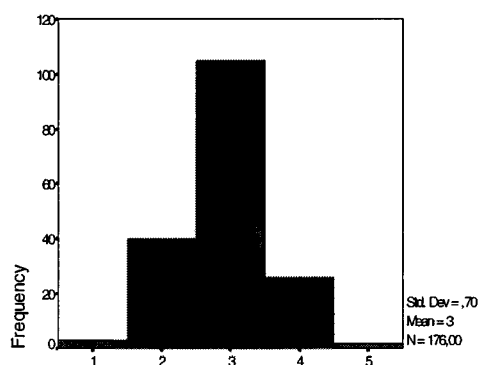


Note. 1= never or almost never true, 2= usually not true, 3= somewhat true, 4= usually true, 5= always or almost always true; Std. Dev= Standard Deviation, N= Number of cases.

Figure 13. Frequency distribution of scores on metacognitive strategies.

Figure 13 demonstrates that in terms of metacognitive strategies (the strategy group with the highest mean score) the score 3 was reported by 54.9%

and the score 4 by 23.9% of the children. The score was 2 among 16.8%, 5 among 2.7%, and 1 among 1.6% of the students.



Note. 1= never or almost never true, 2= usually not true, 3= somewhat true, 4= usually true, 5= always or almost always true; Std. Dev= Standard Deviation, N= Number of cases.

Figure 14. Frequency distribution of scores on socioaffective strategies.

Figure 14 indicates that the use of socioaffective strategies (the strategy group with the lowest mean score) was on an average "somewhat true" (3) among 59.7% of the subjects. The score 2 was the average among 22.7%, the score 4 among 14.8%, the score 1 among 1.7%, and 5 among 1.1% of the subjects. There was a slight tendency of a less confident use of socioaffective strategies as compared to the other two strategy groups. It is possible that some students reported "somewhat true", when they could not tell the use for sure.

There were rather high and significant *correlations among different strategies*. The coefficient between direct and metacognitive strategies was .6960, $p=.000$ in Pearson's correlation and .6633, $p=.000$ in Spearman's correlation, between direct and socioaffective strategies .7310, $p=.000$ (Pearson) and .6697, $p=.000$ (Spearman), and between metacognitive and socioaffective strategies .7668, $p=.000$ (Pearson) and .7505, $p=.000$ (Spearman). The association was the strongest between the two indirect strategies. Evidently the use of one strategy is linked to the use of other strategies. In other words, pupils often either use many different strategies or not use any of them very much.

Table 11. Correlations between language learning strategies and proficiency.

<i>Strategy:</i>	Grade	WE	SE	Test
<i>Direct</i>				
Pearson	(N=175)	(N=156)	(N=156)	(N=168)
Spearman	.2454***	.2305 **	.2647***	.3206***
	.2290**	.2042*	.2298**	.3262***
<i>Metacognitive</i>				
Pearson	(N=184)	(N=164)	(N=164)	(N=177)
Spearman	.1218	.0821	.1148	.1620*
	.0949	.0703	.0919	.1863*
<i>Socioaffective</i>				
Pearson	(N=176)	(N=160)	(N=160)	(N=169)
Spearman	.1774*	.2105**	.2002*	.2592***
	.1831*	.2178**	.2139**	.2854***

Note. WE = Written English, SE = Spoken English, N= Number of cases, * Significance level .05, ** Significance level .01, *** Significance level .001.

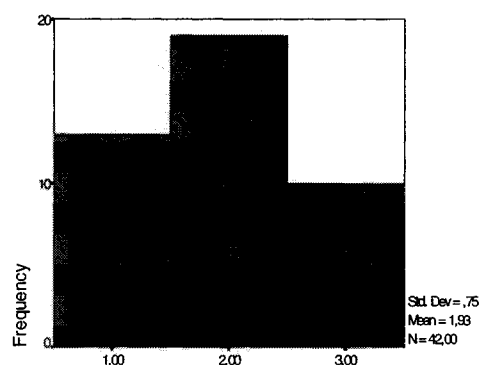
The correlations between strategy use and proficiency point to some importance of strategy use in terms of language learning success (see Table 11). The connections were low in spite of some statistically significant relationships. The correlations ranged from .0703 to .3262***. Some significant influence was evident in terms of direct and socioaffective strategies on all the proficiency measures. As noted above, the coefficients indicated that the relationships were not particularly strong concerning each variable combination. The language test results had the strongest associations, although the correlations were rather low. Metacognitive strategies were significantly associated with only the test results, but the association was weak. If anywhere, metacognitive goal setting and monitoring might help in a test situation rather than in achieving a good evaluation over a period of time. Both Pearson's and Spearman's correlations were in line with each other. Interrelationships

between different potential predictors and cluster analyses that are reported later will cast some more light on these results.

The results can be discussed in relation to several earlier studies. The studies by Bremner (1997), Ehrman and Oxford (1995), Pintrich and De Groot (1990), Zimmerman and Martinez-Pons (1990), and Wong-Fillmore (1976) supported the connection between the use of strategies and success. The findings of Bremner are particularly related to the present study, because the same strategy inventory was used in both studies in relation to learning English as a foreign language. Although the associations were not particularly strong in the present study, some significant interrelationships were found between proficiency and direct strategies, which were also influential in Bremner's study. The findings by Wong-Fillmore are also relevant for the present study, because her study highlighted the significance of social strategies for the learning of English as a second language. The subjects were younger, but sixth graders are children, too. Socioaffective strategies were not strongly associated with proficiency in the present study, but some significant relationships were evident. The research method in the present study was perhaps not the best possible to detect the influences of these strategies. Wong-Fillmore used observation, which may have resulted in a deeper analysis and different results. The context was also different from that of the present study. The study by Ehrman and Oxford is also relevant, because it revealed a relationship between foreign language learning and cognitive strategies. Their study was different from the present study mainly because their subjects were adults. The other studies dealt more generally with cognitive performance in the classroom. Zimmerman and Martinez-Pons (1990) found out that metacognitive strategies such as goal-setting, planning, structuring, and monitoring were used more frequently by gifted students. These findings were in accord with those by Pintrich and De Groot (1990). These strategies were not strongly related to proficiency in the present study, but one significant association was, however, found. The differences between these studies and the present study may also be due to a different type of assessment of achievement.

4.2.4 Personality factors and proficiency

Personality factors were measured with a 4-point-scale (0-3). High ratings reflect the strength of the rated characteristic; it must be noted that the strength of active prosociality is considered an advantage, but the strength of anxiety is considered a disadvantage. The general finding was that active prosociality was on an *average* (mean=1.92) "clearly observable but not emphasized" among the students in the sixth grade. Anxiety (mean=1.03) was typically reflected by the statement "sometimes observable".

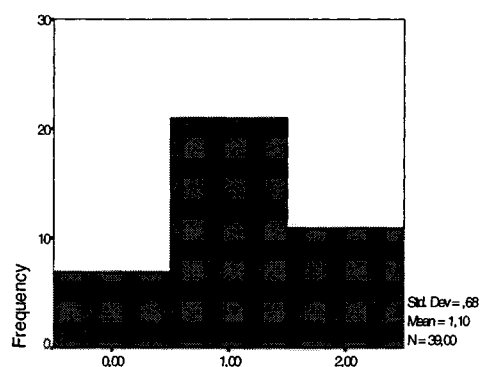


Note. 0= not observable, 1= sometimes observable, 2= clearly observable but not emphasized, 3= very true; Std. Dev= Standard Deviation, N= Number of cases.

Figure 15. Frequency distribution of scores on active prosociality.

The *frequency* in Figure 15 indicates that active prosociality was in 45.2% of the ratings "clearly observable but not emphasized" (score 2). In the second largest group it was characterized as "sometimes observable" (score 1 including 31.0% of the ratings), and the active prosociality of the rest of the subjects was "very true" (23.8%) indicated by the score 3.

Figure 16 shows that anxiety was "sometimes observable" in 53.8% of the ratings indicating score 1. It was "clearly observable but not emphasized" (2) among the second largest group of 28.2% of the subjects and "not observable" (0) among 17.9% of the subjects.



Note. 0= not observable, 1= sometimes observable, 2= clearly observable but not emphasized, 3= very true; Std. Dev= Standard Deviation, N= Number of cases.

Figure 16. Frequency distribution of scores on anxiety.

Unlike the variables within the strategy factors, the social personality behaviour variables were not to measure qualitatively similar characteristics, but there was a *correlation among these personality variables*, anyway. Active prosociality was associated with a low degree of anxiety ($-.3198$, $p=.048$ in Pearson's test and $-.3497$, $p=.029$ in Spearman's test), which supports the model of Pitkänen (1969), in which anxiety and active prosociality are the opposite poles of behaviour. Strauss et al. (1989, 184-189) found in their study of the social competence of children with anxiety disorders that anxious children demonstrated shyness and loneliness, compared to their nonreferred counterparts. They were also socially withdrawn and lacked in appropriate social skills. These findings are consistent with the findings of the present study.

Significant *correlations* were found between *active prosociality* and all the *proficiency* measures except the test results (see Table 12). The correlations ranged from $.1606$ to $.5005^{***}$. It is possible that active engagement in the classroom reflected in sociability affects teachers' evaluations in the long run (grades). The test did not strongly focus on interaction either, which is more emphasized in classroom behaviour that in turn affects teacher evaluations. The correlations were relatively high for the grades and for written English. It is unexpected that oral skills were not more subject to this influence than written English skills. It is possible that the conscientiousness of the child became expressed in this construct (active prosociality), and it is required in writing

tasks rather than in speaking. Pearson's correlations were generally slightly stronger than Spearman's correlations.

Anxiety, rather unexpectedly, did not emerge as a significant negative predictor. The correlations ranged from -.0103 to -.3053. Only Spearman's correlation indicated some influence of anxiety on course grades: the association was not far from significance ($p=.059$). It is worth adding that the anxiety measure was not very reliable. This caution is relevant for all anxiety results including group comparisons and interrelationships.

Table 12. Correlations between personality and proficiency measures.

<i>Personality factor:</i>	Grade	WE	SE	Test
<i>Active prosociality</i>	(N=42)	(N=42)	(N=42)	(N=42)
Pearson	.5132***	.4820***	.4226**	.2065
Spearman	.5005***	.4843***	.3080*	.1606
<i>Anxiety</i>	(N=39)	(N=39)	(N=39)	(N=39)
Pearson	-.1976	-.1493	-.0307	.1722
Spearman	-.3053	-.2710	-.1671	-.0103

Note. WE= Written English, SE= Spoken English, N= Number of cases, * Significance level .05, ** Significance level .01, *** Significance level .001.

The results parallel the findings of Robinson et al. (1994), Short (1992), Riding and Banner (1986), Strong (1983), and Chastain (1975) about the importance of positive social style for language learning. Short and Strong studied young children, whereas Riding and Banner studied 13-14-year-old children, slightly older than those in the present sample. The samples of Robinson et al. and Chastain consisted of adults. All five studies but the one by

Short dealt with second language learning (not general school achievement) in terms of social style. It must be pointed out that in each study social style was defined differently. The studies by Riding and Banner as well as Robinson et al. revealed a link between language learning and extroversion, which includes sociability.

The results of the present study conflict with the findings about anxiety and language learning of Van der Walt and Dreyer (1997), Ehrman and Oxford (1995), Aida (1994), Ganschow et al. (1994), MacIntyre and Gardner (1994), and Pintrich and De Groot (1990). The findings are consistent with the argument by MacIntyre and Gardner (1991, 95) that anxiety may not be a relevant factor to language learning among children. This is an important finding concerning this variable. It must be pointed out that the absence of evidence may result from the fact that anxiety was measured as a trait and not as a quality dealing with language learning situations, which was the focus in the other studies.

4.3 Differences between the groups of twins and singletons

Twin-singleton group differences will be explored so that the group of twins is compared with control group (1) consisting of singletons. The findings concerning the second language learning of twins cannot be contrasted to earlier studies, because apparently there are none. All the findings are discussed together later in this chapter, by contrasting the findings about early cognitive deficits and the social style of twins.

4.3.1 Twin-nontwin differences

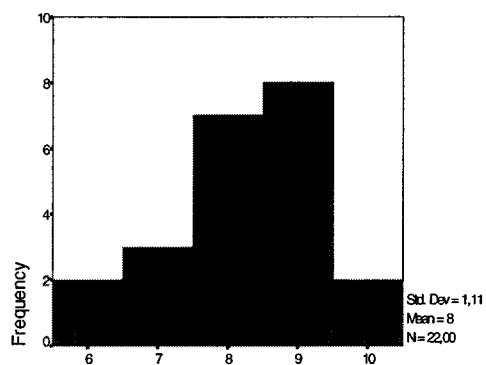
Twin-nontwin differences will be covered by dealing with the differences in proficiency and the differences in intervening variables. Both will be dealt with separately, and conclusions can be drawn on the basis of the emergence of differences and arising patterns. The general relationship between psychological factors and proficiency provide a basis for these analyses. The procedure applies to all the group differences in the study.

The investigation of twins and nontwins contains

- (1) an examination of frequencies;
- (2) an analysis of main variables (including proficiency and intervening variables);
- (3) an analysis of separate items in the variables (only the intervening variables); and
- (4) a summary.

Examination of frequencies

The *frequencies* of proficiency ratings will be reported first among both groups. Twin-singleton differences in proficiency deserve closer attention, because proficiency is a central factor in the study: the most important research question about learning outcome differences between the twins and singletons deals with it. Other potential differences primarily account for these differences. Although mean scores indicate the general differences, it is useful to know something about the frequencies among the two groups. It is worth adding that the examined frequencies indicate the scores of female subjects; quite different patterns might emerge for the males.



Note. Scale: 4-10, Std. Dev= Standard Deviation, N= Number of cases.

Figure 17. Frequency distribution of grades among the twins.

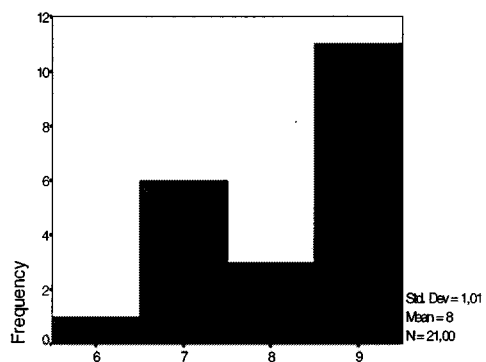
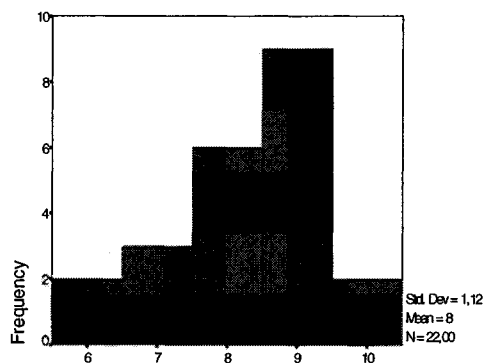


Figure 18. Frequency distribution of grades among the singletons.

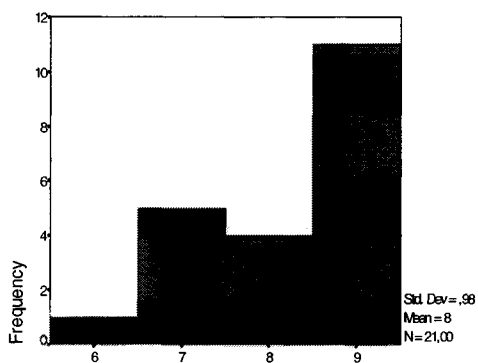
Note. Scale: 4-10, Std. Dev= Standard Deviation, N= Number of cases.

Figure 17 indicates that 45.5% of the twins got an excellent grade (9-10), 45.4% got a fairly good grade (7-8), and 9.1% a satisfactory grade (5-6). The equivalent percentages were 52.4% (9-10), 42.8% (7-8), and 4.8% (5-6) among the singletons (see Figure 18). The distribution was non-normal among the singletons.



Note. Scale: 4-10, Std. Dev= Standard Deviation, N= Number of cases.

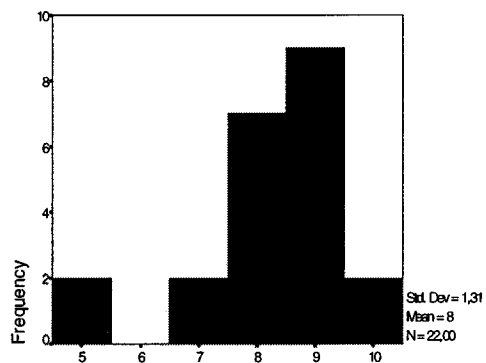
Figure 19. Frequency distribution of written English ratings among the twins.



Note. Scale: 4-10, Std. Dev= Standard Deviation, N= Number of cases.

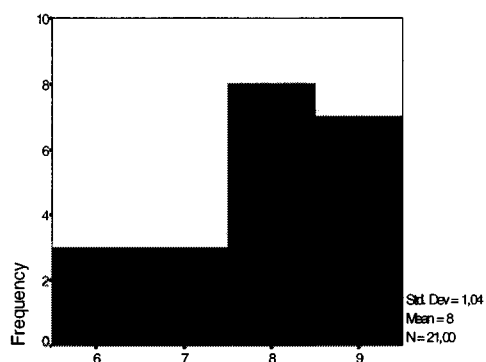
Figure 20. Frequency distribution of written English ratings among the singletons.

The rating distribution of written English were also non-normal among the singletons, but not the twins, among whom 50.0% got the rating 9-10, 40.9% 7-8, and 9.1% 5-6. The equivalent frequencies among the singletons were 52.4%, 42.8%, and 4.8%. (See Figures 19 and 20.)



Note. Scale: 4-10, Std. Dev= Standard Deviation, N= Number of cases.

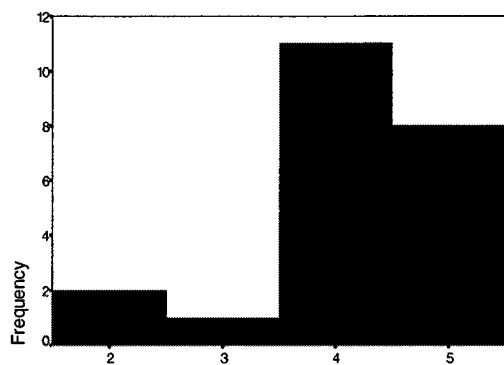
Figure 21. Frequency distribution of spoken English ratings among the twins.



Note. Scale: 4-10, Std. Dev= Standard Deviation, N= Number of cases

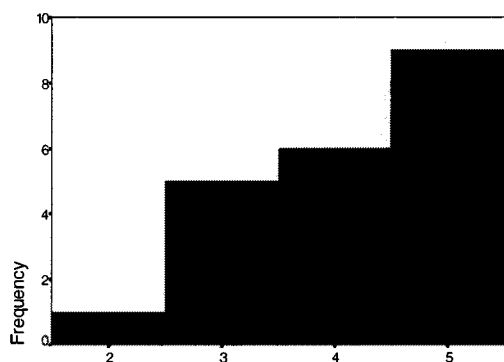
Figure 22. Frequency distribution of spoken English ratings among the singletons.

The evaluations of spoken English were distributed normally among both groups. Most of the twins got an excellent rating 9-10 (50.0%), 7-8 was the rating for 40.9%, and 5-6 for 9.1% of the children. Most of the singletons, instead, had fair oral skills reflected by ratings 7-8 (52.4%), and 33.3% got 9-10, and 14.3% 5-6. (See Figures 21 and 22.)



Note. 1= 1-14 points, 2= 15-28 points, 3= 29-42 points, 4= 43-56 points, 5= 57-70.

Figure 23. Frequency distribution of test scores among the twins.



Note. 1= 1-14 points, 2= 15-28 points, 3= 29-42 points, 4= 43-56 points, 5= 57-70.

Figure 24. Frequency distribution of test scores among the singletons.

The test scores ($N=22$ among the twins and $N=21$ among the singletons) are displayed in Figures 23 and 24. The most frequent test score was 43-56 points among the twins (50.0%) and 57-70 points among the singletons (42.9%). Conversely, the rating 57-70 was received by 36.4% of the twins and 43-56 by 28.6% of the singletons. The lower scores were more common among the singletons: 29-42 points were received by 23.8% and 15-28 by 4.8% of them. Only 4.5% of the twins scored 29-42 and 9.1% 15-28 points. The distributions were normal among both groups.

Analysis of main variables

The *proficiency* measures did not generate any significant twin-singleton differences. The average twin and singleton got the grade 8 in her report, and this was also the evaluation of her writing and oral skills by the teacher. The proficiency means for the twins were a little higher than the proficiency means for the nontwins, particularly in spoken English, but these differences were not statistically significant (see Table 13). A closer analysis of the test indicated that the twins and singletons did not differ significantly in any of the subtests either. The frequencies showed that there were different types of distributions behind fairly similar average scores.

Median tests indicate corrected values (Yates) and t-tests indicate p-values, which can be used in analyses of significance. The median scores of grades and written English (where they were relevant) had slightly higher scores for the singletons. The difference between the means and medians is due to sample errors: a non-normal distribution and the small sample size.

Table 13. Statistical figures for twin-nontwin differences in proficiency.

	Mean (SD): <i>All</i> (N=43)	Mean (SD): <i>Twins</i> (N=22)	Mean (SD): <i>Singletons</i> (N=21)	P-value/ probability
Grades	8.186 (1.05) median: 8.0	8.227 (1.11) median: 8.0	8.143 (1.01) median: 9.0	.882 (median test)
WE	8.233 (1.04) median: 9.0	8.273 (1.12) median: 8.5	8.191 (.98) median: 9.0	.490 (median test)
SE	8.070 (1.18)	8.227 (1.31)	7.905 (1.04)	.378 (t-test)
Test	51.721 (12.59)	52.409 (12.60)	51.000 (12.85)	.718 (t-test)

Note. WE= Written English, SE= Spoken English, SD= Standard Deviation, N= Number of cases.

Table 14. Statistical figures for twin-nontwin differences in intervening variables.

	Mean: Total score (SD) One item score <i>All</i>	Mean: Total score (SD) One item score <i>Twins</i>	Mean: Total score (SD) One item score <i>Singletons</i>	P- value
Orientation:				
Orientation in the classroom	22.171 (4.97) 2.217 (N=41)	21.857 (4.75) 2.186 (N=21)	22.500 (5.30) 2.250 (N=20)	.684
Self-concept:				
Foreign language self- concept	26.842 (7.27) 2.982 (N=38)	26.400 (7.90) 2.933 (N=20)	27.333 (6.70) 3.037 (N=18)	.699
Strategy:				
Direct	51.256 (10.69) 3.015 (N=39)	52.150 (10.81) 3.068 (N=20)	50.316 (10.78) 2.960 (N=19)	.599
Metacognitive	21.476 (5.44) 3.068 (N=42)	21.048 (5.22) 3.007 (N=21)	21.905 (5.74) 3.129 (N=21)	.616
Socioaffective	37.780 (8.13) 2.906 (N=41)	36.095 (6.45) 2.777 (N=21)	39.550 (9.43) 3.042 (N=20)	.177
Personality:				
Active prosociality	13.405 (5.00) 1.915 (N=42)	14.091 (5.21) 2.013 (N=22)	12.650 (4.77) 1.807 (N=20)	.358
Anxiety	4.103 (2.37) 1.026 (N=39)	4.150 (2.58) 1.038 (N=20)	4.053 (2.20) 1.013 (N=19)	.900

Note. SD= Standard Deviation, N= Number of cases.

It must be noted that in Tables 13 and 14, the score of all students involves the sample of twins and control singletons together. It is not the entire sample of 190 students. Singletons are the subjects in control group (1).

The next phase of analysis was to examine twin-singleton differences in intervening affective/cognitive variables. In Table 14 two types of means are displayed: (1) the mean of all the items within a variable as a sum and (2) the mean score on one individual item within a variable.

The analyses indicated some interesting results. The twins and singletons turned out to be rather similarly oriented with each other. In the motivational *orientation* measure both groups reported intrinsic poles to be "sort of true" on an average. The twins were slightly more intrinsically oriented than the singletons. The finding by Lytton et al. (1987) about the lack of twin-nontwin differences in dependency was supported.

There were no significant differences in *foreign language self-concept*. Both groups showed reasonable self-concepts. The singletons had slightly higher scores. *Strategy* use was not a particularly differentiating factor between the twins and singletons either. On an average, the twins tended to use slightly more direct strategies than their singleton counterparts, who used slightly more indirect strategies. One might expect converse results, but the differences were not significant.

Personality factors between the two groups showed no significant differences either. The active prosociality ratings of the twins were higher than those of the singletons to some extent, but the difference was not significant. The twins' anxiety scores were also marginally higher on an average, but again not significantly.

Closer analysis of separate items

The main intervening variables indicated no significant twin-singleton differences. Twin-singleton differences will be examined in more detail by breaking down the aggregated variables into item variables. Such an examination is useful particularly with the aggregated variables such as direct strategies, which include several strategy groups, and socioaffective strategies,

which consist of social and affective strategies. It is useful to know whether there are biases that the aggregated variables did not detect among the twins or the singleton. Such differences might point to areas of further research.

Socioaffective strategies are particularly interesting, because in the earlier version of the study (see Sinkkonen 1997) social and affective strategies were separate variables, and affective strategies were employed significantly more frequently by the singletons than the twins, who used social strategies slightly but not significantly more often. The contrast suggests (although reliability was not as high as in the present thesis) that there might be differences within the single combined variable of socioaffective strategies, which was in the present study aggregated into one variable to increase reliability. Furthermore, the reliability of anxiety was not high. It is useful to know underlying tendencies around this variable. Self-concept also included perceptions of different skills, which might differ between the groups. When individual items are examined separately, their dependence on each other does not have to be considered, because each item represents one characteristic. Although the reliability of the variables suggested that the items were consistent, it does not mean that there was no distance between them. It is useful to know the individual strategies used most commonly and perceived areas of strengths.

The items are listed in the average ranking order among the twins. One purpose here is to consider descriptive data for each variable separately in the two groups. Only significant group differences will be reported. Some items are converse, but the ratings were converted. This means that in the tables the descriptions of some items are negative (some of them could not be changed), but the mean scores indicate correct converted values as if the statement were positive (or not converse). The subgroup where each item belongs is displayed. It must be noted that these results indicate the ratings of only female subjects and are not indicative of the whole sample.

Table 15. Ratings of orientation in the classroom items among the twins and singletons.

Orientation in the classroom	Mean/Standard Deviation/Number of cases:	
	<i>Twins</i>	<i>Singletons</i>
(CI) Some kids study English because the teacher tells them to vs. Other kids study English because they have always wanted to learn it (converse)	1.818 (.73) (N=22)	2.000 (1.00) (N=21)
(CI) Some kids ask questions in class because they want to learn new things vs. Other kids ask questions because they want the teacher to notice them	1.901 (.81) (N=22)	1.810 (.40) (N=21)
(CI) Some kids work on problems to learn how to solve them vs. Other kids work on problems because you are supposed to	2.000 (.69) (N=22)	2.050 (.76) (N=20)
(PC) Some kids only like to learn the right answers at lessons vs. Other kids want to figure out new things during lessons (converse)	2.091 (.87) (N=22)	1.857 (.73) (N=21)
(CI) Some kids do extra projects so they can get better grades vs. Other kids do extra projects because they learn about things that interest them (converse)	2.091 (.87) (N=22)	2.619 (.92) (N=21)
(PC) Some kids like to go on to new work that is at a more difficult level vs. Other kids would rather stick to the assignments which are pretty easy to do	2.136 (.71) (N=22)	2.333 (.86) (N=21)
(PC) Some kids would rather just learn what they have to in school vs. Other kids would rather learn about as much as they can (converse)	2.182 (.96) (N=22)	2.300 (.98) (N=20)
(IM) Some kids like to do their work without help vs. Other kids like to have the teacher help them do their work	2.182 (.73) (N=22)	2.429 (.93) (N=21)
Continued below...		

...Table 15 continued

(PC) Some kids like hard work because it is a challenge vs. Other kids prefer easy work that they are sure they can do	2.428 (.75) (N=21)	2.714 (.78) (N=21)
(IM) When some kids make a mistake they would rather figure out the right answer by themselves vs. Other kids would rather ask the teacher how to get the right answer	2.954 (.72) (N=22)	2.523 (.93) (N=21)

Note. PC= Preference for challenge, CI= Curiosity/Interest, IM= Independent mastery.

The mean scores on the items suggested that *orientation* (Table 15) was "somewhat" intrinsic in almost all the statement pairs among both groups. The twins were on an average "somewhat" extrinsically oriented only in their reaction to mistakes: they more often wanted help from the teacher to get the right answer. The same was evident of the average singleton, who also preferred easy work to challenge and did extra work to get better grades rather than out of curiosity and interest. These were only average scores among two separate groups, but the differences between them were small and the items had consistent mean scores. None of the variable subgroups had a bias to a particular pole among the groups. Generally, curiosity/interest were considered popular reasons for studying. Independent mastery was not emphasized.

Both groups reported on an average rather neutral *perceptions of their language skills* (see Table 16). None of the items had exceptional results among either of the groups. There was, however, one significant group difference between the twins and singletons. The twins rated their ability to pronounce English significantly poorer than the singletons: $t(40)=-2.23$, $p=.031$, and the distribution was normal among both groups. This is interesting, because the teacher ratings of spoken English ability indicated no significant differences: the twins were slightly better than the singletons on an average. Another perceived competence item clearly pointing to spoken English skills was not significantly different in the subgroups. There were no other items pointing to oral skills. Pronunciation and fluency of speech are naturally different things. This finding may point to some phonological weaknesses that

are a residue of twin language. These perceptions were not low, but they were weak in relation to what other students at the same proficiency level experience. On an average pronunciation was perceived as the strongest skill among the singletons, whereas the twins were vocabulary-oriented in their perceived task-related strengths. The children were not particularly self-confident about their proficiency in relation to other pupils.

Table 16. Ratings of foreign language self-concept items among the twins and singletons.

Foreign language self-concept	Mean/Standard Deviation/Number of cases:	
	<i>Twins</i>	<i>Singletons</i>
(T) I often feel that I am not good enough to learn English words. (converse)	3.227 (1.41) (N=22)	2.667 (1.20) (N=21)
(TL) I learn English well.	3.227 (1.23) (N=22)	3.285 (1.06) (N=21)
(G) I often feel that I am very bad at learning languages. (converse)	3.136 (1.04) (N=22)	2.857 (1.28) (N=21)
(TL) I sometimes find English an impossible language. (converse)	3.136 (1.58) (N=22)	3.473 (1.12) (N=19)
(T) I can write well in English.	3.000 (1.05) (N=21)	3.048 (1.02) (N=21)
(T) I know the rules in English well, e.g., how to form sentences.	2.909 (1.19) (N=22)	3.000 (1.03) (N=20)
(T) I am satisfied at my spoken English skills.	2.909 (1.51) (N=22)	3.190 (1.25) (N=21)
(T) I think I pronounce English poorly. (converse)	2.762 (.94) (N=22)	3.476 (1.12) (N=21)
(TL) I am not very good in English compared with others. (converse)	2.727 (1.16) (N=22)	2.714 (1.45) (N=21)

Note. G= General foreign language self-concept, TL= Target language self-concept, T= Task self-concept.

Separate *direct strategies* (see Table 17) were on an average employed to a varying degree. On the one hand, the subjects watched English-speaking media very frequently and paid attention to language. On the other hand, nonverbal compensation strategies and strategies involving active language use in English in real situations were not very popular. The former (frequent use) points to the reception of spoken language, and the latter (less frequent cognitive use) to the production of written language, but they both involve action outside formal learning situations. Native-like speech was not considered very important either. It is probable that the age of the students affected their choice of strategies. Older students might enhance their skills by writing letters in English, for example. It must be noted that in the area of the use of social strategies, the students expressed a wish to find pen-friends ($M=3.3$ for the twins and $M=3.4$ for the singletons), but they used the direct strategy of writing in English ($M=2.1$ for the twins and the singletons) less often.

Table 17. Ratings of direct strategy items among the twins and singletons.

Direct strategies	Mean/Standard Deviation/Number of cases:	
	<i>Twins</i>	<i>Singletons</i>
(C) I watch English language TV shows spoken in English or go to movies spoken in English.	4.591 (.59) (<i>N</i> =22)	4.286 (1.10) (<i>N</i> =21)
(C) I use the English words I know in different ways (in new sentences, for example).	3.682 (.95) (<i>N</i> =22)	3.476 (.81) (<i>N</i> =21)
(M) I pay attention to English words in music and commercials.	3.636 (1.29) (<i>N</i> =22)	3.762 (1.34) (<i>N</i> =21)
(M) I think of relationships between what I already know and new things I learn in English.	3.591 (1.10) (<i>N</i> =22)	3.333 (1.07) (<i>N</i> =21)
Continued below....		

...Table 17 continued

(M) I review English lessons often.	3.409 (1.10) (N=22)	3.191 (1.17) (N=21)
(CO) If I cannot think of an English word, I use a word or phrase that means the same thing.	3.273 (1.20) (N=22)	2.750 (1.07) (N=20)
(M) I remember new words and phrases by remembering their location on the page or on the board, for example.	3.182 (1.05) (N=22)	2.524 (1.33) (N=21)
(M) I remember a new English word by making mental pictures. (I think of a cat when I am learning the word).	3.182 (1.33) (N=22)	2.762 (1.14) (N=21)
(M) I write down new words to remember them better.	3.136 (1.21) (N=22)	3.000 (1.27) (N=21)
(M) I use new words in a sentence so I can remember them.	3.091 (1.07) (N=22)	2.810 (1.12) (N=21)
(C) I try to find something familiar in new words and phrases in English.	3.048 (1.07) (N=21)	2.952 (.92) (N=21)
(C) I practice the sounds of English.	3.000 (.98) (N=22)	3.000 (.95) (N=21)
(C) I say or write new English words several times.	2.818 (1.10) (N=22)	2.905 (1.18) (N=21)
(CO) When I cannot remember a word, I use gestures (use hands and facial expressions, for example).	2.364 (1.14) (N=22)	2.000 (1.14) (N=21)
(C) I try to talk like native English speakers.	2.318 (1.09) (N=22)	2.619 (1.12) (N=21)
(C) I look for words in my own language that are similar to new words in English.	2.238 (1.04) (N=21)	2.350 (1.18) (N=20)
(C) I write notes, messages, or letters in English.	2.091 (1.11) (N=22)	2.143 (.91) (N=21)

Note. M= Memory strategies, C= Cognitive strategies, CO= Compensation strategies.

There is very little to say about separate *metacognitive strategies* (see Table 18). There was a tendency towards the use of all the items being "somewhat true" among both groups; only mistakes were processed slightly

more frequently by the average twin and singleton. The consistent results are due to the content of the variable: it included only indirect metacognitive strategies. There were only random differences between the groups.

Table 18. Ratings of metacognitive strategy items among the twins and singletons.

Metacognitive strategies	Mean/Standard Deviation/Number of cases:	
	<i>Twins</i>	<i>Singletons</i>
I pay attention to my English mistakes and use that information to help me do better.	3.524 (.93) (N=21)	3.571 (1.08) (N=21)
I try to find out how to be a better learner of English.	3.182 (1.22) (N=22)	3.333 (1.16) (N=21)
I pay attention when someone is speaking English.	3.136 (1.04) (N=22)	3.571 (.98) (N=21)
I think about my progress in learning English.	2.955 (1.00) (N=22)	3.524 (.93) (N=21)
I plan my schedule so I will have enough time to study English.	2.818 (1.18) (N=22)	2.429 (1.08) (N=21)
I try to find as many ways as I can to use my English.	2.773 (1.23) (N=22)	2.524 (1.08) (N=21)
I have clear goals for improving my English skills.	2.682 (1.21) (N=22)	2.952 (1.40) (N=21)

Table 19. Ratings of socioaffective strategy items among the twins and singletons.

Socioaffective strategies	Mean/Standard Deviation/Number of cases:	
	<i>Twins</i>	<i>Singletons</i>
(S) I ask my teacher questions if I do not understand something.	3.773 (1.11) (N=22)	3.476 (1.21) (N=22)
(S) I want to be corrected when using English.	3.773 (.87) (N=22)	3.333 (1.16) (N=22)
(S) I want to get to know English speakers and their language by getting pen-friends, for example.	3.318 (1.52) (N=22)	3.429 (1.25) (N=22)
(S) I practice English with other students or friends.	3.182 (1.14) (N=22)	2.810 (.98) (N=22)
(A) I encourage myself to speak English even when I am afraid of making a mistake.	3.046 (1.13) (N=22)	3.286 (1.15) (N=22)
(S) I ask for help from those I speak English with.	2.952 (.87) (N=21)	3.524 (1.08) (N=22)
(A) I notice if I am tense or nervous when I am speaking English, during a lesson, for example.	2.909 (1.23) (N=22)	3.714 (1.23) (N=22)
(S) If I do not understand something in English, I ask the other person to slow down or say it again.	2.818 (1.14) (N=22)	2.667 (1.24) (N=22)
(A) I try to relax whenever I feel afraid of using English.	2.818 (1.30) (N=22)	2.952 (1.24) (N=22)
(S) I try to learn about culture of English speakers.	2.727 (1.28) (N=22)	2.400 (1.10) (N=20)
(A) I talk to someone else about how I feel when I am learning English.	2.046 (1.00) (N=22)	2.810 (1.40) (N=22)
(A) I give myself a reward when I do well in English.	1.773 (.92) (N=22)	2.476 (1.29) (N=22)
(A) I write down my feelings in a language learning diary.	1.318 (.48) (N=22)	1.952 (1.07) (N=22)

Note. A= Affective strategies, S= Social strategies.

The earlier conclusion (see Sinkkonen 1997) that the singletons used more affective strategies than the twins could be revised: their use of *socioaffective strategies* (see Table 19) does not appear to be any more frequent than that of the twins, but some individual affective strategy items were significantly more popular among the singletons than the twins. The singletons noticed if they were nervous when speaking English significantly more often than the twins: $t(41)=-2.14$, $p=.038$. They also talked with someone else about feelings concerning learning English more often than the twins: $t(41)=-2.07$, $p=.045$. Both items had normal distributions among both groups. The latter was an unexpected result, because twins could be expected to talk with each other, at least they have a better chance for such discussion. The former item is slightly controversial, because it is possible that low scores indicate that there are no feelings of nervousness. However, anxiety results did not suggest significant twin-singleton differences in this respect. But they were not concerned with foreign language learning situations.

Some other items in the group of socioaffective strategies (see Table 19) also had clear mean differences, but they were not reliable because of non-normal distributions, and median tests did not indicate any significant differences. It became evident that the variable of socioaffective strategies included affective items that had differences in favour of the singletons, but the socially oriented strategies were not employed any less by the twins than the singletons. The mean scores on the items also varied considerably: the average answer was from "never or almost never true" to "usually true", which suggests that not all the strategies are employed equally. Those involving other people were quite popular, but those enhancing intrapersonal skills were not equally employed.

On an average, the teachers considered the *active prosociality* (see Table 20) of their twin and control students "clearly observable but not emphasized". This was true of all the items. *Anxiety* (see Table 20) was "sometimes observable" among these females, but the item of taking offence when treated nastily was significantly different among the subgroups. There was greater anxiety among the singletons: $t(40)=-2.11$, $p=.041$. The distributions were normal. It is perhaps to be expected that twins do not become offended very

easily because of they have been used to the constant presence of a close co-twin, with whom interaction is not always friendly.

Table 20. Ratings of personality items among the twins and singletons.

Personality	Mean/Standard Deviation/Number of cases:	
	<i>Twins</i>	<i>Singletons</i>
<i>Active prosociality</i>		
Is always in others' company during breaks and after school hours	2.455 (.74) (N=22)	2.000 (1.03) (N=20)
Considered a reliable classmate	2.182 (.85) (N=22)	1.850 (.81) (N=20)
Tries to act reasonably even in annoying situations	2.182 (.80) (N=22)	2.050 (.83) (N=20)
Always friendly to others	2.046 (.79) (N=22)	1.650 (.88) (N=20)
Thinks that if one negotiates, everything will be better	1.818 (1.01) (N=22)	1.900 (.79) (N=20)
Offers to help other children who are having difficulty with the task in the classroom	1.773 (1.02) (N=22)	1.750 (1.02) (N=20)
Sides with smaller and weaker peers	1.636 (1.00) (N=22)	1.450 (.95) (N=20)
<i>Anxiety</i>		
Tends to be fearful or afraid of new things or new situations	1.364 (.79) (N=22)	1.000 (.65) (N=20)
Easily takes offence if others are nasty to him/her	.909 (.68) (N=22)	1.400 (.82) (N=20)
Often worries	.900 (.85) (N=20)	.895 (.88) (N=19)
Is afraid of other children	.864 (.94) (N=22)	.700 (.80) (N=20)

Significant differences for single items suggest that there are some underlying tendencies (that involve twin-singleton differences) in the area of the intervening variables. There appear to be differences in perceptions of pronunciation as well as the affective ability to control one's own learning and tolerate unfavourable social pressure rather than in active social behaviour. These biases have not, however, been extensively examined in the present study, and many of them did not represent factors with great influence on learning outcomes; at least they did not have impact on proficiency in terms of twin-singleton differences. Some significant twin-singleton differences for separate items cannot be emphasized, because they do not reflect general tendencies demonstrated by group differences and correlations, but they require further study. The seven aggregated variables and their results are the core of the findings.

Summary

There are no known earlier studies to support or contradict the main findings about foreign language learning among twins. The factors connected with sociability could have been expected to be stronger in the twins. There was no such bias in terms of the use of socioaffective foreign language learning strategies. This aspect has not been studied among twins before, so there is no external evidence to support or contradict this finding either. Although there was a slight difference in social personality in favour of the twins, the fact that the twins still had no significantly higher scores in active prosociality can be supported by the related studies by Loehlin and Nichols (1976) and Lytton et al. (1987), whose sample consisted of younger children, but the behaviour patterns may not change rapidly between twins and nontwins before puberty. The findings of no significant differences appears contrary to the arguments of Savic (1980), Koch (1966), Rutter and Redshaw (1991), and Shave and Ciricello (1983) for the social advantage among twins, or the arguments about sensitivity in communication presented by Zani et al. (1991) and Barton and Strosberg (1997).

The research question about the second language learning of twins had two poles. On the one hand, the positive pole, which was represented by sociability, was not supported, while on the other hand, conclusions can be drawn on the negative pole, the cognitive disadvantage. The findings by Fischbein (1979) about the lower verbal and inductive ability of twins and by Bishop and Bishop (1998) and McMahon and Dodd (1997) about twins' immature or deviant language, as well as arguments raised by many researchers, for example Lytton (1980, 94-95), about the lower cognitive ability concerning the first language development of twins were to be tested in terms of second language learning. From the proficiency results, which showed that the twins did not significantly differ from the nontwins, it can be concluded that any potential cognitive lag had been overcome by the age of 12. The deficit did no longer operate in the second language learning of sixth graders.

The fact that the twins did slightly better in all four proficiency measures suggests that the potential initial lag had been overcome. There may be some other factors that did not emerge in this study, and which might have contributed to the improvement over the years. Furthermore, the potential cognitive deficits of early age were not examined in these particular twins. Thus no absolute conclusions can be drawn that the students making up the sample of the present study had suffered from this disadvantage at all. However, the results of perceived pronunciation competence may also point to early deficits among these twins.

Thus, an important finding arising from the two-way research question was that twins do not seem to suffer from cognitive deficits at the age of 12 in second language learning. The finding can be supported by the results of the study by Lytton et al. (1987), which confirmed that twins as early as at the age of nine had overcome the initial lag resulting from twinning in school achievement. The study by Dodd and McEvoy (1994) revealed unexpected evidence against twin language as early as the age of 2-4, which suggested that the issue is controversial. The results of the present study suggest that the twins may be linguistically behind their normal development or potential as concerns

advanced phonology, but such a delay does not affect cognitive learning outcomes.

The fact that both the sociability and early cognitive disadvantage of twins are issues that need further examination was confirmed in the present study. In conclusion, the findings of the study suggest that twins are not disadvantaged in second language learning or advantaged in sociability, and their language learning is not affected by any predictor of success in the present study design. Still, their language behaviour appears significantly different in some other affective aspects. It must be reminded at this point that active prosociality and the use of social strategies were, indeed, significant predictors of success in English. If the twins had had the advantage in terms of them, they could have benefited from it.

4.3.2 Identical-fraternal twin differences

The differences in language learning between the zygosity types of twins are examined in the same way as differences between the twins and nontwin singletons were investigated above. The differences in proficiency and intervening variables will be studied separately.

The identical and fraternal twins resembled each other very much in their *proficiency* in English (see Table 21). The identical twins got slightly better scores than the fraternal twins on all other proficiency measures except the test results, but the differences were not significant.

The intervening variables did not generate any significant differences between the identical and fraternal twins either (see Table 22). There were no significant *orientation* differences between the two groups of twins. *Foreign language self-concept* scores were somewhat higher among the identical twins, but the differences did not reach significance.

Table 21. Statistical figures for identical-fraternal twin differences in proficiency.

	Mean (SD): <i>All</i> (N=20)	Mean (SD): <i>Identical twins</i> (N=10)	Mean (SD): <i>Fraternal twins</i> (N=10)	P-value
Grades	8.200 (1.15)	8.300 (.82)	8.100 (1.45)	.709
WE	8.200 (1.15)	8.300 (.82)	8.100 (1.45)	.709
SE	8.150 (1.35)	8.200 (.79)	8.100 (1.79)	.873
Test	52.300 (12.95)	51.800 (6.00)	52.800 (17.82)	.869

Note. WE= Written English, SE= Spoken English, SD= Standard Deviation, N= Number of cases.

There were no significant differences in the *strategy* use of the two groups either. The fraternal twins used all the strategies slightly more frequently than the identical twins. In terms of *personality* factors the identical twins showed higher rates of active prosociality and lower rates of anxiety; the difference was not very far from significance concerning active prosociality. The result weakly points to the same direction as the argument of Rutter and Redshaw (1991) about good co-operative skills of particularly identical twins. The difference was not, however, significant.

In conclusion, there were no significant differences between the identical and the fraternal twins regarding the main variables in the present study design. This may also be due to the small sample size. The present results parallel the findings by Loehlin and Nichols (1976) about the lack of sociability differences among identical and fraternal twins, but contradicts the argument by Lytton (1980) about the inferiority of identical twins to fraternal twins in intellectual characteristics. The present study indicated no significant differences, but it showed that the identical twins scored slightly better on most of the proficiency measures (not the test). The differences, however, were probably random.

Table 22. Statistical figures for identical-fraternal twin differences in intervening variables.

	Mean: Total score (SD) One item score <i>All</i>	Mean: Total score (SD) One item score <i>Identical twins</i>	Mean: Total score (SD) One item score <i>Fraternal twins</i>	P- value
Orientation:				
Orientation in the classroom	21.895 (4.98) 2.189 (N=19)	21.800 (3.16) 2.180(N=10)	22.000 (6.67) 2.200 (N=9)	.936
Self-concept:				
Foreign language self-concept	25.500 (7.80) 2.833 (N=18)	27.444 (6.06) 3.049 (N=9)	23.556 (9.17) 2.617 (N=9)	.304
Strategy:				
Direct	51.842 (11.02) 3.050 (N=19)	50.400 (5.23) 2.965 (N=10)	53.444 (15.39) 3.144 (N=9)	.585
Metacognitive	20.947 (5.49) 2.992 (N=19)	20.200 (3.58) 2.886 (N=10)	21.778 (7.21) 3.111 (N=9)	.547
Socioaffective	35.421 (6.40) 2.725 (N=19)	34.300 (5.19) 2.638 (N=10)	36.667 (7.65) 2.821 (N=9)	.436
Personality:				
Active prosociality	14.100 (5.49) 2.014 (N=20)	16.200 (4.61) 2.314 (N=10)	12.000 (5.70) 1.714 (N=10)	.087
Anxiety	4.056 (2.71) 1.014 (N=18)	3.500 (2.45) .875 (N=8)	4.500 (2.95) 1.125 (N=10)	.454

Note. SD= Standard Deviation, N= Number of Cases.

Identical-fraternal twin differences deal with differences within the twin sample. Besides zygosity, another possible source of differences among twins is *birth-order*. There are differences between co-twins in birth weight due to prenatal competition, for example. The second born B-child is often weaker, while the first-born A-child may be stronger. Cognitive disadvantages arising from biological reasons might also be more evident in second-borns. Accordingly, the proficiency results of A- and B-children were compared. There were no significant differences in this respect either. Identical-fraternal twin comparisons involve two groups that both include co-twin pairs, but birth-order comparisons involve two groups that consists of single twins. Twinship offers many different types of comparisons. So far comparisons have only been made between the groups of twins and singletons, but in the next section the members in the twin pairs are compared with each other, and these average within-pair differences are compared with equivalent within-pair differences in singleton control pairs.

4.4 Differences within pairs among twins and singletons

The behaviour of twins has been so far discussed between groups by contrasting the behaviour of twins and singletons. Besides these between-groups differences, also various analyses were carried out concerning within-pair differences. As has been stated, both differences are twin-singleton differences; in the latter case within-pair differences were also compared between the twins and control singletons. In other words, within-pair comparisons ultimately also involve between-groups comparisons, because after examining within-pair differences in each group, these differences were compared between groups.

In fact, in the case of twins and nontwins with similar affective profiles it is more convenient to discuss similarities, although differences are also possible, and there must be some. Differences are, however, addressed in many contexts because within-pair differences may emerge between groups. There may be differences between within-group similarities. It is self-evident that

similarity does not point to the level of skills, because two people can be similar at a poor or good level.

4.4.1 Background information

Before passing on to the within-pair analyses, some background information is necessary. Comparison levels and types are discussed among other things.

Comparison levels

First, the four *proficiency* measures were examined by comparing the differences in the members of the *twin* sets and *control* pairs. Secondly, similar comparisons were made between within-pair differences in the subgroups, i.e. the *identical*, *fraternal*, and *nontwin* sets. In other words, within-pair differences can be divided into two levels of groups according to how specific information on the origin of possible similarities is available:

- (1) differences between the members in the sets of twins and the nontwin control pairs, and
- (2) differences between the members in the identical, fraternal, and nontwin control pairs (thus also including identical-fraternal twin comparisons).

Level (1) focuses on the influence of heredity and environment, i.e. family resemblance, in general. Level (2) primarily makes it possible to estimate the influence of heredity alone by contrasting the identical and fraternal co-twins. Including nontwins in these analyses deepens the knowledge gained from level (1) analyses.

If the within-pair differences between groups indicate that the co-twins are still more alike in proficiency than the control pair members with similar affective profiles, the conclusions on the influence of heredity are more reliable than the conclusions that could be drawn on the differences between twins and an alternate sample of randomly chosen pairs.

In other words, if the co-twins are as similar in orientation and self-concept as the control pairs, but the proficiency of the co-twins is more similar than the proficiency of the members in control pairs, the results point to heredity. If the co-twins are more different in their self-concept and orientation than the chosen members of control pairs demonstrating similar profiles, but the co-twins are still more similar in their proficiency than the control singletons, even a clearer conclusion can be drawn about the genetic influence on language achievement. In this case heredity would be influential in spite of the influence of intervening variables. To sum up, controlling affective factors makes it possible to contrast their influence with the influence of heredity and family environment.

Affective ratings of the twins

First the *affective* ratings have to be compared between the members in *twin sets*. They were already compared in the nontwins when the control groups were formed. The affective ratings of the twins were not unexpected.

The difference in orientation in the classroom was 1 point between the members in two identical sets, 2 points in one set, 6 points in one set, and 8 points in one set. The difference was 2 points between the members in one fraternal set, 4 points in one set, 5 points in one set, 8 points in one set, and 9 points in one set. The difference was 3 points in the set whose zygosity was unknown. One member in one fraternal set with the difference of 9 points had answered only 9 out of 10 questions, but her score was calculated so that the mean score (one item score of 8 questions) was added to the total score of 8 questions, and thus her score could be compared with that of her co-twin.

The difference in foreign language self-concept was 2 points between the members in two identical sets, 4 points in one set, 5 points in one set, and 7 points in one set. The difference was 1 point between the members in one fraternal set, 2 points in two sets, 7 points in one set, and 11 points in one set. The difference in the set whose zygosity was unknown was 3 points. One member in one identical set with the difference of 4 points and one member in

one fraternal set with the difference of 2 points had answered only 8 out of 9 questions, but the scores were again calculated separately.

The co-twins were more different from each other concerning the two affective variables than the nontwin controls. The differences were significant: $t(13)=3.65, p=.003$ in orientation (the twins compared with the control group 2) and $t(13)=3.04, p=.010$ in self-concept (the control group 3). *The mean difference in orientation was 1.0 point among the nontwin pairs and 4.5 among the twin pairs (identical: 3.6, fraternal: 5.6, zygosity unknown: 3.0). The mean difference in self-concept was 1.2 points among the nontwin pairs and 4.2 among the twin pairs (identical: 4.0, fraternal: 4.6, zygosity unknown: 3.0).*

The origin (heredity or environment) of the affective factors was not examined, but it became obvious that the identical co-twins were somewhat more similar than the fraternal co-twins in terms of both variables. Accordingly, the sample choice generated pairs with affective similarity due to an artificial pair membership (nontwins) and pairs with genetic similarity/resemblance and affective resemblance due to family membership (twins), but the focus of interest was on proficiency similarities. Stronger similarity in the co-twins would probably point to cognitive language ability as a predictor of proficiency.

Comparison types

The *within-pair comparisons of proficiency* consisted of two analyses concerning the main proficiency measures:

- (1) the comparisons of *correlations* indicating within-pair similarities in the four proficiency measures between the groups; and
- (2) the comparisons of *average scores* (means and medians) of within-pair differences in the four proficiency measures between the groups.

In other words, the significance of within-pair differences was compared *between different groups* in both types of analyses. Correlation tests also made it possible to investigate the significance of *within-group* dependence in the co-twins or nontwins. It must be noted that in such a small sample, the two groups could be significantly different from each other, although both groups reached

significance in within-group similarity. It can be due to relative differences between two "similarities". Furthermore, the scores of the members in sets may be significantly dependent on each other, but there could be a systematic difference between them, and significant within-pair average differences may then arise in relation to another group with great within-group similarity. A less systematic dependence may even reflect a smaller average distance/difference (in a small sample) between the scores of the members in pairs. This may also be a question of sample errors. Besides systematic dependence, a small difference also contributes to the strength of correlation.

Nonparametric distribution tests (Kolmogorov-Smirnov Goodness of Fit Test) were run in each group separately before the group comparisons of means/medians were carried out. The twins and identical twins had non-normal distributions in spoken English (see Table 7).

4.4.2 Within-pair analyses

This section involves the two types of analyses of the main proficiency variables. It also includes a more detailed analysis of the language test.

Correlation analyses of the four proficiency measures

The first stage of within-pair analysis consisted of correlation analyses; the proficiency scores of the members in pairs were correlated separately in each group. On this basis, different groups could be compared by *contrasting correlations*. Pearson's correlations are primarily focused on because of the nature of the scale, but Spearman's correlations are also reported, since they are more reliable in terms of correlations among the identical and fraternal twins because of the small sample sizes.

The correlations of all the twin pairs regardless of zygosity can be seen in Table 23. Tables 24 and 25 demonstrate the correlations of the two groups of nontwin control pairs. To study twins more specifically, the correlations of the identical twin pairs can be seen in Table 26 and the fraternal twins in Table 27.

These correlations can also be compared with the correlations of the control groups. Member A was always more successful in proficiency (in all the four measures) than member B.

Table 23. Proficiency correlations between the co-twins.

<i>Correlations:</i>	Member A:			
	<i>Grade</i>	<i>Written English</i>	<i>Spoken English</i>	<i>Test</i>
	(N=11)	(N=11)	(N=11)	(N=11)
Member B:				
<i>Grade</i>				
Pearson	.8901***	.8901***	.8801***	.7238*
Spearman	.8723***	.8723***	.8630***	.6651*
<i>Written English</i>				
Pearson	.9007***	.9007***	.8960***	.7451**
Spearman	.8779***	.8779***	.880***	.7386**
<i>Spoken English</i>				
Pearson	.9405***	.9405***	.9747***	.8535***
Spearman	.8758***	.8758***	.9293***	.7550**
<i>Test</i>				
Pearson	.7000*	.7000*	.8049**	.9238***
Spearman	.3877	.3877	.5201	.6925*

Note. * Significance level .05, ** Significance level .01, *** Significance level .001, N= Number of cases.

The focus was on the correlations for *the same measures* between the members in the pairs: for example, the correlation between the test results of

both members in a set rather than e.g. the oral skills of member A and the writing skills of member B. The Tables also show the correlations between different measures. Furthermore, it must be noted that the grade of member A is correlated with the test result of member B, for example, but another correlation is seen between the test result of member A and the grade of member B. However, the purpose is not to compare the different measures but to indicate the correlation concerning one measure: the grade of member A and B, for example. The safest way to examine hereditary influences is to contrast the results of the same measure between the members in sets.

Table 24. Proficiency correlations between the members in nontwin control pairs chosen according to orientation.

<i>Control group (2): Member A:</i>				
	<i>Grade</i>	<i>Written</i>	<i>Spoken</i>	<i>Test</i>
		<i>English</i>	<i>English</i>	
	(N=11)	(N=11)	(N=11)	(N=11)
Member B:				
<i>Grade</i>				
Pearson	.2604	.2310	.2547	.1990
Spearman	.2342	.1786	.1781	-.0506
<i>Written English</i>				
Pearson	.2720	.2533	.2055	.1017
Spearman	.2667	.2435	.1135	-.1218
<i>Spoken English</i>				
Pearson	.4150	.3486	.4258	.3754
Spearman	.4006	.3251	.3423	.1532
<i>Test</i>				
Pearson	.5768	.5260	.4922	.5247
Spearman	.7307*	.6344*	.6028*	.4966

Note. * Significance level .05, N= Number of cases.

Table 25. Proficiency correlations between the members in nontwin control pairs chosen according to self-concept.

<i>Control group (3): Member A:</i>				
	<i>Grade</i>	<i>Written</i>	<i>Spoken</i>	<i>Test</i>
		<i>English</i>	<i>English</i>	
	(N=11)	(N=11)	(N=11)	(N=11)
Member B:				
<i>Grade</i>				
Pearson	.2406	.1427	.5352	.0613
Spearman	.2165	.0000	.6132 *	.0144
<i>Written English</i>				
Pearson	.2406	.1427	.5352	.0613
Spearman	.2165	.0000	.6132*	.0144
<i>Spoken English</i>				
Pearson	.3627	.1936	.6374*	.2275
Spearman	.3086	.0000	.6782*	.1763
<i>Test</i>				
Pearson	-.1141	-.1073	.2088	.1494
Spearman	-.0582	-.0676	.3024	.2700

Note. * Significance level .05, N= Number of cases.

Twins and nontwins. A look at the correlation Tables and a comparison of the results indicated that the correlations of the twin pairs were stronger than those of the nontwin pairs, whose correlations did not generally suggest great similarity in the same measures. This was evident in Pearson's and Spearman's correlations. The correlations were strong and significant among the twins in all the measures, but weaker and mostly not significant among the nontwins of both control groups. The oral skills of the controls chosen according to self-concept made the only exception: the members were significantly similar with each other, although the association was not as strong as that of the twins. The different measures also had some associations with each other, but they only

suggest that peers with similar affective characteristics may have different strengths that are still equally high or systematic, but it cannot be said that the affective profile makes these people similar in some specific aspect of language skills.

The results of the groups *separately* (without comparisons between groups) show that the proficiency level of the fellow twins was significantly similar. The results of the nontwins suggest that despite similar affective characteristics the nontwins were significantly similar only in oral skills. Besides, this was true of only control group (3). Thus, it seems that in oral skills similar self-concept is associated with two individuals succeeding similarly. Spoken English had the strongest correlations among also the twin pairs.

The correlations were also *compared*. The test can be seen at internet site home.clara.net/sisa/correl.htm (2000). Only Pearson's correlations were compared, because they were emphasized. It became evident that the group of twins was significantly different from control groups (2) and (3) in all the proficiency measures at level 5%. Thus the co-twins were more similar in learning outcomes than the co-nontwins. Comparisons suggest significant *hereditary and environmental influences*

Identical and fraternal twins. An analysis of the proficiency measures among the identical and fraternal twins *separately* (not between them) shows that both correlations were the strongest with spoken English among the identical twins, but among the fraternal twins differences were very small: Pearson's analysis had the strongest correlation for the test results, and the more reliable Spearman's analysis for grades and written English. The differences were small.

It was not possible to run the test that compares correlations between the identical and fraternal twins, because the minimum number of cases was 10. It is, however, possible to *compare* the zygosity groups in terms of their correlations in the Tables. Significance cannot be discussed.

Table 26. Proficiency correlations between the identical co-twins.

		Member A:			
		<i>Grade</i>	<i>Written</i>	<i>Spoken</i>	<i>Test</i>
			<i>English</i>	<i>English</i>	
		(N=5)	(N=5)	(N=5)	(N=5)
Member B:					
<i>Grade</i>					
Pearson		.8686	.8686	1.0000	.4464
		.056	.056/	.000/	.451/
Spearman		.8250	.8250	1.0000	.6325
		.086	.086	.000	.252
<i>Written English</i>					
Pearson		.8686	.8686	1.0000	.4464
		.056/	.056/	.000/	.451/
Spearman		.8250	.8250	1.0000	.6325
		.086	.086	.000	.252
<i>Spoken English</i>					
Pearson		.8686	.8686	1.0000	.4464
		.056/	.056/	.000/	.451/
Spearman		.8250	.8250	1.0000	.6325
		.086	.086	.000	.252
<i>Test</i>					
Pearson		-.4341	-.4341	-.0125	.8541
		.465/	.465/	.984/	.065/
Spearman		-.3354	-.3354	.0527	.7000
		.581	.581	.933	.188

Note. N= Number of cases.

The correlations among the identical and fraternal twins indicate slightly unpredictable results. They can be seen in Tables 26 and 27. The exact *p*-values were shown here because of the small sample size. The correlations were generally slightly stronger among the fraternal twins for the grades, written English, and the test results, but the identical twins had slightly higher correlations for spoken English. In fact, only spoken English results of the members in pairs were correlated significantly among the identical twins, although correlation coefficients were generally quite strong. The oral skills of the identical co-twins had the strongest association among all the twin groups concerning any measure. Both correlation analyses indicated similar patterns, but Spearman's correlations are more reliable in this case because of small groups. There is no use comparing the correlations of the twin subgroups with the correlations of the control groups, because no clear differences were seen in the subgroups.

It could generally be expected that identical twins would show greater similarity in all measures because of a stronger hereditary bond. The identical twins had slightly weaker correlations in written-language-related measures in comparison to oral skills. Correlations could suggest that oral skills are more strongly influenced by heredity than written-language-related skills are, unless more closely analysed.

A look at the scores of the co-twins indicated, for example, that the real difference between the identical co-twins was 0 in all pairs in spoken English and 0 in four pairs and 1.0 in one pair in written English, whereas the differences were not smaller in fraternal pairs: they were 1.0 in three pairs and 0 in two pairs in both spoken and written language. The samples were too small for correlation comparisons. It is likely that the sample size was the reason for small differences in the analyses and variation in the results of different test types.

Table 27. Proficiency correlations between the fraternal co-twins.

<i>Correlations:</i>	Member A:			
	<i>Grade</i>	<i>Written English</i>	<i>Spoken English</i>	<i>Test</i>
	(N=5)	(N=5)	(N=5)	(N=5)
Member B:				
<i>Grade</i>				
Pearson	.9336	.9336	.8938	.8216
	.020/	.020/	.041/	.088/
Spearman	1.000	1.000	1.000	.9747
	.000	.000	.000	.005
<i>Written English</i>				
Pearson	.9336	.9336	.8938	.8216
	.020/	.020/	.041/	.088/
Spearman	1.000	1.000	1.000	.9747
	.000	.000	.000	.005
<i>Spoken English</i>				
Pearson	.9692	.9692	.9726	.9165
	.006/	.006/	.005/	.029/
Spearman	.9211	.9211	.9211	.8208
	.026	.026	.026	.089
<i>Test</i>				
Pearson	.9499	.9499	.9591	.9864
	.013/	.013/	.010/	.002/
Spearman	.8208	.8208	.8208	.9000
	.089	.089	.089	.037

Note. N= Number of cases.

Thus, no further conclusions on family resemblance could be drawn. Correlations indicated the difference among the co-twins. Correlation comparisons above will be supplemented by average score comparisons, i.e. t-tests and median tests below. The average score comparisons may also clear up the origin of influence (heredity or environment) by contrasting the zygosity groups.

To sum up the correlations, the clear correlation difference between the twins and nontwins, in general, points to the influence of heredity and shared environment, but the identical-fraternal twin correlation comparisons did not specify the source of influence further.

Group comparisons of average differences in the four proficiency measures

Another way of analysing within-pair differences/similarities is to compare the average scores of the groups. Firstly, the *means and medians* indicating average within-pair differences in proficiency were compared between the twins and controls.

Twins and nontwins. The comparisons indicated (see Table 28) that the within-pair differences were somewhat higher among both groups of nontwin control pairs than among the twins in all four measures, but the differences were significant in all the proficiency measures when orientation was controlled, and in spoken English when self-concept was controlled. In the comparisons between the twins and control group (2), grades had values $t(14)=-2.29$, $p=.038$, and written English had values $t(20)=-2.13$, $p=.045$. The test results had values $t(20)=-2.11$, $p=.047$. The median test of oral skills had the probability of .002. The comparison between the twins and control group (3) had the probability of .024 by a median test in oral skills. The mean figures in Table 28 are the average within-pair differences in the scores among the three groups.

Table 28. Average within-pair differences in proficiency among the twins and control nontwins.

	Mean (SD): <i>Twins</i> (N=11)	Mean (SD): <i>Control</i> <i>group 2</i> (orientation controlled) (N=11)	Mean (SD): <i>Control</i> <i>group 3</i> (self-concept controlled) (N=11)	P-value/ probability: between twins & control group 1	P-value/ probability: between twins & control group 2
Grade	.4545 (.52)	1.3636 (1.21)	.9091 (1.14)	.038 (t-test)	.242 (t-test)
WE	.3636 (.51)	1.1818 (1.17)	.9091 (1.14)	.045 (t-test)	.161 (t-test)
SE	.0909 (.30) median: .0	1.5455 (1.21) median: 1.0	.9091 (.94) median: 1.0	.002 (median- test)	.024 (median- test)
Test	5.3636 (4.95)	13.5455 (11.84)	10.4545 (11.22)	.047 (t-test)	.184 (t-test)

Note. WE= Written English, SE= Spoken English, SD= Standard Deviation, Sig= Significance, N= Number of cases.

Thus, significant twin-singleton differences were observed. The role of family background seems quite strong, because significant differences were found in such a small sample. Nevertheless, within-group correlations were significant in all the proficiency skills among the co-twins, but this similarity was not significantly stronger than the corresponding association among the co-nontwins in all the skills in these tests. Correlation comparison tests indicated significant differences in all the skills, but the weaker results by t-tests/median tests will, however, be more closely analyzed below.

The finding that the within-pair comparisons between the twins and the nontwin pairs resulted in significant differences particularly in *spoken English* skills is rather problematic. It could point to hereditary/environmental

influences on oral skills, on the one hand, or suggest that grades can be gained by effort and written English skills can be improved regardless of talent or the lack of it, on the other hand. Correspondingly, lack of effort leads to poorer results. Self-concept could partly be a product of efficient working, which may also be its outcome. Self-efficacy, for example, points to perceptions in relation to effort. Due to the nature of teaching practises and testing methods, grades can be expected to reflect writing skills, which makes the grades and written English evaluations rather similar. Those who had worked hard in their studies could also have been advantaged in the test, which was also primarily concerned with written English, at least as regards reading and grammar. It is also possible that listening and reaction are more subject to effort than oral skills, because the former are strongly affected by extensive vocabulary (related to effort) and the latter by fluency and experiences in language use (related to heredity/environment). A closer analysis of the test below reveals underlying tendencies. Spoken English requires spontaneous skills, which do not always require efficient further reading. There was no spoken English test to measure these skills; the teachers gave the evaluations on the basis of what they had experienced during lessons. These skills might be more strongly influenced by heredity and environment than other skills are.

The findings could also point to low credibility caused by the small sample. All interpretations can be partly true. It must be noted that the comparisons between the twins and control group (2) indicated significant proficiency differences in terms of all the measures. Hereditary and environmental influences are thus likely to affect all domains of language learning. Control group (3) could also have had significant differences if the fellow controls had been equally similar, not significantly more similar, than the co-twins, in self-concept, still suggesting hereditary/environmental influences.

Identical twins, fraternal twins, and nontwins. Secondly, similar *mean/median* comparisons of within-pair proficiency differences were made among the identical, fraternal, and nontwin controls separately (see Table 29). When the within-pair differences among the four groups were compared, no statistically significant differences by an analysis of variance or Scheffe

Multiple Range Test were found in *grades, written English, or the test results*. The Scheffe Test indicated that there were no significant differences between any of the groups. The identical sets of twins were, however, more similar in some degree than the fraternal sets of twins in all the proficiency measures except the test results. The members in the control pairs were, as expected, more different (but did not reach significance mainly because of the sample sizes) than the members in the fraternal sets of twins, and particularly more different than the members in the identical sets of twins.

Table 29. Average within-pair differences in proficiency among the identical twins, fraternal twins, and control nontwins.

	Mean Dif. (SD) <i>Identical</i> <i>twins</i> (N=5)	Mean Dif. (SD) <i>Fraternal</i> <i>twins</i> (N=5)	Mean Difference (SD) <i>Control group 2</i> (orientation controlled) (N=11)	Mean Difference (SD) <i>Control group 3</i> (self-concept controlled) (N=11)
Grades	.2000 (.45)	.6000 (.55)	1.3636 (1.21)	.9091 (1.14)
Written English	.2000 (.45)	.6000 (.55)	1.1818 (1.17)	.9091 (1.14)
Spoken English	.0000 (.00) median: .0	.2000 (.45) median: .0	1.5455 (1.21) median: 1.0	.9091 (.94) median: 1.0
Test	5.2000 (3.42)	3.2000 (3.11)	13.5455 (11.84)	10.4545 (11.22)

Note. SD= Standard Deviation, Dif.= Difference between co-twins.

Oral skills generated significant differences. A median test had to be used for spoken English because the distribution of the identical twins was not normal. The median test of the differences among the identical twins, fraternal

twins, and the nontwins of control group (2) had Chi-Square 11.2324 and significance .004. The median test among the identical twins, fraternal twins, and the nontwins of control group (3) had Chi-Square 6.8140 and significance .033.

The next step was to analyze *which of these individual groups* were significantly different from each other in spoken English. These comparisons are displayed in Table 30. A t-test or a median test was run concerning each pair of the groups. The fraternal twins and both groups of nontwins could be examined with the help of t-tests, because the distributions were normal, but the comparisons with the identical twins had to be run by median tests.

Table 30. Significance of comparisons among the average within-pair differences in spoken English of the different twin and control groups.

Spoken English:	<i>Fraternal</i>	<i>Nontwin/ group 2</i>	<i>Nontwin/ group 3</i>
P-value/probability			
<i>Identical</i>	1.000 (median test)	.119 (median test)	.034 (median test)
<i>Fraternal</i>		.033 (t-test)	.137 (t-test)

According to the median tests, there were no significant differences between the identical co-twins and fraternal co-twins. The median test was not powerful enough to indicate a significant difference between the identical co-twins and the control pairs (2), but the t-test indicated significance between the fraternal twins and control group (2): $t(14)=2.37$, $p=.033$. Conversely, there was a significant difference between the identical co-twins and control group (3), the probability was .034 by a median test; but no significant difference was found by a t-test between the fraternal twins and control group (3).

On the basis of these mean/median differences in within-pair scores between the identical, fraternal, and nontwin pairs, the conclusion can be drawn

that although the twins were more similar with each other compared to the nontwins in earlier comparisons, there was no significant difference between the *identical and fraternal twins*. Table 29 indicated that the identical co-twins were, despite slightly weaker within-pair dependence in the scores, somewhat more similar than the fraternal co-twins on an average in writing-related skills in particular, although the difference was not significant. This was not true of oral skills.

These results point to the conclusion that heredity and environment affect oral skills together, but written language might be strongly affected by genetics. There was no significant evidence concerning the latter assumption, but the difference was somewhat greater than in oral skills. The inconsistency of the test scores may be due to the fact that the measure was composed of many different areas of language skills, which may vary in their origins of influence. The difference was small when considering the scale.

The fact that the contribution of environment to the interaction between nature and nurture might not be as great in writing skills may have resulted in written English producing no significant differences in relation to the balance of influence between self-concept and family resemblance. Variation in the results concerning twin-singleton within-pair differences in written and spoken language skills was due to somewhat greater similarity among the co-twins in oral skills than in writing skills, not the difference between fellow controls in different skills.

The different *zygosity groups*, however, differed significantly from certain *control groups*. The significant differences arose from *oral skills*. The interpretation of the earlier results concerning the similarity in all the co-twins in general in contrast to the nontwins can be continued. Either the teachers' evaluations of the oral skills of twins are similar, because they cannot distinguish between the two members in a set, or these language skills have something to do with heredity/environment, which are stronger predictors than certain affective styles and possibly effort. Identical twins, in particular, are often treated similarly. However, the fraternal twins were also very similar in their ratings, and in this case it should be easier for the teacher to distinguish between the two individuals, unless twins in general are evaluated as one unit.

The fact that particularly oral skills rather than writing skills had significant differences supports the view that the teachers' failure may partly account for the significant finding. Another explanation could be that the interaction between heredity and family environment has more influence on oral skills than written English skills. Yet another explanation arises when these results of three groups are compared with the results of two groups (all the twins regardless of zygosity and the nontwins). The latter comparisons reached significance also in other skills. Thus the former comparisons may have been partly affected by a reduced sample size. Heredity/environment could be influential in general.

The t-tests between individual groups indicated expected results on the basis of mean comparisons, but the results of the median-tests were rather unexpected. No significant difference emerged between the identical twins and control group (2), because this mean difference appeared strong. The median test was not powerful enough to generate a significant result. This must be explained by *sample errors*: small sample sizes as well as the differences between the means and medians and the non-normal distribution of the identical twins. Median tests are based on different assumptions than mean tests. Consequently, an examination of means does not provide reliable information if one of the groups has a non-normal distribution. The other differences were expected. The mean scores of the fraternal twins and control group (3) were not as different as those between the fraternal twins and control group (2), which resulted in no significance with control group (3). The necessity to use different tests concerning different relationships made the results slightly complicated.

These comparisons were also made to add to the understanding of general co-twin-nontwin differences. The results implied that shared environment in interaction with genetic resemblance was stronger than resemblance in orientation, but self-concept predicted proficiency better. Resemblance in self-concept was, however, weaker than environment in interaction with full genetic similarity. The lack of difference in influence between this interaction and orientation was subject to the choice of the statistical test and sample errors.

Both levels of comparisons. On the basis of average within-pair differences in both group comparisons (twin-nontwin and identical-fraternal-nontwin), some *conclusions* can be drawn. There are several facts that point out the role of heredity/environment in *oral skills*, in particular. Twin-nontwin comparisons pointed to the significant similarity of twins regardless of control variables. Also, the comparisons between the identical twins, fraternal twins, and nontwins indicated significant differences in spoken English. Furthermore, the correlations among all the twin pairs were the strongest in spoken English.

The origin of the influence is unclear concerning spoken English. The results point to interaction between nature and nurture. The average similarities and correlations were slightly stronger for spoken English among the identical twins as compared with the fraternal twins, but the difference was not great enough to draw such conclusions that heredity would be more significant than family environment in oral skills. The result, however, suggests that environment might not account for similarity alone. Both twins can be assumed to have a similar degree of shared environment, but the identical twins are genetically more similar, which may have led to somewhat greater similarity in learning outcomes. In a bigger sample, more significant differences could have been detected. Genetics and family environment seem influential in terms of oral skills, in particular.

Although oral skills seem to be emphasized when the impact of heredity and environment is estimated, the analyses indicate that these factors also affect *other aspects of proficiency*: scores on *written English* measures. The twin-singleton comparisons of within-pair means/medians indicated significant differences when orientation was controlled: the twins were more similar than the nontwins in all the measures. Even stronger evidence can be seen in the correlation Tables and comparisons. The correlations were much stronger among the twins than the nontwins concerning all the proficiency measures, and regardless of the control variable. Comparisons indicated significant differences, i.e. hereditary/environmental influences in all skills.

As was stated before, equal self-concepts among all the groups, instead of greater similarity in the co-nontwins, could have led to the significance of family resemblance also in t-/median tests. Because the difference between the

identical and fraternal twins was somewhat higher in written than in spoken English, written English might be more strongly influenced by genetics.

The difference between spoken and written language reflects a difference between influences on two different *media* of language competence. Another way of comparing influences on skills is to explore different *areas* of language competence. The test measured different abilities.

Closer analysis of the test

Although the four main proficiency measures were the core of within-pair analyses, it was also considered useful to explore the different subtests. They may give some indication of which language skills might be the most sensitive to family resemblance. Average score comparisons were carried out by contrasting the *twins and singletons* only, because it was concluded that the results of the *zygosity* groups were more unreliable because of the reduced sample size. Correlation analyses were again carried out to contrast these co-twins and fellow control pairs separately.

T-tests were applied first, because the primary purpose here was to find the areas where heredity and environment affect the most in relation to other factors, and this could be indicated by these tests the most precisely. The correlation results concerning the whole test had already earlier indicated that the co-twins were very similar with each other. The additional correlation analyses (to be reported later) cleared up more specifically the areas with significant within-group similarity between the co-twins. First the aim was to find out which of the subtests had the strongest differences.

It was acknowledged that the co-twins could be very similar in total test results, but this similarity could be due to similarity in most of the subtests or alternatively to the balance between different strengths and weaknesses. Proficiency consisting of different areas could be similar, but these areas could indicate either similarities or differences. Great differences were not likely to arise, because the scores in the subtests were earlier found to be related in a reliability analysis. This relatedness does not necessary indicate that there are

significant twin-nontwin differences in all the areas. Within-pair similarity in the subtests may also vary between the twins and nontwins.

Table 31. Average within-pair differences in subtests among the twins and control nontwins.

Subtest:	Mean (SD) <i>Twins</i> (N=11)	Mean (SD) <i>Control</i> <i>group 2</i> (orientation controlled) (N=11)	Mean (SD) <i>Control</i> <i>group 3</i> (self-concept controlled) (N=11)	P-value: between twins & control group 1	P-value: between twins & control group 2
Listening	1.6364 (1.91)	3.0909 (3.08)	1.8182 (1.94)	.198	.827
Reaction	3.0000 (2.53)	4.2727 (3.38)	3.8182 (4.00)	.329	.572
Reading	.9091 (1.04)	2.2727 (2.83)	2.3636 (1.80)	.150	.031
Grammar	2.3636 (2.16)	5.3636 (4.08)	5.4545 (4.95)	.048	.079

Note. SD= Standard Deviation, N= Number of cases.

The average score comparisons by t-tests (see Table 31), which were used because of normal distributions in both groups, suggested that *grammar* and *reading* were the only parts of the test where significant twin-singleton within-pair differences emerged. Significant differences arose in grammar from the comparisons between the twins and control group (2), which was based on consistent within-pair orientation scores. Reading comprehension was significantly more similar among the co-twins than control group (3), fellow nontwins with similar self-concepts.

Table 32. Subtest correlations for the co-twins and nontwin pairs.

	Listening	Reaction	Reading	Grammar
<i>Twins</i>				
(N=11)				
Pearson	.7744 **	.8148**	.8957***	.8367***
Spearman	.7689**	.7077*	.7542**	.8846***
<i>Control group 2</i>				
(orientation controlled) (N=11)				
Pearson	.4328	.2923	.3551	.6214*
Spearman	.5832	.2372	.2555	.4908
<i>Control group 3</i>				
(self-concept controlled) (N=11)				
Pearson	.7125*	.3170	.0392	.2807
Spearman	.6873*	.5505	-.3246	.3393

Note. * Significance level .05, ** Significance level .01, ***Significance level .001, N= Number of cases.

The test was not designed to measure within-pair differences in particular grammatical or syntactic features, but the results point to the hereditary (or environmental) influence of *grammatical* ability. *Reading* comprehension pointed to similar evidence. These findings point to the influence of genetic endowment rather than environment on these areas of language learning, because family environment should rather affect the other measured skills (reaction and listening), which are more subject to stimuli and exposure to language. Reading skills might also be employed more in some families, but sixth-graders are not likely to be affected by such environmental influence to any great degree.

The correlations between the co-twins (see Table 32) suggested that the success of one twin predicted the success of the co-twin significantly in all parts of the test. Although twin-singleton differences were not significant in listening and reaction, the co-twin comparisons indicated significant dependence also in these skills. Reading and grammar were naturally significantly similar among the co-twins. The fellow nontwins were significantly consistent only in listening when they had similar self-concepts, and in grammar when they were similarly oriented.

It must be noted that in some cases, the generally more proficient member scored slightly lower on some particular part of the test, although her total test score was higher than that of her pair. Such evidence was not frequent, and often the total scores were already very close in these cases.

The correlations were also compared concerning the subtests. Reading was the only subtest where the twins were significantly different from both control groups (2) and (3) concerning Pearson's correlations. Thus the co-twins were more similar than the co-nontwins in this respect. The correlations of the zygosity groups could not be statistically compared here either.

The correlation results denote (in relation to the t-test results) that reading comprehension was quite strongly influenced by the interaction between nature and nurture. The lack of difference in grammar was probably due to relatively somewhat higher similarity in the nontwins as compared to reading. Different tests indicate slightly different results because of different assumptions.

The findings concerning the tests can be *summed up* as follows. It seems that the co-twins were significantly similar in all aspects of the test: listening, reaction, reading, and grammar. Comparison of the twins with the singletons by t-tests indicated that the within-group similarity of the co-twins was significantly greater than the correspondence of the fellow nontwins with similar affective predictor patterns only in grammar and reading. However, according to correlations, similarity in orientation (see the control group) indicated consistency in grammar, and similarity in self-concept indicated consistency in listening. Concerning these skills, the results, however, indicated that the affective characteristics of the nontwins were less powerful than hereditary/(environmental) influence in terms of grammar. Correlation

comparisons, however, suggested that nature/nurture was not more powerful than consistency in grammar.

Thus, family resemblance was evident in all the skills. It was significantly stronger than the correspondence in the affective characteristics that were examined only in grammar when orientation was controlled and in reading when self-concept was controlled. The role of grammar in the results was somewhat complicated probably due to the sample size.

Reading seemed to be the most affected area in terms of the influence of nature/nurture on the basis of the two test types. Grammar appeared to be the most universally affected area regarding all the influences studied (including family background and affective factors).

Summary

To sum up *all correlation and average score comparisons*, both analyses point to greater similarity among the twins. This was evident in oral skills in particular, although within-group similarity was great among writing skills and subtests, too. Correlations indicated clear differences between the twins and both control groups concerning all the measures, but the mean/median comparisons indicated significant differences in all the measures only with control group (2) (orientation controlled). Spoken English generated significant results also with control group (3) (self-concept controlled). This leads to the question of reasons for variation in these results. Variation is probably due to *different test types*. Still, the pattern of influences became evident.

With regard to the lack of some significant associations when self-concept was controlled, the general relationship between proficiency and self-concept did not suggest that self-concept would affect oral skills any less than writing skills. This could have explained the difference in oral skills and the lack of difference in writing skills. Correlations, again, indicated significant differences in relation to the group whose self-concept was controlled also in writing skills. It seems that group comparison tests were not simply powerful enough to indicate significant results in this respect, considering the balance between influences. This could be partly due to the fact that oral skills are

influenced by the powerful interaction of nature and nurture, whereas writing skills have a bias to more exclusive genetic influence. Also, self-concept could have been equally similar in co-twins and fellow controls, and still the comparisons would have been reliable in terms of heredity/environment estimates, but now it was significantly more similar in the fellow nontwins.

The difference between the correlation analyses and mean/median comparisons is that the correlations also indicated the significance of similarity within a group. It was significant among the co-twins but not among the fellow nontwins in writing-related skills. Both heredity and affective profiles had an influence, but it was possible to contrast these influences by comparing average scores and correlations. Correlation comparisons were clearly suggesting greater similarity in the twin pairs, but t-tests and median tests did not indicate significant differences in all aspects. The studies earlier reported were often based on correlation analyses.

When the test was examined more closely, it was found out that reading and grammar were the areas where hereditary influences operate significantly more strongly than the affective factors. Environmental explanations are also possible, although on the basis of earlier literature this seems less evident. Furthermore, the analyses of the present study pointed to the role of genetics in written English. Thus at least grammar is likely to be clearly affected by genetics.

It is difficult to show the difference between the identical and fraternal twins because the samples are so small, and for the same reason the comparisons between the zygosity groups and control groups are slightly problematic, and they indicated somewhat unsystematic results. The emphasis in analyses should be placed on general twin-singleton within-pair comparisons of means/medians and correlations because of the doubled sample of twins. However, the role of heredity in writing skills was indicated by greater similarity in the identical than fraternal co-twins. It was also supported by the fact that differences between written and spoken language skills was not due to differences between these skills in the co-nontwins.

There was a slight difference between correlation and average score results concerning the identical and fraternal twin comparisons. The

correlations were slightly stronger for the fraternal than the identical co-twins in writing-related measures, but the average within-pair similarities were stronger among the identical co-twins. This points to sample errors: the scores of the fraternal co-twins were more consistent in the group (see correlations) than those of the identical co-twins, but the differences were smaller among the identical twins on an average. The closeness between the scores is generally more important than systematicity in the group. Furthermore, in a small sample, also distant but systematic scores between the members in pairs in a group may consistently predict each other, although this may not always indicate similarity.

Several earlier studies are consistent with the results of the present study. The studies conducted among twins are particularly relevant in this connection, because the shared environment factor is likely to be more similar among twins than other relatives in family studies. The study by Ando (1992) is important in this context, because it is the only known study that was reviewed concerning genetics associated with foreign language learning and documenting positive evidence. Furthermore, the heredity of first language learning involving normal development has been reported by Ganger et al. (1998), who also found evidence concerning syntactic features, Emde et al. (1992), Fischein (1983), and Munsinger and Douglass (1976), who also found evidence concerning syntax and reading. The genetic basis of first language learning is likely to be related to that of foreign language learning.

4.5 Gender differences

Gender differences will first be dealt with in terms of proficiency. The differences concerning affective and cognitive variables will be viewed after this. These two relationships serve as the basis for the analysis of the reasons for gender differences. The same factors were examined in general and with reference to twin-singleton differences above.

The *proficiency* findings indicated that in the spring the average student got the grade eight in English (see Table 33). This was also the average

evaluation made by the teachers of the students' written and spoken English skills, except for the writing skills of the boys, which were on an average closer to the grade seven.

The average grades of the twins were somewhat higher than those of the whole sample, 190 subjects (compare Tables 13 and 33), because gender was a control variable in twin-singleton analyses. This also points to the superiority of the girls in proficiency.

Table 33. Statistical figures for gender differences in proficiency.

	Mean (SD): <i>All</i>	Mean (SD): <i>Males</i>	Mean (SD): <i>Females</i>	P-value
Grade	7.942 (1.25) median: 8.0 (N=190)	7.581 (1.32) median: 7.5 (N=86)	8.240 (1.10) median: 8.0 (N=104)	.024 (median test)
Written English	7.870 (1.34) median: 8.0 (N=169)	7.392 (1.45) median: 7.0 (N=79)	8.289 (1.09) median: 9.0 (N=90)	.002 (median test)
Spoken English	7.834 (1.32) median: 8.0 (N=169)	7.570 (1.39) median: 7.0 (N=79)	8.067 (1.22) median: 8.0 (N=90)	.080 (median test)
Test	48.743 (16.18) (N=183)	44.210 (17.77) (N=81)	52.343 (13.85) (N=102)	.001 (t-test)

Note. SD= Standard Deviation, N= Number of cases.

Significant evidence was found that the proficiency level of the girls was considerably higher than that of the boys. This was confirmed by all the proficiency measures except the evaluations of oral skills. The t-test values were $t(148)=3.38$, $p=.001$ for the whole test. The median tests resulted in Chi-

Square with Yates' CC 5.1075 and corrected significance .024 for grades, as well as Chi-Square (Yates) 9.5785 and corrected significance .002 for written English. The results suggest that girls may be willing to invest more effort in language learning, and they do better in the tasks that require cognition. Oral skills are more interactional in nature. They may not be subject to great effort and advance preparation, which written tasks and tests often require in the school system.

Accordingly, gender clearly emerged as a predicting factor of achievement in English. The studies by Takala and Saari (1979), Huttunen and Kukkonen (1995), and Riding and Banner (1986) indicated similar findings. The work of Clark and Trafford (1995, 1996) also points to similar conclusions. The study by Huttunen and Kukkonen (1995) resembled the present study in many ways. The subjects were Finnish sixth graders in both studies, and learning outcomes were measured fairly similarly. The subjects in Riding and Banner's (1986) study were students in French classes, and the hypothesis of gender differences in foreign language learning was also supported by this study.

Table 34 shows the scores for intervening variables among the males and females. It appears that no significant differences occurred between the males and females in the *orientation* ratings. The males reported slightly more extrinsic orientation than the females. The earlier studies reported in the background section did not suggest that gender would be an operating factor in orientation behaviour. The findings about the lack of gender differences are consistent with those by Vallerand et al. (1994). It is evident that females' higher proficiency must be accounted for by other predictors of success.

Foreign language self-concept was not characterized by significant gender differences either. The females perceived themselves to be somewhat less competent foreign language learners than the males. The differences are likely to be random. Earlier findings do not strongly support gender differences in self-concept, but arguments and findings are somewhat inconsistent. Leondari argued (1993) that girls have a tendency to underestimate themselves as learners, while boys tend to overestimate themselves. The self-concept ratings of the present study pointed to this direction, when they were compared

with actual proficiency, but the difference may also be random. Vallerand et al. (1994) and Leondari (1993) did not find any gender differences in school perceived competence. Zimmerman and Martinez-Pons (1990) found that boys displayed significantly better verbal efficacy than girls. Self-efficacy is a task-related concept, but the self-concept of the present study also involved task self-concept.

Table 34. Statistical figures for gender differences in intervening variables.

	Mean: Total score (SD) One item score <i>All</i>	Mean: Total score (SD) One item score <i>Males</i>	Mean: Total score (SD) One item score <i>Females</i>	P- value
Orientation:				
Orientation in the classroom	22.253 (4.913) 2.225 (N=178)	22.667 (4.43) 2.267 (N=78)	21.930 (5.26) 2.193 (N=100)	.322
Self-concept:				
Foreign language self- concept	29.337 (7.86) 3.260 (N=178)	30.012 (8.24) 3.335 (N=82)	28.760 (7.51) 3.196 (N=96)	.291
Strategy:				
Direct	51.343 (10.38) 3.020 (N=175)	50.718 (10.61) 2.983 (N=78)	51.845 (10.23) 3.050 (N=97)	.477
Metacognitive	21.755 (4.99) 3.108 (N=184)	21.500 (4.76) 3.071 (N=82)	21.961 (5.18) 3.137 (N=102)	.535
Socioaffective	37.858 (8.15) 2.912 (N=176)	36.260 (7.97) 2.789 (N=77)	39.101 (8.10) 3.008 (N=99)	.021

Note. SD= Standard Deviation, N= Number of cases.

The girls employed all the *strategy* groups slightly more frequently than the boys. The relationship between strategy use and gender generated one significant result. Gender determined the use of socioaffective strategies significantly: $t(174)=2.32, p=.021$. The finding is supported by the results by Oxford and Nyikos (1989). Their sample consisted of older students, but the conclusion was the same. Females employ social strategies more frequently than males. This was the only strategy group that was significantly influenced by sex differences in the present study.

To sum up the intervening influences, the use of socioaffective strategies was the only factor that was a significant predictor of both success in English and gender differences. The use of these strategies is particularly relevant in terms of the present study design. Personality could not be studied in this context, because the data were collected from the (female) control group (1) and the twins, but active prosociality could have involved gender differences, because it represents sociability. This is also supported by the fact that the use of socioaffective strategies was not highly crucial to success in learning outcomes, but yet the females succeeded clearly better. It is possible that there are also other intervening factors.

The *conclusion* of all the gender differences can be drawn on the basis of the findings of proficiency and affective/cognitive differences. It was found that the females were significantly superior in English; all the proficiency measures except oral skills pointed in this direction. The only significant intervening variable was the use of socioaffective strategies, which was also earlier found to be linked with the proficiency in English. Thus, it can be argued that the superiority of the female sixth graders in English at least partly results from the frequent use of socioaffective strategies and possibly other interactions associated with it. It is possible that similar and more interesting conclusions could have been drawn on active prosociality if it had been examined. Superiority in proficiency particularly in writing-related skills points to the conscientiousness of girls.

4.5 Interrelationships among affective and cognitive factors

The fifth group of findings consists of interrelationships between affective and cognitive variables. Each possible interrelationship is displayed in one of the three tables. Pearson's correlations are again supplemented by Spearman's correlations because of ordinal scales, and the general tendency is reported. Table 35 shows all the possible interrelationships between orientation in the classroom and other examined potential predictors of learning success.

Orientation was significantly correlated with *foreign language self-concept*. The correlation was moderate in both analyses. This was an expected finding, because the variables are related to each other at the level of definitions. If a subject has an intrinsic orientation, he works for his own good, to satisfy his own interests, and he also wants to do things on his own. This is hardly possible, if the person does not find himself capable of doing so. A low degree of perceived competence is likely to result in extrinsic values.

There is also a considerable amount of overlap in the concepts used to refer to perceived competence and control. The definitions alone serve as sufficient evidence for the positive relationship. The study by Skinner et al. (1990) of perceived control among 9-12-year-old children highlighted the relatedness of the two concepts of perceived competence and control. Also, Noels et al. (1999) found intrinsic motivational orientation and self-evaluated competence related in foreign language learning.

Significant interrelationships between *orientation* in the classroom and the use of *strategies* were also found. Each individual strategy group (frequent use) had a positive connection to intrinsic orientation. The association was the strongest with metacognitive strategies. All the interrelationships were significant, although direct and socioaffective strategies did not have as clear correlations as metacognitive strategies. This is interesting, because these strategies were associated the least with learning outcomes suggesting indirect influences. Both correlations had similar patterns.

Table 35. Correlations between orientation and self-concept/
Strategy use/personality.

	Orientation in the classroom	
	Pearson	Spearman
Self-concept:		
Foreign language self- concept	-.5842*** (N=169)	-.5848 *** (N=169)
Strategy:		
Direct	-.4516*** (N=163)	-.4169*** (N=163)
Metacognitive	-.5049*** (N=173)	-.4315*** (N=173)
Socioaffective	-.4368*** (N=165)	-.3776*** (N=165)
Personality:		
Active prosociality	-.4485** (N=41)	-.4149** (N=41)
Anxiety	.1345 (N=38)	.1273 (N=38)

Note. ** Significance level .01, ***Significance level .001, N= Number of cases.

There were four previous studies reporting significant correlations between strategy and control variables: those by Finkbeiner (1997), Pintrich and De Groot (1990), Ely (1989), and Oxford and Nyikos (1989). Finkbeiner found a relationship between individual and situational interests (reflecting motivation) and reading strategies among 9th and 10th graders. These strategies are somewhat different from those of the present study, but the two studies are yet in line with each other: interests in Finkbeiner's study reflect intrinsic orientation in the present study, and the age difference was not great.

Ely's (1989) study, which sought to measure various language learning variables, was different from the present study in that it used college students as a sample. The finding that high motivation contributed to the internalization of the language, interest in mastering, encountering, using new language items, openness to correction, and willingness to create associations, which are direct and indirect strategies like those used in the present study, parallels the results of the present study to some degree. However, it is essential to notice that a high degree of motivation does not exclude a high degree of extrinsic motivation, although motivation is likely to be stronger with intrinsic interests. The present study adds to the understanding of the relationship between high motivation and frequent strategy use by dealing with the nature of motivation. Ely also found that pupils who were interested in getting good grades were those actively engaged in learning. This was not supported by the present study, which demonstrated a positive association between strategy use and the intrinsic pole, not the extrinsic pole, which was represented by interest in grades. Nevertheless, the students might also have reported an interest in grades, if it had not been contrasted with one's own interests.

Oxford and Nyikos (1989) found significant correlations between direct and indirect strategies and a high degree of motivation. The results can be interpreted in terms of the present study similarly to those by Ely (1989) about high motivation. The subjects of the study by Oxford and Nyikos were university students, not elementary school students, like the subjects of the present study. It must be noted here that the relationship between different factors contributing to language learning is not likely to be greatly affected by age, because it is the question of interrelationships between the factors already found to be predictors of success, not the influence of one factor on success.

The findings by Pintrich and De Groot (1990) suggested that intrinsic value was highly predictive of the use of cognitive and metacognitive-related strategies. The finding was supported by the present study. The sample consisted of children of the same age as those in the present study, and the control value was defined fairly similarly in the two studies.

Motivational *orientation* had the only significant connection with *personality*. It was associated with active prosociality. This finding was not

supported by any of the studies reported in the present work. The finding by Noels et al. (1999) of the relationship between intrinsic motivation and anxiety was not supported in the present study. The connection between active prosociality and intrinsic orientation can be interpreted so that both involve a certain amount of activity and interest in the outside world.

Table 36 shows interrelationships between *foreign language self-concept* and the rest of the predictors of success in language learning. All *strategies* seemed to have weak but significant interrelationships with foreign language self-concept. The association was particularly weak with socioaffective strategies. Spearman's correlations indicated slightly weaker interrelationships.

Table 36. Correlations between self-concept and strategy use/personality.

	Foreign language self-concept	
Strategy:	Pearson	Spearman
Direct	.2272** (N=164)	.1913* (N=164)
Metacognitive	.2289** (N=172)	.1811* (N=172)
Socioaffective	.1732* (N=168)	.1665* (N=168)
Personality:		
Active prosociality	.3177 (N=38)	.2351 (N=38)
Anxiety	.0030 (N=36)	-.1117 (N=36)

Note. * Significance level .05, ** Significance level .01, N= Number of cases.

Although the relationships were not particularly strong in the present study, the results are slightly similar to the findings of Oxford and Nyikos (1989) about the relationship between self-esteem and strategy use, also Pintrich and De Groot (1990) about the relationship between self-efficacy and the use of strategies related to cognitive and metacognitive strategies, and Zimmerman and Martinez-Pons (1990) about perceived efficacy and self-regulated strategies. The finding by Nelson Le Gall et al. (1989) about the connection between help-seeking (related to social strategies) and low perceived competence, however, was not confirmed in the present study. In fact, the study by Nelson Le Gall et al. could be supported by the significant correlation between extrinsic orientation and low foreign language self-concept in the present study. Help-seeking seems to reflect extrinsic orientation rather than the use of social strategies.

It is important to notice that the concepts are slightly different in some studies. For example, the studies by Pintrich and De Groot (1990) and Zimmerman and Martinez-Pons (1990) dealt with task-related self-efficacy, which can be interpreted to have a control orientation bias. However, intrinsic orientation and self-concept were found to be closely related.

Foreign language self-concept was not significantly correlated with *personality*. Active prosociality seemed to have a slight tendency to interrelate with positive foreign language self-concept, whereas anxiety would have been expected to have the reverse interaction, which was not significantly evident. Among the studies which were reported in the background section, no important findings were reported between personality and perceived competence. Self-concept could actually be considered a personality-related variable. High global self-concept reflects self-esteem.

The rest of the correlations can be seen in Table 37. *Strategy use* was not connected to *personality* to the extent it was correlated with orientation. The only significant relationship existed between direct strategies and active prosociality in Pearson's analysis, but the correlation coefficient indicated a relatively weak association. This finding could not be expected, and there was no support for it in the previous studies. It is possible that both variables involve active engagement characterized by attention to the outside world:

images, people, etc. The general lack of interrelationships between personality and strategy use is consistent with the fact that no important findings were reported in the numerous studies introduced in the background section.

Table 37. Correlations between strategy use and personality.

	Personality:	
	<i>Active prosociality</i>	<i>Anxiety</i>
Strategy:		
<i>Direct</i>		
Pearson	.3266* (N=38)	.2010 (N=35)
Spearman	.2987 (N=38)	.1509 (N=35)
<i>Metacognitive</i>		
Pearson	.2830 (N=41)	.1263 (N=38)
Spearman	.1921 (N=41)	.0805 (N=38)
<i>Socioaffective</i>		
Pearson	.1482 (N=40)	-.0004 (N=37)
Spearman	.0574 (N=40)	-.0043 (N=37)

Note. * Significance level .05, N= Number of cases.

The general finding about personality was that the interrelationships between these factors of social behaviour and other variables were not as extensive as those between the other groups of variables. Active prosociality had an association with orientation and direct strategies. It was as such a clear predictor of achievement, although personality seemed to represent a slightly different source of influence, which might even be more apparent in other contexts.

4.7 Learner types among singletons and twins

Correlations and group comparisons indicated that certain factors predict learning outcomes and certain groups show different achievement and predictor patterns. It is, however, possible that there are *different routes to successful learning* and *different patterns of failure*. It is also essential to have a better understanding of how different factors work together for learning outcomes. Furthermore, some factors seem to have a significant but not particularly strong influence on proficiency. It is worth examining the role of such predictors more closely. A *cluster analysis* is a good solution to identify different learner types and describe the profiles. Such an analysis groups people into several classes according to their patterns of scores on the variables (Skehan 1986, 82). The purpose is to find different learner types, not just different levels of proficiency associated with corresponding levels of predicting behaviour, because such findings can also be achieved by correlation tests. It is also interesting to see how subgroups such as twins and genders are distributed according to profiles.

K-Means Cluster Analysis was used to identify learner groups. There is no commonly accepted single solution to find a correct number of clusters. The solution of six clusters was chosen in the present study on the basis of checking out different solutions. The purpose was to find a number of clusters that differ. Less than six clusters would not have clearly indicated several enough predictor patterns. More than six clusters did not indicate anything that was not evident in six clusters. The cluster analysis also produced an analysis of variance. The analyses of variance were used to find out and indicate how much the groups differed. When interpreting the results, it must be noted that all the clusters do not have to differ in all aspects: it is useful to see how similar proficiency is associated with different predictor patterns or how one predictor can have different outcomes in different clusters. The F-values for each variable were:

- (1) written English (F=48.599, probability .000);
- (2) spoken English (F=59.119, probability .000);
- (3) test (F=34.940, probability .000);
- (4) orientation in the classroom (F=24.401, probability .000);

- (5) foreign language self-concept ($F=45.693$, probability .000);
- (6) direct strategies ($F=20.518$, probability .000);
- (7) metacognitive strategies ($F=31.864$, probability .000); and
- (8) socioaffective strategies ($F=37.518$, probability .000).

The clusters were formed on the basis of standardized data, because the scales of the variables differed markedly. It is important to use standardized variables is important particularly when the distance between cluster centers is measured. The initial cluster centers were refined iteratively, and the cases were classified. Table 38 indicates the *final cluster centers*. Besides standardized mean scores (when the mean is .0 and standard deviation 1.0 in the whole sample), the table also includes the mean scores according to the original scales, which were calculated on the basis of cluster memberships.

The clusters included only 126 cases, because the analysis excludes cases with any missing data. Eight variables were selected on the basis of their relevance: three proficiency measures (written English, spoken English, test results) and five psychological learner factors (orientation, self-concept, direct, metacognitive, and socioaffective strategies), which all predicted learning outcomes. Grades were not included because they resembled teacher evaluations closely, and the purpose was to contrast spoken and written language. Separate evaluations were also chosen rather than grades, because they were from the same period of time as self-report questionnaires. The test was chosen to be the measure indicating general skills in several areas of proficiency. Personality factors were excluded, because they would have limited the number of cases dramatically.

The descriptions of the clusters indicating *learner profiles* can be seen 39. The groups were identified on the basis of the mean scores 34. It must be noted that these analyses were experimental: they only supplement other analyses. The tables indicate that Clusters 1 and 2 represent opposite learner types. Cluster 1 was characterized by low proficiency and low scores in all the affective/cognitive predictors and Cluster 2 by high proficiency and favourable affective/cognitive characteristics. Such groups could be expected on the basis of the correlations. There were, however, groups that showed relatively similar proficiency but different predictor patterns.

Table 38. Mean scores for six clusters.

Mean:	<i>Cluster 1</i>	<i>Cluster 2</i>	<i>Cluster 3</i>	<i>Cluster 4</i>	<i>Cluster 5</i>	<i>Cluster 6</i>
Z- Score	(N=12)	(N=17)	(N=43)	(N=14)	(N=20)	(N=20)
Original scale score (SD)						
Written	- .834	1.148	.461	-1.179	.767	-.534
English	6.750	9.412	8.488	6.286	8.900	7.150
	(.75)	(.62)	(.77)	(.91)	(.55)	(.81)
Spoken	-1.010	1.149	.477	-1.280	.731	-.594
English	6.500	9.353	8.465	6.143	8.800	7.050
	(.90)	(.61)	(.67)	(.77)	(.70)	(.69)
Test	- .798	1.078	.441	-1.327	.554	-.485
	35.833	66.177	55.884	27.286	57.700	40.900
	(12.09)	(3.19)	(8.90)	(16.40)	(5.92)	(13.36)
Orientation	1.475	-1.153	-.137	.472	-.255	.234
	2.950	1.659	2.158	2.457	2.100	2.340
	(.28)	(.39)	(.37)	(.21)	(.30)	(.28)
Self-concept	-1.528	1.350	.076	-.807	.944	-.240
	1.926	4.438	3.326	2.556	4.083	3.050
	(.64)	(.40)	(.57)	(.33)	(.63)	(.51)
Direct	-1.068	.720	.466	.235	-.649	-.722
strategies	2.368	3.460	3.305	3.164	2.624	2.579
	(.55)	(.50)	(.36)	(.52)	(.43)	(.36)
Metacogniti-	-1.471	.910	.259	.679	-.923	-.422
ve strategies	2.060	3.756	3.292	3.592	2.450	2.807
	(.57)	(.56)	(.49)	(.40)	(.43)	(.35)
Socioaffective	-.883	1.180	.446	.412	-1.088	-.468
strategies	2.359	3.652	3.191	3.170	2.231	2.619
	(.50)	(.46)	(.35)	(.33)	(.42)	(.32)

Note. Z-Score= Standardized Score, SD= Standard Deviation, N= Number of Cases.

Table 39. Learner profiles.

<i>Proficiency</i>	<i>Predictor pattern</i>
Cluster 1 rather low proficiency	<ul style="list-style-type: none"> * extrinsic orientation * low self-concept * minor use of direct strategies * very minor use of metacognitive strategies * minor use of socioaffective strategies
Cluster 2 high proficiency	<ul style="list-style-type: none"> * fairly strong intrinsic orientation * high self-concept * above average use of direct strategies * frequent use of metacognitive strategies * frequent use of socioaffective strategies
Cluster 3 above average proficiency	<ul style="list-style-type: none"> * slightly above average intrinsic orientation * average self-concept * above average use of direct strategies * slightly above average use of metacognitive strategies * above average use of socioaffective strategies
Cluster 4 poor proficiency	<ul style="list-style-type: none"> * below average intrinsic orientation * clearly below average self-concept * slightly above average use of direct strategies * above average use of metacognitive strategies * above average use of socioaffective strategies
Cluster 5 above average proficiency	<ul style="list-style-type: none"> * slightly above average intrinsic orientation * clearly above average self-concept * below average use of direct strategies * clearly below average use of metacognitive strategies * minor use of socioaffective strategies
Cluster 6 below average proficiency	<ul style="list-style-type: none"> * slightly below average intrinsic orientation * slightly below average self-concept * below average use of direct strategies * below average use of metacognitive strategies * below average use of socioaffective strategies

Clusters 3 and 5 both showed above average proficiency (the test results, in particular, were in line), but Cluster 3 showed corresponding strategy use but a lesser degree of motivational orientation and self-concept, whereas clearly less frequent strategy use and relatively better self-concept than proficiency and slightly worse motivation was typical of Cluster 5. Orientation was thus fairly similar. The former type was more common, because it included clearly more cases. This profile was actually the most common learner type.

Cluster 4, in turn, seems peculiar, because it was characterized by poor proficiency, but the learner profile was otherwise very different: affective/cognitive factors seem more favourable; in fact, strategy use was considerably high on an average. It was on an average clearly better than the strategy use of Cluster 5 with above average proficiency, for example. Cluster 4 represented a quite different pattern of proficiency failure from Cluster 1. Perhaps the most striking finding was that poor proficiency was associated with less negative behaviour than low proficiency. Cluster 6 also represented weaker than average achievement, but this group was also characterized by a weaker than average affective/cognitive profile.

Accordingly, it appeared that strategy use was the most *varying factor* in terms of its effects on proficiency. This was also evident in correlation tests. Strategies seem to be frequently used by those who really succeed, on the one hand, and those who do not succeed, on the other hand. Another (not so strongly differentiating) factor that also seemed to have different patterns was self-concept. Above average proficiency was gained by clearly above average or average self-concept (or this proficiency level leads to this level of perceived competence). Low achievers perceived their competence even lower and were somewhat more negative in this respect than poor achievers. In other cases self-concept mainly followed the level of proficiency. Orientation clearly followed the level of proficiency only among high achievers. Low achievers were quite poorly motivated and extrinsic, whereas poor achievers showed only below average motivation, which was on an average within the limits of intrinsic orientation.

Table 40. Distances between final cluster centers.

	1	2	3	4	5	6
1						
2	6.3580					
3	4.2079	2.2392				
4	3.1620	5.0268	3.2067			
5	4.1281	3.4562	2.4355	4.5341		
6	2.2258	4.3970	2.4378	2.2075	2.6098	

The *distances* between the final cluster centers are displayed in Table 40. The distance was the greatest between Clusters 1 and 2 and the smallest between Clusters 4 and 6. Cluster 2 was clearly distinct from Cluster 4 as well. Cluster 6 was also relatively close to Cluster 1. Clusters 3 and 5 resembled each other in proficiency (above average) but not correspondingly in predictor pattern. Clusters 1 and 4 were also rather close in proficiency (below average). The centers for individual variables clarify the situation further.

Some clusters indicating fairly similar proficiency but different predictor patterns can be compared with regard to significance. Both standardized variables and original scores have similar results. The normality of distributions determined the choice of the test: nonparametric alternatives were applied in the case of non-normal distributions. The distribution was not normal only in written English in Clusters 2 and 4, spoken English in Cluster 2, and orientation in Cluster 3.

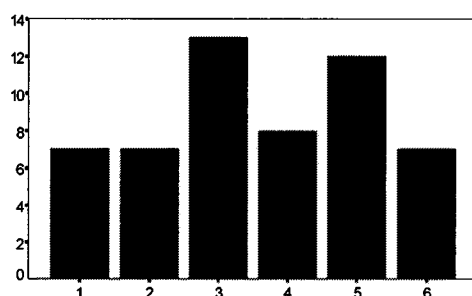
With reference to above average proficiency, the difference between the Clusters 3 and 5 was significant by Scheffe Multiple Range Test concerning self-concept, direct strategies, metacognitive strategies, and socioaffective strategies, but not orientation, which had to be tested by a median test. Clusters 2 and 5 differed significantly in direct, metacognitive, and socioaffective strategies, and orientation, but not in self-concept. The differences between Clusters 3 and 5 did not reach significance concerning any of the proficiency measures. The difference in proficiency in more distant Clusters 2 and 5 was significant (by a median test) only in written English.

With reference to below average proficiency, significant differences emerged between Clusters 1 and 4 in orientation and all strategies, but not in self-concept. Clusters 1 and 6 differed significantly in orientation, self-concept,

and metacognitive strategies, but not in direct or socioaffective strategies. The differences between Clusters 1 and 4 or 1 and 6 did not reach significance concerning any of the proficiency measures.

It is interesting to observe whether the twins and other subgroups had different learner profiles. In order to observe the twins, the gender groups had to be studied first, because comparisons indicate whether the twins are similar to the girls in general. These examinations provide more descriptive information about *group differences*.

Figure 25 shows that membership in Clusters 3 (24.1%) and 5 (22.2%) was the most frequent among the *males* ($N=54$). In other words, many boys tended to have an above average proficiency combined with either a fairly consistent affective/cognitive profile or a profile with below average strategy use but relatively better self-concept. The rest of the clusters were relatively even: 14.8% belonged to Cluster 4, and 13.0% (each) to Clusters 1, 2, and 6. This suggests that below average proficiency was associated with the different predictor profiles quite evenly among the males.

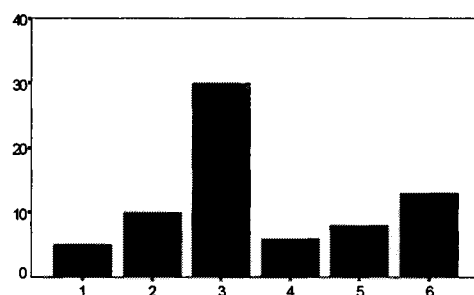


Note. See cluster (1-6) profiles in Table 39; the frequency indicates the number of cases.

Figure 25. Cluster membership among the males.

The *females* ($N=72$) with above average proficiency, instead, as can be seen in Figure 26, very frequently belonged to Cluster 3 (41.7%). Many girls seem to rely on strategy use, whereas relatively many boys appear to succeed alternatively thanks to good self-concept. The latter, Cluster 5, included 11.1% of the females. It also seems that Cluster 2 with excellent proficiency and a

consistently favourable affective/cognitive profile was not any more typical of the females (13.9%) than the males, although significant proficiency differences emerged. Below average proficiency was often characterized by a consistent predictor profile among the females (Cluster 6: 18.1%). Cluster profiles 4 (8.3%) and 1 (6.9%) were not as frequent.



Note. See cluster (1-6) profiles in Table 39; the frequency indicates the number of cases.

Figure 26. Cluster membership among the females.

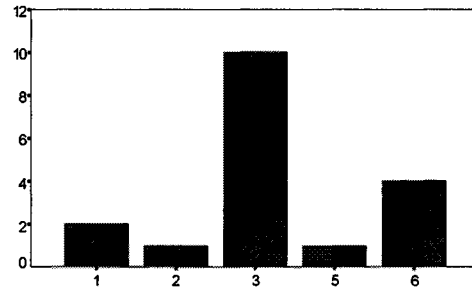
The *twins* ($N=18$) highly resembled the whole group of females in their learner profiles (see Figure 27). However, it became apparent that a relatively high percentage (55.6%) belonged to Cluster 3. Those twins who did not reach above average proficiency usually belonged to Cluster 6 (22.2%). The membership in Cluster 1 generated the percentage 11.1%. A tendency was observed for the twins to have fairly consistent achievement and predictor profiles, when the profiles were examined concerning either success or failure with reference to the average scores. Cluster 5 and 2 (each) consisted of only 5.6%, and Cluster 4 included none of the twins.

The twins generally appear to be quite proficient learners of English. The cluster analyses revealed profile differences between the boys and girls, but great twin-nontwin differences were not displayed. The female twins tended to achieve learning goals through routes fairly similar to the female singletons. It was obvious that the sample did not include any twins with very poor proficiency suggesting that possible severe learning problems in early childhood had been overcome by the whole sample. Many exceptionally good

twins in terms of the profile were not discovered either. At this age twins might still be too immature (because of the twin situation) psychologically to make the best of their co-operative potential and create excellent predictor profiles, although the cognitive skills seem fully developed without a trace of delay. Success specifically due to self-concept without favourable cognitive characteristics was not particularly obvious either. It is possible that young twins do not yet possess all required learner factors to benefit from the twin situation. Dependence and competition may make them rely on strategy use but slightly reduce courage, which is perhaps required to achieve good results in interaction with sociability.

The analyses did not support the view of a battle between influences: that some twins might suffer from deficits and some twins might benefit in second language learning from affective factors including sociability; such a situation might, however, result in average results in the whole group. Affective factors did not strongly explain the success of twins, and twins in the cluster of poor proficiency did not exist.

Out of 22 twins only 18 were included in the cluster analysis. When the members in pairs were compared with each other, only 7 sets could be observed because of the missing data of some sisters. Only the subjects in one pair belonged to different clusters (3 and 5). The co-twins generally appeared to have very similar learner profiles, although the sample was too small for clear conclusions. The proficiency level was close, as was indicated in within-pair analyses, but the affective profiles were also pretty similar (although the control pairs of within-pair analyses were even significantly more similar concerning some variables). Strategy use, for example, was ignored in within-pair analyses. The twins who belonged to different clusters had similar proficiency patterns through slightly different routes: one twin belonged to the group where strategy use was more frequent and the other to the group where self-concept was better on an average.



Note. See cluster (1-6) profiles in Table 39; the frequency indicates the number of cases.

Figure 27. Cluster membership among the twins.

The results are consistent with the view of individual differences suggesting that there are several ways to succeed, not only a single profile (see Ellis 1994, 523-524). An accumulative effect of supporting individual differences was only evident among the best students. The worst affective barrier was not associated with the lowest achievement. The results may be positive from the point of view of some learners with specific but not accumulative weaknesses.

5 DISCUSSION

The findings will be discussed from three perspectives: their importance (which also serves as a summary of the findings), their limitations, and further possibilities for research.

5.1 Significance of the findings

The findings of the study point to the importance of individual differences in learning English as a second language. The results lent support to several assumptions and answered many questions arising from the research area. Interesting relationships were revealed, and significant differences and correlations emerged among the examined language learning variables.

5.1.1 Factors affecting second language learning

The *first research question* dealing with the assumed connection between achievement in English and psychological affective or cognitive factors received a positive answer. Significant correlations were found between proficiency and foreign language self-concept, active prosociality as a personality type, intrinsic motivation, and certain language learning strategies. It could be concluded in general that these factors contribute to proficiency positively.

More specifically, the strongest correlations emerged between orientation and all the proficiency variables as well as between active prosociality and the course grades. There was a tendency of orientation affecting all skills fairly equally. Self-concept predicted all the skills and oral skills in particular rather clearly. There was a bias of strategy use affecting particularly a test situation and active prosociality influencing written English more generally, although oral skills were also affected. It seems that a certain amount of confidence

helps the learner to express himself in spoken language, in particular. Motivation helps learners gain knowledge rather than express it, and this affects all skills equally. Active prosociality seemed to reflect conscientiousness rather than interaction: conscientiousness leads to efficient working, which is often noticed when grades are given. Strategy use, direct and socioaffective, seems to have a short-term impact on achievement, and particularly metacognitive strategies seemed to work only for the test results.

The *causal nature* of some relationships, however, remains unsolved. This is possible particularly with reference to foreign language self-concept, because a learner may succeed as a result of a confident attitude, or high perceptions of his/her abilities may be caused by success. The same goes for a low degree of self-concept and learning problems. Self-concept may be a cause and an affective outcome of learning at the same time. The results significantly support the positive interrelationship, but it is not clear which factor contributes to the other. Probably there is a relationship of two-way interaction between them.

Orientation and strategies, instead, are not likely to be similarly affected by success or failure, because it does not seem probable that a successful learner, for example, will become intrinsically oriented or start using strategies frequently as a result of success. There is no use starting to practise only after success. Orientation points to reasons for learning rather than outcomes of learning. Success might arise from both poles of orientation, and a successful learner may study either to get good grades or out of curiosity and interest, but intrinsic orientation was significantly more successful. Intrinsic working preferences and independence reflect high motivation more clearly in comparison to extrinsic poles. Active prosociality, in turn, is a personality trait, which is not dependent on language learning results either.

Besides the direction of causality, separate factors can be discussed in detail with regard to their importance. *Orientation* was not strongly intrinsic, although the average score pointed to this pole. This variable consisted of two poles, which makes it an easier factor to analyze. It seems that at this age students cannot yet fully rely on themselves as a source of motivation. This also

suggests that there is a great deal of unused potential in orientation among them. Children may also have a tendency to please their parents and teachers.

Sixth graders were fairly self-confident about their learning. *Self-concept* is, after all, also a very powerful factor. The results also confirmed that it had the strongest association with achievement. If a person has a strong will and confidence, he usually succeeds better in everything he does. Self-concept cannot exclusively be considered something that develops after success, because ambition often leads to success, and it is related to good self-esteem. It is likely that good self-concept makes a learner to exceed his aptitude potential (e.g. to become above average after being average), but a certain amount of talent is also needed to become excellent and develop consistent self-concept. The cluster analysis pointed to the conclusion that success can be associated with effective information processing (strategy use) or good self-concept. Strategy use did not always yield good results, which self-concept more frequently did. Excellent students were good at both. It appears natural that a self-confident student may also rely on his cognitive potential, because positive experiences strengthen concentration and success. A less confident student may not test his abilities.

A little older students might benefit from self-concept to a greater degree than young students, because older students are likely to set goals (e.g. concerning further studies) instead of just doing what they are expected. Success often requires goals, the importance of which may have been underestimated in terms of developing self-concept.

Among children, foreign language self-concept is mainly a product of classroom situations, which do not, however, always reveal the real nature of actual competence. Sajavaara's (1993, 36-37) point of Finns' low perceived competence is based on the fact that Finland is located on the periphery in Europe, which means that experiences of the actual use of English are limited. It would be interesting to find out whether and to what extent foreign language self-concept is affected by the experiences of the language in real situations.

The fact that *strategy use* was not as strongly associated with learning outcomes as other factors might point to sixth-graders' age and level of skills: success may be more dependent on affective than conscious cognitive factors at

this point. It became evident that particularly the use of metacognitive strategies was not highly predictive of success, although direct and socioaffective strategies had significant associations. Unconscious qualities that are reflected by positive attitudes create favourable learning, but sixth-graders are perhaps not able to benefit from active strategy use equally. They might be still too passive or inefficient in their strategy use to fully profit from its potential. It is also possible that at this level good grades do not necessarily require extra attention other than just doing homework: those with an efficient linguistic processing system do not have to enhance or practise their skills any more. It is also possible that some students are unaware of using some strategies. The assessed strategies may not have been the ones that are the most powerful either, or they were not employed efficiently.

Strategies seem to work in interaction with affective variables, and their efficiency is not guaranteed. The cluster analysis suggested that particularly the extremes were associated: a frequent use of strategies was associated with relatively high intrinsic motivation, and a lack of strategy use with a lack of motivation. Some students used strategies more frequently than average students, but did not succeed. Successful students were also good strategy users. It is also possible that strategy use does not improve learning clearly, although those who succeed very well seem to use them. It is also possible that merely the use of strategies does not help: successful learners seem to be able to exploit them, but in otherwise unsuccessful learning they do not always help.

The findings lend support to the importance of *sociability* to second language learning, which was the main starting point for the present study. Significant evidence was found for active prosociality being a rather clear positive predictor of achievement in English. There were also some significant correlations between the use of socioaffective language learning strategies and proficiency in English, although the associations were not particularly strong. Sociability may have a stronger effect on language use than on achievement. Language use contributes to achievement, but older students might be able to make use of this way of learning more effectively.

The relationship between sociability in its different forms and achievement was confirmed also in terms of gender differences: the females

used socioaffective strategies more frequently and succeeded better. Both relationships were significant. The success of females can be partly explained by the use of these strategies. Although the association between socioaffective strategies and achievement was not very strong, strategy use can be expected to have some indirect influence on learning, since it correlated significantly with orientation in the classroom in particular and to some extent also with foreign language self-concept. Direct strategies had an association with active prosociality.

The measures of active prosociality and socioaffective strategies were slightly different. The former was based on teacher ratings and showed moderate associations, and the latter was based on self-reports and displayed weak associations. It is possible that teachers have a tendency to evaluate proficient and often friendly students positively also in terms of personality. (They may naturally also be that.) This is not, however, likely to be a relevant explanation for the difference between the results of the two factors, because strategy use had a general tendency towards weaker associations, but other self-report measures such as self-concept and motivation showed moderate relationships. The teacher ratings of negative social behaviour, anxiety, were not strongly associated with poor proficiency either, which implies that the subjectivity of teacher evaluations did not affect the strength of personality results. It is more likely that sociability is expressed at this age by general behaviour in natural situations (active prosociality) rather than by conscious attempts to learn (socioaffective strategies).

Unexpectedly, no significant evidence was found to support the assumed negative interrelationship between *anxiety* and language learning. This could be explained by the nature of the anxiety measure. The questionnaire dealt with trait anxiety, which is different from state or task anxiety. More specific questions concerning SLA would probably have produced more significant associations. The anxiety results must also be interpreted with some caution, because reliability was not particularly high. Low reliability may also have contributed to the lack of associations, although the nature of the items is likely to be the major cause. Furthermore, contradictory remarks have been expressed concerning anxiety: MacIntyre and Gardner (1991, 95), for example, argue that

anxiety may not be as relevant among children as among adults, which may also account for the results of the present study.

Although *affective* aspects were emphasized, the importance of the *cognitive* domain for second language learning was also confirmed. The use of direct strategies was a significantly operating factor in terms of proficiency. They can be considered at least partly conscious, but inherited cognitive language ability also proved important.

Ellis's (1994, 472-474) *framework for individual differences* got support from the present study. Learner factors (affective) and learning outcomes were interrelated, and there were also interrelationships between learner strategies and other learner factors. An equally strong direct relationship between strategies and outcomes was not, however, detected, although the framework suggested it. This could be due to the reasons mentioned above. The results were not as consistent with Skehan's (1991, 276-277) alternative model, in which strategy use was placed in an intermediate position between individual differences and learning outcomes.

One *special purpose* of examining associations between affective (orientation, self-concept, personality) and controllable cognitive (strategies) factors was to improve the credibility of within-pair twin-singleton differences. The aim was to find characteristics that should be controlled when the influence of unconscious cognitive factors that are inherited was explored. The results indicated that orientation and self-concept were such factors. The connection between strategy use and learning outcomes was not so clear, and thus this factor was not controlled, because it was not likely to result in clear twin resemblance. Personality could not be controlled, because the data were available concerning a limited group of subjects only.

Favourable affective factors reflect *emotional intelligence*. It helps the learner to avoid an affective filter, which causes low motivation as well as disinterested and dependent behaviour, low perceptions of one's abilities, unwillingness to develop one's skills, and worrying. Negative thinking is typical of unfavourable affective factors. The existence of favourable characteristics seems clear, but the question remains what they really do to enhance performance: *how* social and motivated behaviour predicts success.

The answer could be a focus on creative and flexible instead of narrow thinking. A sense of "flow" (Goleman 1997, 121-124), i.e. an efficient state of thinking, creates a state of concentration and rewarding experience: it channels emotions to positive energy resulting in optimal performance.

5.1.2 Differences between twins and singletons in linguistic behaviour

The *second two-way research question* was the most exciting, because it dealt with a problem to which there was no direct answer in previous studies. Twin-singleton differences represent an extension of research on individual differences by pointing out predictors that might be significant in terms of twinship. The research question was a product of two different facts arising from the controversy between them. The question was whether twinship was an advantage or a disadvantage for second language achievement. The possible positive influence was expected to arise from the situation of "twoness", twinship being a social advantage. The possible disadvantage was supported by clear findings relating to the early cognitive/linguistic disadvantages of being a twin. It has been controversial whether early deficits predict later problems and at what age they might end. The association of these problems to foreign language learning is unknown.

The results of the present study *did not point at either pole concerning proficiency*, although the twins' own perceptions pointed to slow development in the linguistic area of phonology. The twins scored slightly better on all the proficiency measures, but the differences did not reach statistical significance. Consistently, the argument about sociability was not confirmed either, because the twins displayed higher but not significantly different rates in active prosociality and their use of socioaffective language learning strategies was slightly less frequent than that of the singletons. This partly explains why they did not succeed better, because the basis of the argument, the connection between sociability and success, was valid. It must be noted that a deeper analysis revealed that affective, but not social, strategy items were less used by

the twins. No other affective or cognitive factors had significant differences either.

Thus, the *argument concerning significant sociability* favouring proficiency in English can be rejected in this study, but the same can be done concerning the *argument for* a negative influence of twinship generating from *early cognitive disadvantages*. These results were concerned with measured learning outcomes. The significance of early differences between the native language skills of the twins and singletons could not be studied, but learning outcomes suggested that differences did not exist any more. The significantly lower pronunciation perceptions of the twins than singletons suggest that some linguistic problems have probably existed, although their relevance as achievement difficulties or clearly bad articulation was not clear any more.

It can be *concluded* from these findings that at the age of 12 *twins are equal with* their nontwin counterparts in cognition, as concerns measured second language learning. Thus, any potential handicap had been overcome. Correspondingly, Lytton et al. (1987) concluded that twinship was not a predictor of language ability at the age of 9, but these results were concerned with a native language. The present study suggests that twins do not, however, manage to take enough advantage of the unique situation arising from "twoness" to be significantly more successful in language learning at this age. The twins might be too young to show higher sociability: some researchers think that young twins might be slow in social development (Rutter & Redshaw 1991, 891-892).

The multivariate developmental ecological model (Bornstein et al. 1998) suggests that *social competence* has influence *on first language* development among all children. At that point twins' sociability potential might not yet have reached such an ideal state (due to other problems) that it would be strong enough to fully compensate for disadvantages. Verbal co-operation might, however, facilitate or enhance learning. Nontwin later-borns may also be advantaged in conversation skills, although their interaction with their siblings is limited, as compared with co-twins.

Thus, at this point twins may not suffer from cognitive or social disadvantages but have not reached a point of favourable social development

either. The present study indicates a general tendency, but a larger twin study might make it possible to detect new aspects in the area. The next step in twins' life in future learning might be to start profiting from the social aspects of twinning. The potential exists, but perhaps it should be developed, because the favourable sociability of early years might not work as such in later SLA, which involves interaction with more people than just one or two.

The lack of twin-singleton differences in SLA was not due to a *balance between benefits and drawbacks* in any aspects. The results indicated that compensation for possible deficits in aptitude was not found in social intervening factors, because differences did not emerge in this respect. There was no tendency of above average sociability vs. somewhat below average achievement, suggesting that clear deficits were avoided/moderated by social behaviour. But there was no tendency of distinct poles either: good results vs. bad results, suggesting that some twins would be disadvantaged and some advantaged. The cluster analysis and the twins' contribution to it suggested that the good average scores of the twins were not related to non-normal distributions in learning outcomes or predictor patterns. No balance of influence between favourable social behaviour and unfavourable learning problems deriving from early difficulties was detected. The impact of social moderator variables has been earlier found by Ahonen (1997).

On the basis of earlier research, this balance seems more apparent in twins' late native language development than in second language learning. The question arises when potential disadvantages are overcome by potential advantages. The roots of second language learning of both twins and singletons are in first language learning, but particularly in the case of twins there might be a battle between positive and negative effects at some point. Adult input is likely to be limited in infant years and disadvantage twins by delaying development, which sometimes also happens to later-born singletons. But communicative behaviour between the twin children, once the native language has been properly acquired, may become a blessing.

Many twins may really suffer from a delay in their cognitive development, but the situation may be slightly more complicated. A variety of influences may operate in the development. It might also be more *controllable*

than generally assumed. This means that rearing and growth patterns may influence the development more extensively than biological factors. The difference in the results of various studies might be due to variation in the influence of family environment, which suggests a need for advice and support in multiple-birth families. It is also possible that in Finland problems during pregnancy and delivery are often avoided thanks to advanced health care. Parents may also be more aware of the risks involved in twinship than in past years. These factors may reduce biological and rearing problems and affect results.

Twins' skills should be compared to their *own potential* rather than the average potential. It is possible that a young twin shows relatively weak skills when compared to his full potential. A twin with inherited cognitive talent may demonstrate average skills at an early age, but once the deficits have been overcome, he may show skills above the average. Very low cognitive performance at an early age may become average performance later. A longitudinal study or a follow-up examination of the development of twins might reveal these aspects. Nevertheless, a delay in profiting from one's own potential among several individuals naturally affects twin-singleton group differences at some particular time that is within the period of slow development. Group comparisons are also needed.

On the basis of earlier research, it can be summed up that not only (1) environment-related cognitive deficits among twins, (2) variation in the functioning of the inherited universal language faculty or (3) possible linguistic coding deficit among all learners, but also (4) the social aspects of communication are important when there is a shift from first language learning to second language learning. The present study unfortunately could not reveal early development in any of the aspects. If the twins of the present study had had any early problems, they had now reached the point when deficits had been overcome. It is also possible that they had had no cognitive lags, although linguistic processes may have been abnormal in terms of phonology.

In the present study, no significant differences were found in language learning between the *zygosity* groups, the fraternal and identical twins, either. On the basis of earlier research, the fraternal twins could have been expected to

do better in English than the identical twins. Earlier findings have suggested that identical twins suffer more extensively from the early cognitive disadvantage than the fraternal twins do (Lytton 1980, 87).

Analyses focussed on proficiency results in association with clearly defined factors. Besides the seven aggregated variables, separate *items* were also explored. Although significant differences in the main variables were not found between the twins and singletons, some individual variables proved significant. The twins had lower perceptions of their ability to pronounce English, although their evaluated oral skills were not worse (in fact, marginally better) than those of the singletons. The finding remained separate from the other findings. On the one hand, twins may have a better sense of imitation, and they may pay attention to it, and they may thus be more critical of themselves than singletons. At an early age twins are babbling models for each other. Later they often develop a unique language that is sometimes characterized by unique phonological processes mediated from one twin to the other. On the other hand, there is a reason to explore whether the phonological skills of twins could develop more slowly than general cognitive and other linguistic skills, which were not significantly different among the twins. Pronunciation is not likely to greatly influence the teacher evaluations of oral skills, if speech is otherwise fluent. The level of pronunciation could be reflected in perceived competence, unless there is reason to have false perceptions. *Twin language* is associated with phonological problems, and it is possible that in the present study the *disadvantage of twins was indicated in phonology* rather than proficiency, which featured in the study. Self-assessment is not naturally very reliable in this respect, but its results point to a specific problem. Phonology may be affected by twin-twin interaction rather than reduced adult input; Vihman et al. (1994), for example, found no association between (singletons') phonology and adult input.

A more detailed analysis revealed a pattern concerning the twins' less frequent use of some individual affective strategies and the lesser degree of anxiety concerning nasty treatment by peers. These characteristics contrast with active prosociality, because they represent *passive behaviour* and prosociality is active in nature. At this age the twins did not seem to be significantly more

active than the singletons: they were no more prosocial and used no more social strategies. But their passive social behaviour had both negative and positive significant features. On the one hand, twins do not seem to get offended by socially undesirable treatment by peers, which is probably an advantage resulting from quite often having to put up with the co-twin's negative behaviour and learning to live with it. On the other hand, they appear more passive concerning the use of affective strategies. They might not experience the effects of an affective filter or they may just pay less attention to coping with their own emotional states, which may be a negative result of twinning.

The *strategy use* finding may indicate *low intrapersonal skills*. Anxiety results did not suggest that the twins would be generally less nervous than the singletons, but there is no knowledge of classroom behaviour.

Twins might have potential for developing successful emotional intelligence, since they are obliged to constantly deal with the co-twin's feelings. The risk of becoming self-centred appears very small because of the constant presence of someone else and divided attention, and this encourages *focus on interpersonal skills* and an awareness of other people's feelings. A great *tolerance* of other people's behaviour (which was significantly different in the twins) reflects interpersonal skills, although this type of behaviour is passive rather than active.

It is naturally possible that the members in a twin set are very different from the very beginning and develop different senses of personal skills. One twin might be more demanding by nature, get more attention, and develop a selfish attitude, which is supported by the other twin's adjustment and empathetic behaviour. The present study did not focus on revealing within-pair differences in a variety of aspects of personality.

Accordingly, twins seem capable of developing complex and slightly contradictory affective skills. They do not seem to do much to develop their emotional states in learning, but they also seem to tolerate unsupportive behaviour. These skills were not, however, particularly crucial in achievement. The factors in which differences emerged were strongly associated with social behaviour and personal skills, which means that the initial interest in these

aspects was justified, although the expressed behaviour was slightly different than expected.

It is also possible that the twins could not fully profit from the potential for active interpersonal skills at the age of 12 yet, because these skills were used in interaction with the co-twin, but the twins did not feel a need for social *interaction with other children* because of their closeness with the sister. Twins may show maturity in relation to their co-twins but immaturity in relation to other people. Teacher ratings were concerned with active prosociality in relation to peers. When twins become less dependent on each other later in their lives as well as associate more with other people and have their own friends, they may start using their interpersonal skills actively with other people. It is naturally also possible that they generally have good interpersonal skills only in relation to their twin sisters/brothers because of a special bond.

In conclusion, although twins may develop good interpersonal skills in relation to others, it is possible that intrapersonal skills in relation to oneself are not equally successful. "Twoness" and the lack of individual attention might lead to less attention to, and awareness of, one's own feelings and needs and problems of identity. This could explain why the twins scored lower than the singletons in some affective strategies reflecting intrapersonal skills.

Theories of individual differences in foreign language learning can also be discussed in terms of twinning. The theories and models with a focus on the social process and equivalent learner characteristics suggest that orientation, motivation, sociability, and strategies affect learning, but the factors of the present study did not indicate significant evidence for the special function of these relationships among twins. The separate item variables that had twin-singleton differences did not represent factors particularly influential in achievement, and the influence of one single item requires a context. It is possible that the theories with a focus on the linguistic/cognitive process explain the situation. With reference to Krashen's (1981a; 1982) distinction between acquired and learned systems, twins might be more oriented to using *acquisition applied in communication* because of their flexibility and willingness to communicate, although their conscious rule learning is not likely to be any more efficient than that of nontwins. Oral language skills might yield

different results if separately measured and analysed in relation language use. In the present study, proficiency was primarily due to conscious rule learning because of the nature of the measures and limited chances of the use of acquired systems among Finnish sixth-graders.

5.1.3 Views on twins' rearing and communicative behaviour

Multiple births are increasing, and twinning requires more discussion which will help educators to deal with the situation. Twins should not be included in research only for methodological purposes. The rearing of twins needs special attention. Unfortunately many parents are not aware of arising risks and tensions; all their energy is spent on taking care of children's physical needs, because two infants need double care. *Emotional needs* often become neglected. Earlier research has shown that psychological development accounts for linguistic development, and the present study suggested that emotional skills in relation to oneself require more attention. However, it must be noted that many twins develop normally and do not suffer from the twin situation.

The results of the present study raise a discussion. Some views presented in this section do not have a direct reference to the results, but they seek to explain why the situation of twinning might be more complicated in linguistic behaviour than was assumed initially. Explanations are also sought for why there may be variation in twins' social behaviour. Twinship might become a social advantage in favourable circumstances, provided that early psychological problems have been overcome or avoided. The views are based on existing knowledge, which is elaborated further, and on the present results and questions arising from it.

In twinship possible *social advantages* arise from the presence of a co-twin, but *cognitive disadvantages* are primarily explained by negative rearing patterns arising from parents' behaviour. Constant interaction between two people at a low developmental level may also add to the situation. The social advantages of twinship cannot be exploited if the potential for co-operative interaction is destroyed by jealousy, competition, and quarrel arising from

parents' failure to respond to children's emotional needs. To avoid these dangers and promote social advantages, parents should find time for each twin separately and try not to reduce affectionate behaviour because of limited time and their own distress. Children should experience more one-to-one interaction.

Primarily there is a danger of an unequal *division of attention*: if one child is more difficult and cries more, the other may end up experiencing even less closeness (both physical and emotional) than the average twin. Unequal attention may also arise from preference: an easier child experiences more approval. Both reasons for unequal attention may lead to bitterness later in life, because twins are particularly sensitive to equality in relation to their co-twins because of having to fight for individual support and approval. Another type of mistake is to treat both children so identically that their sense of individuality suffers. Attention should be paid equally, but parents should also understand that two individuals have different kinds of needs.

Lack of emotional support may lead to either very demanding behaviour or the idea that one does not need anyone. This may be reflected by a negative idea of oneself or a lack of trust in other people, which in turn may lead to quite opposite patterns of behaviour: either dependence resulting in bad self-esteem or exaggerated independence, which often means that help is not accepted or sought. In these cases communication and learning are also affected.

Competition deriving from a need for parental attention may lead to enormous pressure, which may affect social behaviour negatively. Comparisons between the co-twins are equally dangerous. The social environment hardly produces a pair of people that is more often forced to become compared than a set of same-sex twins. Identical twins may even more often be evaluated according to the same criteria than fraternal twins, who, in turn, may experience comparisons more severely because of greater differences in talents. Such experiences in early years may affect the whole life.

Supporting children's emotional development eventually benefits also language learning. There are also some *linguistic advice* that parents should be given in order to avoid cognitive and language-related deficits. Besides attention, it is crucial that each twin also gets speech directed to himself only. This is how he learns conversational patterns between two people, not only the

reception of collective speech, which does not always even require responding. This also contributes to activity, because success in the classroom also requires independent communication. Conversation with the co-twin is not enough for other reasons either: this interaction often works using only limited twin language. Twins also learn to communicate with people other than their fellow twins, if other people just talk to them as individuals.

If *twin language* is an early indication of later problems, as McMahon et al. (1998) suggest, its prevention is important also for early second language learning. Parents should not content themselves with just understanding twin language, but they should encourage twins to appropriately express themselves to other people as well. They could themselves use extra time for communication with the children including informative teaching: providing appropriate labels and repeating correct expressions.

The six twin *identity types* by Schave and Ciricello (1983) can also be discussed with direct reference to communication and rearing. Twins' communication and underlying social behaviour and interaction is more complicated than one might assume. Identity may have caused stylistic variation also among the twins of the present study, although this was not analysed.

Interdependent identity twins are likely to develop a positive ground for communication, because they interact in a co-operative and caring manner. They are likely to be quite social, and parents' rearing problems do not constitute a risk for their relationship, because jealousy or dominance are not problems.

Split identity twins may run into severe problems also affecting their communication skills. The "bad twin" may become passive and withdrawn, which reduces his social skills, and he may later consider himself a bad language learner and suffer from language anxiety. The "good twin", in turn, will probably be an active language user, which is affected by possible egocentricity. The classification may perhaps be too simple. The "good twin" is not always dominant, and the "bad twin" may be considered bad because of his troublesome behaviour rather than poor accomplishments. It is also possible that the "bad twin" is more loud and dominant and becomes an active language

user despite his poor social skills, whereas the "good twin" is more quiet, but benefits from willingness to study and empathy in communication. In this case the "bad twin" may still have a low self-concept because of a constant feeling of guilt resulting from the label "bad" and troubles, while the "good twin" may have a high perception of his skills arising from being respected for being kind and "good". Thus the labels may arise from accomplishments and adaptive behaviour. The parents should avoid these labels. Laying guilt on one twin and praising the other is dangerous, but so is also becoming overinvolved with the problems of the troublesome twin and forgetting the other. This type of identity is likely when the children are very different but constantly become compared according to the same criteria. The situation is far from similar to the situation between nontwin siblings, who are allowed to be individual and experience assessment at different times.

Idealized twins may benefit from their dominant behaviour resulting in good foreign language self-concept and active behaviour, but their communication skills may be otherwise poor, since they are not particularly understanding of other people's feelings. Nevertheless, it is possible that empathy is not as important in language learning as active prosociality, which is perhaps more typical of these twins. Since they find separation a relief, their communicative behaviour is not likely to be limited to the co-twin.

Parents should encourage unit identity twins to interact with also other people than their co-twins. Being placed in different classes might be an advantage in the long run. In language learning this might lead to twins directing their social and linguistic skills to the outside world and becoming more involved with practising and using their skills for intrinsic purposes. They might also understand that "the twin laws" are not necessarily valid in relationships with unknown people, and this also affects communication. These twins are different from interdependent twins, because their relationship is rather dependent than symbiotic.

Competitive twins are likely to benefit from competition in language learning, because it makes them try harder. These twins are also probably very successful in language learning due to high sociability. The risk of this type of identity might be that competition becomes too dominant even in situations

where it is not a source of success. Parents should pay special attention to the fact that the children should not always be evaluated according to the same measures and accomplishments.

It is often easier for parents to raise sibling identity twins than other types of twins, because they are always different genders and avoid many risks. They are naturally treated as individuals. An unevenly divided attention, speech, and closeness in infant years are, of course, dangers concerning these twins, too. A sibling identity twin is more likely to overcome these problems, because a little later in his/her life he/she is not likely to live in his/her sibling's shadow, because he/she also develops social contacts of his own. In language learning it is a benefit that these twins are likely to have their own friends, with whom they can use their social skills without the risk of becoming dependent or overly competitive. Although they have different identities, they are not likely to become labelled "the good one and the bad one" because of different expectations.

The identity of twins could not be analysed in the present study, but the results of the cluster analysis imply that the twins of the present sample were not likely to be split identity twins. The co-twins succeeded very equally, and their affective predictor profiles were fairly close. They may not greatly reflect interdependent identity either, because they were not particularly efficient in their use of socioaffective strategies. Idealized identity (dominant, not particularly understanding of other people's feelings) might not be strong in the sample either, because the twins were quite tolerant with respect to other people. Sibling identity is out of the question because of the gender. The majority of the twins may resemble competitive or unit identity twins. The twins succeeded very well in spite of any early problems of twinship. One reason for overcoming weaknesses and becoming successful may even be competition.

The results of the present study suggest that identity differences between *identical and fraternal* twins might emerge only later in life, when the different zygosity groups may run into different types of difficulties and opportunities. Being a twin means potential for sensitivity and co-operation in communication as such, but the relationship between each co-twin pair is different. Strong

similarity between fellow twins, often identical twins, may lead to better cooperative skills because of a sense of common understanding, on the one hand, and stronger competition or dependence due to identical treatment, on the other hand. Apparent differences between fellow twins, often fraternal twins, in turn, may, on the one hand, lead to sociability and flexibility in relation to all interaction as a result of interpersonal awareness but individual identity, and on the other hand to unsuccessful communication and interaction as well as too dominant or passive behaviour because of jealousy, rivalry, and quarrel arising from variation in talents and weaknesses.

Thus, because twinning is characterized by both social chances due to "twoness" and psychological problems due to parents' failures, twins might develop a rare *combination of good and bad social skills*, as the results of the study suggested. Twins learn empathy and social skills and become talkative but may feel they have missed something, individual love and support. On the one hand, a twin might later become socially very active but still be quite unsure of his own worth, because he has never become convinced that he is good and loved as an individual. In such a case, sociability aims at getting approval. On the other hand, a twin might become very empathetic but develop a view that he himself has to cope with everything without help and support from others (authorities). Parents are the first authority model, and the twin children are another team: they often deal with their problems together, unlike other children who rely on adults. Furthermore, if parents have clearly expressed their disapproval of less controlled behaviour and distress about having to deal with the simultaneous needs and problems of two children, the child tries not to bother his parents and be a nuisance at the expense of not being able to express his feelings. In this case interpersonal skills cause intrapersonal problems. This is a problem particularly if the other twin's needs are emphasized. The adaptive twin might be the one that has otherwise been stronger and always taken responsibility.

The present results did not imply a contrast between self-concept and activity in the twin group, but these factors may exert influence later, when experiences strengthen characteristics by accumulative effects. Certain

indication was found concerning the lack of attention to oneself, but empathetic behaviour which is possibly connected with it was not directly assessed.

In both cases the children may become linguistically talented, but they might suffer from unbalance in other areas in life. Accordingly, there may be underlying reasons, even unhealthy ones, for superficially controlled yet successful social behaviour. Furthermore, social control might be expressed by emphasized empathy without reciprocity; a twin may even feel that no-one else but the co-twin understands him, and his social skills are limited to associating with the co-twin with a similar way of thinking.

Favourable twinning might actually contribute to the dimension of *control and activity* of social behaviour. This reflects interpersonal skills, but may also involve intrapersonal skills. Noticing and being aware of one's own (intrapersonal) and other people's (interpersonal) feelings is one aspect of social skills, i.e. knowledge, but it does not always lead to the control of behaviour: here control points to successful action. A learner may know why he is anxious but cannot do anything about it, and a child may realize that his friend is sad but does not know how to comfort him or find the right words. Twins in an ideal situation might be advantaged so that they not only learn to notice other people's feelings but also learn to respond to them correctly because of shared closeness. Successful interaction, in turn, usually leads to successful communication and requires it. The control of intrapersonal skills may not be as obvious among twins. It may also be possible that some twins learn to understand themselves by observing the twin sisters or brothers. In the present sample the twins' advantage was in interpersonal skills and the disadvantage in intrapersonal skills, although behaviour was not, however, active.

Avoiding first language problems involves attention and rearing, but *foreign language learning* can also be supported: twins should be encouraged to use their social and communicative skills with other people and thus become actively prosocial. Sociability and communicative behaviour are also likely to diminish self-concept problems, which some twins might have. Twins could also be advised to make use of "twoness" by conscious learning techniques such as social language learning strategies, which can be controlled. A foreign

language might even become their secret twin language: it is not impossible that twins might sometimes communicate with each other in foreign languages (by having conversations or writing letter, for example), because it does not appear unnatural (it might sound artificial between two other people), since twins share much stranger things, they are likely to understand each other better than other people regardless of an elementary knowledge of the language, and there are no ego boundaries between them. It is also a challenge for parents and teachers to realize that members in twin sets may have different strengths and weaknesses, which should be dealt with so that twins could benefit from "twoness" also as a unit.

The knowledge of twin-singleton differences in learning is also important for teachers. It would be a benefit for some twins to go to school a year later than peers. Teachers should also sometimes pay extra attention to twins in the classroom, similarly to all other special groups.

Twins' native language and early psychological development represent a different perspective from their foreign language learning: the former is characterized by *overcoming difficulties*, whereas the latter is characterized by *potential*, once the dangers have been avoided. The results of the present study may suggest that the psychological difficulties had not been overcome in such a degree that the potential could be exploited, although any possible early cognitive disadvantages did not exist any more. Or it was too early to measure twin-singleton differences, since the skills were still quite elementary and could not reflect wide communicative differences yet.

5.1.4 Hereditary and environmental influences indicated by co-twin resemblance

The *third research question* about the twin-singleton within-pair comparisons of proficiency was associated with some answers clearly suggesting hereditary or environmental influences, which serve as a contrast to affective predictors of success. The research question was concerned with heredity, because it more

obviously reflects learner factors. Nevertheless, the influence of environment often becomes evident in twin analyses.

It must be pointed out that in most cases the twins were similar in the normal range of language. Similarity was not due to similar problems resulting from the disadvantages of the twin situation, because the twins were successful. Consistent earlier positive evidence concerning the genetic endowment for foreign language learning was reported by Ando (1992). Other studies were concerned with first language, either normal or abnormal. More focused studies are still needed. The genetic roots of different verbal abilities have recently roused keen interest and they call for further research.

Different types of comparisons indicated positive evidence of the influence of common family background. The correlations of each proficiency measure between the two members in the sets were clearly stronger among the twin sets than among the two control groups with similar within-pair affective profiles. In fact, the correlations were very strong and significant among the twins and weaker and mostly not significant among the control pairs: the only significant nontwin relationship existed in the oral skills of the fellow control pairs with similar self-concepts. Correlation comparisons were significant in all the skills. It was also found out that all the proficiency measures had significantly more similar results in mean and median tests demonstrating average differences in pairs for the twin pairs than for the control pairs whose orientation ratings resembled each other. Spoken English skills were more similar within the twin sets than within the control pairs whose self-concepts resembled each other. More specifically, the oral skills of the members within the identical sets of twins were significantly more similar than those within the control pairs with similar self-concepts, and the oral skills of the members within the fraternal sets of twins were significantly more similar than those within the control pairs with within-pair orientation resemblance.

Within-group similarities between the co-members cannot always be directly compared between different skills, because it is possible that some skills are more affected by other factors (or less affected by any factors), and relative similarities in different skills do not always necessarily point to any specific influence. This is why group comparisons indicating the relative

strength between different predictors must be emphasized. It is naturally clear that within-group similarity between co-twins is largely due to heredity and environment. Within-pair similarity in twins was strong and predictive.

There is no need to further analyse the within-group similarity in spoken English among the fellow controls chosen according to self-concept, because the significant relationship between self-concept and proficiency was already confirmed. Twin similarity was in every case greater than nontwin resemblance concerning this language skill, too. As far as the influence of affective variables on specific areas of language is concerned, it can be added that similarity in self-concept predicted similarity in listening skills in two individuals. Also, similarity in orientation predicted similarity in grammar scores.

The twin-singleton findings point to the importance of *hereditary factors* in second language learning. But is also possible that the similarity in twin pairs was partly due to a *shared environment*. The influence of the primary learning environment (school) and the teacher was eliminated, because the members in pairs were studying in the same classes. Shared environment among the twin pairs points to life outside the school.

One way of finding out the source of influence, either genetics or environment, is to compare identical and fraternal twins. Both twin types have the shared environment, but identical twins should be more similar because of full genetic resemblance, as compared to fraternal twins. The results of the present study did not indicate significant differences in this respect, and these results were partly unreliable because of small sample sizes. However, it became evident from these analyses that oral skills are influenced by the interaction between heredity and environment, whereas writing skills seem to be subject to genetics to a large extent. Differences between the zygoticity groups were greater in writing skills.

The fact that the identical co-twins were not significantly more similar in proficiency would point to environmental influences, and their weaker influence on writing than on speaking, unless there was a certain tendency of the identical sisters being more similar than the fraternal sisters. The fact that the differences were small was probably influenced by the small sample size. The differences between identical and fraternal twins must be explained by

genetics. Also, the results concerning the subtests emphasized stronger twin similarity in areas with clear focus on writing skills rather than interaction skills. These areas were also those which were clearly emphasized as heritable in earlier studies. Quite definite conclusions could have been drawn, if the results had been supported by a larger sample.

According to these results, it seems that on the one hand, genetics and environment together contribute to oral skills more strongly than to writing skills, while on the other hand, they affect structural and comprehension abilities in written English more extensively than reaction and comprehension abilities in spoken English. It is necessary to notice that teacher evaluations of oral and writing skill in general reflected production skills, whereas comprehension skills were also involved in the test. Thus the production of spoken language is generally subject to hereditary/environmental influences more than the production of written language. When both production and comprehension are involved, written English seems to be more affected.

The role of heredity and environment can be further discussed with reference to the areas of language skills where both influences were found operative. Although the source of influence was not quite clear, second language learning is not likely to be so strongly affected by *family environment* that it would alone account for similarity. Munsinger and Douglas (1976), for example, found no influence of shared environments in normal first language development. Fischbein (1983) also suggested that the influence of environment weakened from grade 3 to 6. The fact that genetics rather than environment accounts for twin similarity has also been pointed out by Plomin and DeFries (1998), who have conducted extensive research on cognitive skills including verbal ability.

Circumstances in families are not likely to vary dramatically with reference to exposure to a second language. Some families may, of course, encourage children to study, but this should be expressed through affective factors such as strategy use, self-concept, and motivation. Some of the affective factors were controlled in the analyses. Some families might also be more oriented to rich verbal expression, which may enhance oral skills, although such behaviour might not take place in a foreign language. Family interference

may even cause extrinsic motivation. Extrinsic orientation, in turn, was found to be a negative influence on proficiency. The influence of shared family environment became partly controlled, because it is likely to have an impact on learning outcomes mainly through these affective factors (which are affected by rearing).

It is, however, possible that environmental family influences reflect first language learning circumstances rather than the foreign language learning environment. *Early exposure* to language may partly affect aptitude, and first language learning/aptitude and foreign language learning/aptitude are related.

Peer influence could have been a source of shared environment among the twins and a source of nonshared environment among the nontwins. It is not, however, likely to be a strong predictor in language learning. The use of socioaffective strategies, for example, was not a very powerful predictor of learning, and the twins tended to use some of these strategies less frequently than the singletons. This suggests that twins do not benefit from peer influence at this age as concerns SLA.

School environment, instead, which was controlled in the study, might constitute a significant factor, because it is directly associated with language learning. Consequently, the findings generally indicate family resemblance and point to the importance of hereditary-environmental influences without a definite reference to a specific source. This was true of the rated oral skills, in particular, and some subtests. Genetic causes seem more probable in writing skills also in the light of earlier research.

The results concerning certain statistical tests will be analyzed more closely. It is evident that there were no significant *mean/median differences* in several proficiency measures between the twins and the controls chosen according to *self-concept*, because foreign language self-concept affects proficiency more than orientation in the classroom does. This was also indicated by the correlations between proficiency and these affective variables. The control pairs were chosen to be so similar in self-concepts with each other that twins' hereditary/environmental resemblance was not stronger than it. It must be noted that self-concept may also result from a family background. No significant difference between the twins and controls could be found

concerning writing skills, because self-concept determined learning outcomes more strongly than inherited/environmental language ability, but it was less powerful in oral skills than heredity/environment. One might even expect reverse relationships.

It is also possible that foreign language self-concept is still too much a product of proficiency rather than a clear cause. In this case the control pairs were not selected according to another predictor of success: they became selected so that their learning outcomes were already very similar, and a contrast was made between a cause and an effect rather than two potential causes. This interferes with the estimates of hereditary/environmental influences. Genetic endowment and environmental factors seem, after all, predictors of outcomes. Despite this possibility, hereditary-family-environmental influences were still more powerful in oral skills.

Another explanation would be that self-concept assessments indicate perceptions of writing skills, and thus the control pairs had partly become chosen according to actual proficiency in the written language, unless the general relationship between self-concept and proficiency had been fairly consistent concerning both oral and writing skills. The former had even slightly stronger associations, which is peculiar, because the questions rather dealt with writing skills. Only one or two self-concept items out of nine directly pointed to spoken language. Furthermore, the within-group correlations of the control subjects suggested an influence of self-concept on oral skills, although genetic background had still greater similarity than self-concept resemblance. The school system and evaluation at school also emphasize writing skills, which may affect the bias of self-perceptions. Oral and writing skills, however, seem to go hand in hand, which means that even if the students had expressed their perceptions of their writing skills, these perceptions also predicted actual oral skills.

In conclusion, a more probable explanation is found in variation in the relative strength between the affective factors and family background, which varied concerning different language skills. This is due to the greater influence of self-concept in comparison to orientation and the fact that self-concept is also an outcome of learning, resembling proficiency in this respect. Family

background was simply the most dominant factor in oral skills, and in writing skills the association between self-concept and proficiency was simply stronger than that between orientation and proficiency: similarity in orientation was not strong enough to defeat hereditary-environmental influences, unlike similarity in self-concept. Similarity in self-concept among the controls prevented family background from causing significant differences in writing-related measures, but it was not powerful enough to do this in oral skills, and family background was superior in strength to orientation in all the skills. The fact that family background was stronger than both the affective factors in oral skills may be due to these skills being subject to a powerful interaction between nature and nurture. Genetics possibly primarily affecting writing skills was strong enough (alone) to cancel only the influence of orientation.

It must be noted that controlling affective factors was based on the assumption that the twins might be more similar in the affective domain, which was found predictive of success. If they had not been controlled, proficiency comparisons would also have indicated the influence of psychological learner characteristics, not only the influence of language genes and family environment. However, the control pairs were now significantly more similar in this domain. If both groups had been equal in this respect, the results would have probably pointed to much greater co-twin similarity (proficiency) in relation to the nontwins. Then the influence of affective factors would still not have interfered with the results. Then the results would have pointed to heredity and environmental influences more extensively also in writing skills. Significant differences in all skills could have emerged when foreign language self-concept was controlled as well. Now the comparisons indicated the *balance of influence* between the affective and hereditary-environmental factors rather than simply the isolated influence of genetics and environment.

Similarity in the co-twins was so strong concerning oral skills that there is hardly an affective control factor that would have been more powerful. The significance of differences in oral skills was due to exceptional similarity in the co-twins rather than great difference between the control pair members. A look at Table 29 confirms this view: the control subjects in pairs were no less similar with each other in oral skills than in other writing-related measures on

an average, but the co-twins were exceptionally similar in oral skills. Children from the same family background seem to resemble each other particularly in oral skills.

The fact that all the proficiency measures did not have significant differences in all skills between the subgroups of twins - identical and fraternal - and the control group chosen according to orientation (which demonstrated significantly greater within-pair differences than the whole group of twins in all the proficiency measures) is likely to be due to the sample size: the twin sample was quite small to be broken down into two separate groups. Oral skills were associated with significant differences despite all these weaknesses.

Although median/mean comparisons indicated stronger evidence when orientation was controlled, it must be noted that *correlation* comparisons suggested a clear and significant difference between the twins and nontwins also when self-concept was controlled. This suggests that family background has real influence, although affective factors are important.

The origins of different skills and areas of competence can be discussed further. It is interesting that differences between the groups emerged particularly with regard to *spoken language* skills, which also had the strongest within-group twin resemblance. As was stated before, it could be due to the powerful interaction between nature and nurture. Other explanations also exist. It could partly be a result of the teachers' tendency to evaluate the spoken language skills of the members within sets of twins as similar, because they cannot tell the difference between the two individuals.

Spoken language skills are evaluated according to the face value, because there is no clear measure. Few schools arranged spoken language tests with feedback at the time of the study. Written language skills and test results in the present study were based on preconceived measures. Grades usually reflect written language, because they are based on test results usually measuring mostly written language. The teachers' failure is not likely to constitute a strong influence, because differences between the twins and singletons emerged also in writing skills, and the fraternal twins, who do not look alike to the same extent as identical twins, were also very similar in these skills.

It is also possible that the evaluations of oral skills are more affected by inherited talent and the influence of environment in contrast to perceived effectiveness, and success in other measures primarily indicating writing skills can be gained by effort, which may vary from one individual to another and be more equivalent in pairs with similar self-concepts. Studying does not necessarily improve all aspects of oral skills such as fluency, although vocabulary expansion (which is often due to conscious studying), for example, facilitates speaking.

If all students engage in learning activity equally, those who are blessed with talent succeed better, but this happens to the extent that the performance is affected by such influence. Family environment may also influence oral skills rather than writing skills, because some children have a more socially oriented environment that encourages communication regardless of the language. The results emphasizing oral skills can also partly be explained by credibility problems caused by the small sample size.

The results as a whole show that there were also several results pointing to hereditary/environmental influences in *writing skills*, not only oral skills. All the correlations and mean/median comparisons with orientation as a control variable pointed in this direction. Correlation comparisons were also significant when self-concept was controlled. As was mentioned before, the subtest analyses emphasized the power of these influences on the written language rather than on skills associated with the spoken language. The influence of effort may also be stronger on the areas of the spoken language in the test rather than on the production of oral skills. Furthermore, the influence of family background, possibly genetic, also cancelled the influence of self-concept on reading comprehension skills, although other written language measures did not repeat this pattern in terms of this affective variable. Variation in the results of different tests is probably due to the sample size, but a general tendency was observed for family background - heredity and family environment - to have influence on proficiency including both skills, oral skills indicating the strongest relationship at a general production level.

Accordingly, the results indicated hereditary/environmental influences in *all language skills* (e.g. correlation contrasts, which are mostly used in genetics

studies), but when their strength was contrasted in terms of significance with the strength of some affective factors, differences in different skills emerged.

It became evident that oral skills as a medium of competence were in some analyses more strongly affected by hereditary-environmental effects than written English, but when the latter were analysed in terms of the test, *grammar and reading* became emphasized as areas of competence subject to inheritance. Other areas (listening and reaction) actually also had strong similarity in the co-twins, but the comparisons between the groups suggested that the within-pair similarity among the twins was not greater in all these skills. The latter analysis (average score comparison) indicates the influence of family background in comparison to affective characteristics, because similarity in pairs may be due to many factors. It was again a question of the relative strength of factors making pairs similar.

The test was rather general in the area of grammar, but the results serve as reference. Writing-related skills needed at school work are likely to be largely based on grammatical competence. The production of language, in particular, requires grammatical competence. The reaction part in the test also required production, although grammar was not emphasized. Reception-related tasks, i.e. reading and listening comprehension, also had significant within-group correlations, although only the comprehension of written language was significantly more similar among the co-twins as against nontwins. The correlations indicated that *all the subtests* were significantly similar among the co-twins, and the associations were stronger than those of the nontwin pairs. This suggests the influence of heredity/environment, although similarity was not always significantly greater in t-tests.

It is interesting that the control pairs were significantly more similar in orientation and self-concept than the twin pairs, but yet the twin pairs were in most tests significantly more similar in proficiency. This finding is important also in general. It clearly supports the idea of the influence of heredity and family environment. Even if the co-twins had been as similar in affective factors as the nontwins, the proficiency results would have pointed to the influence of heredity-environmental factors. The fact that they were less similar makes the argument even stronger.

5.1.5 Views on explanations for co-twin resemblance

It can be concluded on the basis of the data that family environment may have affected co-twin resemblance at least in oral skills. Environment is assumed to influence learning outcomes indirectly by having an impact on learner characteristics. It is difficult to say *which constructs environmental influences affect*. It is likely that they have very little influence on cognitive learner factors. An attempt was made to control some affective learner factors which may be affected by these influences.

The influence of environment that was discovered is likely to have affected some other affective learner factors that were not controlled in the study. A minor influence is also possible on cognitive language aptitude, which is a learner factor that exerts direct influence on learning. A more undefined, possibly direct influence of environment is also possible. Stylistic variation might be a direct outcome. Environment may also delay learning through the availability of input, although the product of learning would eventually be the same and no ability constructs would be affected. Twins may experience such influence.

Hereditary influences, in turn, clearly reflect some constructs. It is likely that heredity is a strong factor at least in many writing skill areas. On the basis of within-pair proficiency similarities explained by genetics, the question of *what is inherited* can be raised, even if the influence of some affective factors (possibly partly inherited) was excluded.

There are several possible explanations for the fact that proficiency seems to run in families. There is confusion of *concepts* in the literature; it is claimed that an inherited language device involving grammar influences native language learning, whereas second language learning is affected by innate language aptitude which involves grammatical ability. The question remains whether these two concepts reflect the same ideas in any degree. Furthermore, language aptitude is considered separate from general intelligence, which is also heritable. Both aptitude and intelligence are also considered stable and not affected by earlier learning. According to one definition, intelligence includes a linguistic domain with a separate information-processing system. The question

remains what the association of this linguistic intelligence is with the other concepts, whether it interacts with aptitude, a universal language device, or something else, and what the associations between the other concepts are.

It is likely that general intelligence and language aptitude are separate, but they have something in common: they represent traditional views on intelligence. The linguistic domain of intelligence might be associated with aptitude, but the role of intelligence in the present context might be to help the conscious learning process, in particular, rather than account for the talent that can be assessed before learning. A universal language equipment or grammar might point to available language knowledge rather than processing and partly result in aptitude, which may also be a result of a universal maturation timetable, suggesting that the knowledge is not completely available from the very beginning of life.

These constructs have something in common: they are all considered inherited, and they all seem to affect language learning, although some views suggest that these characteristics can also be enhanced and influenced by environment to some degree. Heredity is likely to be the major cause, and other influences may sometimes merely shape the products. Even the cognitive side of language learning is very complex and presumably affected by multiple genes, which may control different characteristics. The role of different concepts can be more closely discussed in terms of the results of the present study.

It does not seem likely that the functions of a language *device* (UG) greatly affect later linguistic intelligence, which was assessed in the present study. It is possible that the genetic influence of UG resulting in learning differences is limited to *impaired language*. The language universal faculty is considered similar in all human beings; everyone learns to speak. A disruption of a gene involved in this capacity may lead to abnormal language development, but variation in the normal range is affected by several genes. A disruption of a gene may point to mutation, which implies that the structure of the gene is changed due to some factor.

Nevertheless, if learning is disadvantaged in this way in childhood, it also affects later learning. Early language learning problems may lead to foreign

language learning difficulties. Although the genetic basis of language universals might not be involved in the heredity of foreign language learning, primarily because this universal language faculty might not be active any more, the genetically based problems of native language learning may, however, also influence later foreign language learning. If the structures of a native language were not learned properly, it is not easy to learn another language. This does not imply that UG still has to be effective, but the outcomes of native language learning are a starting point for later learning.

But there is also genetically based variation in normal language learning. It is likely that heredity influences both first and second language learning, but it probably causes considerable variation primarily in SLA. Variation in foreign language learning may be due to quite a different genetic endowment. The universal constructs and maturation were probably not operative among sixth graders any more, because after the critical period of easy acquisition, language learning probably resembles processing involved in all learning to a greater degree. Genetically based variation has to be accounted for by other constructs focusing on learner differences rather than similarities.

The results of the present study possibly point to *inherited language aptitude or IQ (or the linguistic module of intelligence)*. They may generally contribute to all language skills. Just like motivation and self-concept are different affective aspects but associated, language aptitude and general intelligence are separate cognitive predictors, although they might be distantly related or work together. The present study design did not provide a chance to study aptitudinal strengths and weaknesses more closely, although different areas of proficiency were touched on.

The results suggested that particularly *grammatical* properties of language were subject to twin resemblance, which pointed to the genetic influence on certain constructs rather than the influence of environment. If family influence was involved, it would have rather affected listening and reaction skills, which may be subject to exposure to language. It must be noted that listening skills did not have significant differences partly because they were also strongly affected by self-concept, which did not predict other areas that were assessed. But the genetic influence must be viewed in contrast to

control variables. Anyway, grammatical forms of a foreign language rarely become enhanced in a family, unless family supports language study. Nevertheless, the concepts used in earlier research to refer to inherited language ability also emphasize grammatical aspects. The inheritance of grammar is supported by the UG theory and the definition of aptitude. It is probable that IQ also enhances grammatical processing. The inheritance of structural properties has earlier been supported by Ganger et al. (1998) and Munsinger and Douglass (1976), for example.

Other areas of the language test were also very similar among the co-twins suggesting hereditary and environmental influences in language ability, but not all abilities were significantly more similar in the twins than in the nontwins. *Reading* comprehension skills were, however, also found sensitive to heredity, which appeared to be a more logical explanation of origin than family environment. Reading comprehension also relies very much on structural knowledge. There could be a specific talent for reading as well. The study by Munsinger and Douglass (1976) also supported the inheritance of reading skills in normal native language learning, and Grigorenko et al. (1997) actually identified chromosomes associated with reading. Plomin and DeFries (1998) also assumed that there was a genetic link between normal and abnormal reading ability. The present study supports the heredity of reading and grammatical abilities also in foreign language learning.

In the discussion of inherited concepts, the role of structural competence has been emphasized. In the present study, oral skills had the most evident connections with family background. It is not likely that environment accounts for all variation in oral skills. There are likely to be inherited language abilities that affect all skills, but it is possible that there are also additional slightly *different genetic endowments* for both oral skills and grammar. These areas may also be subject to *common* inherited information-processing regardless of which concept it reflects. Different endowments might also interact. The inheritance of writing skills could be more influenced by this common inheritance. It seems that this talent can be affected by a favourable affective/cognitive profile.

Among different endowments, writing skills might also be more subject to inherited grammatical ability, possibly aptitude, and oral skills might be, in addition, a matter of inherited fluency of expression, independent of self-concept and other related affective factors. There are some people who do not do well on tests but produce speech fluently. Spoken language competence might also be more subject to family environment, which may affect how this inherited verbal ability develops. The strength of twin similarity in oral skills as compared to writing skills may be due to the fact that the former are affected by both nature and nurture and the latter often primarily by nature. This is why confident effort may defeat inherited talent in writing skills.

It is known that family members are often similar in many skills and characteristics, but there is potential for action behind this general knowledge. Similarity can be caused by nature or nurture, but if the origin of influence is identified, the *circumstances can be changed*. Foreign language learning is also affected by many factors other than family background, such as affective ones; it is worth investigating how all these factors work. Exploration of the reasons for family similarity might contribute to the understanding of how to support positive similarities and avoid negative ones through influencing the *environment*. In fact, positive differences between family members might be a result of avoidance of negative patterns that makes family members behave similarly. For example, children's language problems might not be only a result of *inherited deficits* but a result of a *less rich linguistic environment* due to parents' similar difficulties. In the case of twins, both children suffer from environment and repeat the family pattern. Knowledge of how to break this chain contributes to improvement. Genes cannot (or are not) manipulated but environments should be.

The union of nature and nurture is a source of variation in behaviour. The results of the present study support a balance between stable hereditary talent and affective factors, which can be learnt and influenced, because both were found to be predictors of proficiency. The role of environment appears more or less indirect. The issue can be discussed from a wider perspective of *manipulation*, also concerning normal learning, not only difficulties. Although

this perspective was not directly evident in the findings, it is important to raise discussion on pedagogy.

In pedagogics an attempt should be made to support inherited talent and overcome unfavourable inherited characteristics by providing an appropriate growing and learning environment. Even a content and balanced child may become depressed, lose motivation, and become withdrawn if parents do not manage to provide him with positive experiences and stimuli, and do not encourage him to be active and have many social contacts outside the home, or if they raise him merely to fulfil their own needs or to live for his parents. This causes guilt if the child fails to behave in an accepted way or sometimes puts his own needs in the first place.

In language learning such a child may avoid communication, does not attempt to improve his skills, and probably gets poor grades, even if he were otherwise linguistically intelligent. A learner with less innate talent may become a successful user of oral skills and overcome some problems by effort, if he has grown in an encouraging environment and has developed a strong sense of self-worth. In early childhood, family environment plays an important role in the development, but later in life other experiences and learning might change the pattern of behaviour. Both teachers and parents should themselves show emotional intelligence and discuss affective aspects of learning and growing with children.

5.1.6 Gender differences

The *fourth research question* was concerned with gender differences between the boys and girls. Earlier assumptions were confirmed. The girls scored significantly better in all the proficiency measures except the rated oral language skills. The purpose was also to find reasons for *proficiency* differences. A tendency was observed for the girls to be more oriented to the use of *socioaffective strategies*, which was the only intervening factor in which significant gender differences emerged. This variable was also confirmed to be a predictor of success in language learning, at least to some extent. It must be

noted that gender differences could not be contrasted in terms of personality, because the data on it were collected from girls only.

The use of socioaffective strategies evidently contributed to the success of the girls, but it is not likely that it is the only operating factor. The present study design did not, however, directly offer any other explanations. The cluster analysis was experimental, but it suggested that the females succeeded primarily through one route, whereas the males were more heterogeneous in this respect. Most of the successful females belonged to the group where strategy use was a way to succeed, which is consistent with Clark and Trafford's (1996) comment: girls are usually more conscientious. This was also supported by the fact that the girls did better in writing-related skills, which are more subject to effort.

There were no significant differences in perceived competence, but the higher proficiency of the females could also have generated higher perceptions, particularly if they are outcomes of learning. Self-concept predicted success clearly, which might imply that girls tend to underestimate themselves in contrast to boys, considering the proficiency results. The cluster analysis also suggested that the boys were somewhat more prone to belong to the group which succeeded through a high level of self-concept.

The proficiency results indicated that it was necessary to *control gender* in terms of twins-singleton differences to detect the influence of twinship and not gender. Consequently, this procedure should always be done in this type of research. It would have been interesting to study male twins, too. Male twins might be more sociable than male singletons. Differences could have emerged between these groups. Males are generally less oriented to social learning, as was indicated by the results. This might not be true of male twins, who also benefit from twinship in this respect. Male twins might in fact have the capacity to catch up with females in proficiency, provided that their early cognitive development does not disturb learning.

5.1.6 Interrelationships between different factors and arising learner profiles

Evidence was also gathered to clarify the area of the *fifth research question* about the interrelationships between the different independent variables. According to the results, the emergence of one variable within a factor group is likely to result in the emergence of the other variables of the same factor group. The use of different strategies showed such patterns and high active prosociality predicted low anxiety.

Intrinsic *orientation* was associated significantly with other intervening factors. It was the factor with the strongest associations with other factors reflecting individual differences. Intrinsic orientation had a rather clear and significant positive association with all strategy factors. There was also a clear positive association between foreign language self-concept and intrinsic orientation. Orientation also correlated with active prosociality.

Many of the interrelationships between foreign language *self-concept* and other independent factors in the study were significant. The variable was associated with strategy use, although the relationships were not particularly strong despite statistical significance. There was, as was stated before, a clear association with intrinsic motivational orientation. No significant correlations were found between foreign language self-concept and personality.

There was a significant positive interrelationship between language learning *strategies* and other factors. Frequent strategy use concerning all the variables was associated particularly with intrinsic orientation and to some extent with foreign language self-concept. There was only one significant interrelationship between strategy use and personality factors: a connection between active prosociality and direct strategies. It became apparent that the role of metacognitive strategies is indirect at this age, because these strategies were not strongly predictive of learning outcomes. They were the strategies most clearly associated with other factors, mainly intrinsic orientation.

The relationship between *personality* factors and other linguistic behaviour factors was not considerable, in general. As has been indicated, active prosociality correlated significantly with orientation in the classroom and

direct strategies. These were the only significant interrelationships between personality factors and language learning behaviour factors.

The findings about significant interrelationships between linguistic rather than personality factors can be explained by the fact that personality factors dealt with trait factors, but the three language behaviour factor groups were more specified. The findings about the lack of relationships between proficiency and anxiety point to a similar conclusion, although it is worth noticing that the reliability of the anxiety variable was not high. It seems that active prosociality as a general psychological trait is associated with language learning, but anxiety must probably be felt in relation to a learning situation, if an influence is detected. The personality factors were general trait variables, not developed for the specific purposes of a linguistic study, although they were considered an area of interest in the present study. If the items were to be designed for the purpose of a study concerning language learning, it would be wiser to concentrate on the aspects of personality which are directly connected with language learning situations, such as situational anxiety. It is, however, useful to explore how general personality affects situational learning, because it is the basis for behaviour.

The interrelationships between the variables predicting success in language learning suggest that good qualities in terms of proficiency in English are often to be found in the same people, because there were correlations between different predictors of success. This finding also suggests that there are successful *learner types* who can successfully make use of the cognitive domain - language learning strategies, for example - and who are often characterized by certain affective qualities: sociability, good self-concept, and intrinsic motivation. But it is also obvious that not all good characteristics in terms of language learning success cluster in one and the same person. For instance, the use of indirect strategies or foreign language self-concept did not correlate significantly with active prosociality, but they were all significant predictors of high proficiency. This finding suggests that nobody is perfect, but the lack of one characteristic can be compensated for by another.

The linkages between the different variables also suggest that some factors which do not directly contribute to language learning may exercise

indirect influence by contributing to another success-predicting factor. For example, the use of each individual language learning strategy did not directly contribute to proficiency, but those who employed one strategy group frequently were likely to use several others. Furthermore, many strategies were more strongly connected with orientation than proficiency, which again were connected. It is possible that some factors need to interact with other factors to become effective. Motivation can also be attained by other routes than strategy use, but it may also interact with it.

The role of interrelationships in association with proficiency can be viewed from the point of view of *learner profiles*. These analyses were experimental, but they explain the influences more closely. The analyses revealed that a high level of proficiency could be achieved by a relatively high level of all predicting features: self-concept, motivational orientation, and strategy use. Below average proficiency was also due to corresponding problems in these characteristics. Lower proficiency was associated with several different patterns. Poorest proficiency was associated with satisfactory strategy use but it seemed to be mainly affected by (or resulting in) poor self-concept, whereas slightly higher but still low proficiency was associated with low scores on all the predictor variables, which were also relatively low when compared with the below average proficiency group. There were also different routes to above average proficiency. It could be gained, for example, with the help of frequent strategy use or high self-concept (which could also be an outcome). Proficiency level is also probably related to other factors, such as aptitude, but these were the affective profiles linked to different levels.

The role of *strategy use* appears to be complex. It seems that it helps many successful students, but it does not always work. It is possible that on the one hand, successful students are good partly because of their efficient strategy use, and on the other hand, poor students employ strategies relatively frequently to succeed, but they cannot overcome their problems by strategy use alone. It is possible that strategy use has to interact with adequate perceived control and competence or unknown factors to become influential. It appears to have indirect and interactional influence.

Foreign language *self-concept* does not seem quite irreplaceable in successful learning. Or it may not always be an outcome of learning. The fact that above average proficiency was connected with relatively high strategy use in one cluster, and self-concept in another cluster, suggests that self-concept is not merely an outcome of learning but also an alternative predictor. The success of the cluster with relatively high self-concept could not clearly be explained by the other factors that were examined, at least there were no great differences in contrast to other clusters. It does not seem probable that strategy use would prevent an outcome of learning (self-concept) from emerging in the cluster with high strategy use either. Both clusters were fairly equal in orientation, but it is also possible that some other undefined factor, such as aptitude, was operating and created high self-concept only in the other cluster. Below average success was usually associated consistently with low self-concept, although somewhat different patterns were found with poor and low achievers. The same was evident of *orientation*, which was, in turn, very consistent among the two groups with above average proficiency.

When all the predictors work together, the results are the best, but there also appear to be variable routes to success. The contradictory difference in affective/cognitive profiles between poor and slightly better students, in turn, might point to predictors of failure that were not included in the psychological learner factors of the present study. It might point to uncontrollable factors such as inherited difficulties.

Perhaps the learning process would profit from a more active approach to learning. Affective barriers and a lack of encouragement may still prevent some learners from fully profiting from their potential. The cluster analysis suggests that the number of students who dare and understand to make use of both cognitive and social engagement and be self-confident simultaneously is rather small. Failure was in some cases associated with frequent strategy use, but rarely with intrinsic motivation or positive perceptions, where the most underused potential might lie.

5.1.8 Contrast between affective and inherited cognitive factors

The present study deals with twin-singleton differences. It also deals with the importance of trainable psychological factors and unchangeable inheritance. The latter are controllable only to the extent that early linguistic environment shapes them, but in second language learning there is hardly anything that can be done about them. Twin-singleton between-groups analyses address the role of psychological, mainly affective learner factors, and twin-singleton within-pair analyses address the role of hereditary cognitive factors.

Environment was included in the study design only because its indirect influence often becomes evidenced when learner factors are examined. Affective factors reflect it, and in analyses of heredity it is sometimes difficult to distinguish between various origins of influence. Twins' linguistic development pointed to indirect and direct environmental influences: the emphasis was on their direct impact on other psychological learner factors and direct/indirect impact on learning outcomes.

Two research questions (2 and 3) dealt directly with these factors in terms of twin-singleton differences, and the rest of them produced supplementary knowledge. The research questions about different learner factors (1 and 3) involved the role of these factors on learning. If the questions were concerned with whether these influences operate or not, answers would be simpler.

The contrast between cognitive language aptitude and affective factors as predictors of foreign language learning is often highlighted (see Sparks & Ganschow 1991; 1993a; 1993b; 1995; MacIntyre 1995a; 1995b). In the present study, both the affective and cognitive domains were found to be important. A pattern emerged for the relationship between *affective* factors and success. Aptitude was not examined, but achievement similarity in co-twins in comparison with genetically unrelated control pairs with very similar affective profiles probably results at least partly from *inherited* aptitude. Conclusions cannot be drawn directly on the role of aptitude, but it seems evident that cognitive genetic factors, regardless of which concept they reflect, also play a significant role in learning. As was stated before, it cannot be said that affective

factors are merely side-effects. However, the strength of different explanatory factors can be discussed.

Affective and hereditary factors represent different sources of learning and are both important. So far their importance to learning outcomes has been mainly discussed separately. The present study also provided a chance to *contrast the strength* of these affective and stable cognitive factors. Within-pair comparisons indicated a tendency that family background (strongly pointing to genetics) was stronger than single affective variables among the studied cases: the fellow control subjects were significantly more similar with each other in these affective characteristics and the co-twins were naturally considerably more similar in genetics (and family environment), but the proficiency results (which can be affected by both factors) were significantly more similar among the co-twins. Hereditary-environmental influence was stronger than orientation and self-concept in oral skills, and it was also stronger than orientation in writing skills. In correlation comparisons nature/nurture was stronger than any of the measured affective skills. Family background was also stronger than orientation in grammatical ability and stronger than self-concept in reading, when different areas of competence were explored.

The findings might result from the nature of the *learning situation*. The role of aptitude and intelligence (which the genetic endowments for language may point to) is considered important in formal conscious learning. This was confirmed in the present study. Finnish sixth-graders seldom acquire languages in a natural situation. An entirely different situation would arise if actual language use was examined more closely. There is, after all, no need to exclude the role of one factor and emphasize the other, because both the affective and cognitive domains were found significant and the factors are likely to work in interaction. Their importance may depend on the situation and age.

5.2 Limitations of the study

The results revealed some interesting findings, but they should not be considered without any reference to some limitations of the study. First of all, all possible factors affecting language learning could not be controlled.

The *proficiency* measure was appropriate for the purposes of the study. It was in line with the other proficiency measures. The only predicting variables which did not have significant correlations with both the grades and the test, when the overall connection between proficiency and the affective/cognitive variables was examined, were the use of metacognitive strategies and active prosociality. The influence of metacognitive strategies was, however, minor and the difference was not considerable.

The fact that the test did not have a strong association with active prosociality might be due to the fact the test primarily measured written English, which was not so greatly affected by interaction and compliant behaviour. Classroom behaviour in general, separate from test situations, is probably more affected by these factors. Sociability also seems to produce behaviour that affects writing skills that are needed in situations where advance preparation or group work are required. Teacher evaluations are probably largely based on such evidence. The test was not based on quite recent lessons. It is also possible that the fact that both the grades and the sociability evaluations were teacher ratings has affected the strength of associations between them to a degree, but it is unlikely that it would account for the whole relationships, because no such tendency was observed for the association between lack of anxiety and the grades. Furthermore, only in one class the same teacher who rated personality did not teach English.

On the one hand, the conclusion can be drawn that the grades served as an adequate proficiency measure, and on the other hand, that the produced test was an appropriate measure. The problems of some non-normal distributions were solved by using appropriate statistical tests. As far as the language test is concerned, one limitation became evident. Some teachers reported that students may have been familiar with some tasks, but as was stated above, this cannot have had any significant effect on the results, because the students felt

differently. Furthermore, the test was not administered in all the classes at exactly the same time, but it is not likely that proficiency changes so rapidly that a couple of weeks would make a difference.

The *reliability* of the variables was generally high; only anxiety results were of somewhat low reliability. Misinterpretations of influence or differences were not made, because results involving anxiety were not significant. The lack of significant findings might naturally be misleading. The lack of significance was mainly explained by other reasons than reliability.

The *teacher ratings* of oral skills cannot be used as a measure without reference to limitations. Oral skills were not measured by any test; the evaluations were originally qualitative in nature. The fact that the teachers were told to make the evaluations with the contrast between oral and writing skills in mind perhaps added to their validity, because it is likely that a teacher knows whether a student is better in spoken or written English skills. Furthermore, all the teachers who made the evaluations had taught the students for a long time, usually all the way from the third grade. Grades in general may not be any more reliable.

Furthermore, the influence of individual teachers may have affected the results. It is possible that the grades given by individual teachers are not always based on the same criteria. In fact, teachers may vary even considerably in strictness. This is why the common English test was arranged. These results suggest that teacher influence in terms of the present sample was not great. Such teacher influence was also possible in personality ratings, which, however, had employed defined scales.

The teacher ratings of personality had been collected during the spring, and the grades were from previous spring reports, too. It might have been possible that these data would not have been consistent with language behaviour data collected in the following autumn. Such a tendency was not observed. As was stated above, all the proficiency measures indicated consistent results, which suggests that language skills do not change dramatically over a few months.

Personality data were also obtained through teacher ratings. The problem here is that the teachers may not know their students well enough to evaluate

their personality precisely. However, it may also be an advantage that the evaluations were not made by an insider, who might not be able to maintain objectivity. The questions were also quite simple; the teachers were likely to observe such behaviour at school. Evaluation of learning outcomes can be even easier, because teachers do it practically every day. Parents' ratings of the personality factors were available, but they were left out in the present study, because they were not available for the control group.

Self-report questionnaires are slightly problematic. It is possible that they do not measure what they are intended to measure. There may be a difference between self-assessment and actual behaviour. Observation as a measure could have been more valid for strategy assessment, for example, but in the present study it would have been impossible, because the sample was so large. A part of the data were teacher ratings.

There are some "people issues" related to the controlling of the variables. It is possible that the subjects are pleased to participate in the study, and that their reports have a positive bias. It is also possible that they report things that they feel to be expected. (Brown 1988, 29-41.) The aim was to control these factors by pointing out that there were no right or wrong answers and by not telling the twins that they were of a special interest.

The problem with *personality* factors was the lack of specification in terms of language learning. The questions measured these factors in general, not in relation to language learning. This is a problem related to anxiety, in particular. Nevertheless, it is an interesting finding as such that general anxiety does not affect language learning. There seems no reason why active prosociality as such should not be related to language learning. The argument was supported by the findings.

The *sample of twins* was rather small. This constitutes a risk in terms of the reliability of the results as concerns twins. The same goes for the general findings about personality factors. The comparisons between the fraternal and identical twins, in particular, are subject to this limitation. The twin-nontwin comparisons were based on a sample of twins and a control group, but the identical-fraternal twin comparisons concerned only the sample of twins. Furthermore, it must be kept in mind that the possible early cognitive deficit

was not investigated in these particular twins; the conclusion was more general in nature, which is a limitation as such.

The results of within-pair differences would have produced more interesting conclusions if the difference between the identical and fraternal twins could have been studied more closely. The size of the sample made these comparisons somewhat vague. The source of family resemblance remains partly unsolved. It has been discussed, but a larger sample might have generated more evidence for conclusions.

Another factor which could not be entirely controlled was the influence of *context*. Because the classes were chosen where the twins who met the criteria were located, the size of the town could not be controlled as an influencing factor. However, only two classes represented a different size from the others. Some studies have shown that the region plays a certain role in learning. Huttunen and Kukkonen (1995, 121) found out in their study of the national examination for the sixth grade (English as a second language) in Finland that in smaller communities the results were lower. This was assumed to be a result of the more limited amount of stimuli, socio-economic factors, and attitudes at home, resulting in lesser motivation. (Huttunen & Kukkonen 1995, 121.) This limitation would mainly affect descriptive data. Correlations would not be subject to this influence to the same degree, because both correlated factors are likely to become similarly influenced. Twin-singleton comparisons were also more reliable in this respect, because an equal number of members in both groups were from small towns.

Laine (1988, 63-64) also concluded from the results of his study of Finnish ninth graders that there were differences in motivation between urban and rural schools. Instrumental orientation was the only factor that did not follow this pattern. It was also found out by Laine and Pihko (1991, 109) that rural students were disadvantaged in terms of the affective domain and foreign language self-concept. Only two classes in the present study were located in a bigger city, the rest being classes in rural schools.

5.3 Further possibilities for research

The relationship between twinship and second language learning was examined from the point of view of sociability and cognitive development. Sufficient conclusions could be drawn on the cognitive lag, but sociability calls for further research.

The question of twinship could have been considered from a more specific point of view, if the sample had been bigger. Schave and Ciricello (1983) have classified twins. Thus, there are *individual differences among twins*, too. The question of sociability of twins in terms of successful language learning seems somewhat more problematic than was assumed in the beginning. Instead of pointing out the significance of being a twin in terms of language learning, the significance of belonging to a specific type of twins could be highlighted, and the influence of identity could be examined in relation to specific aspects of linguistic behaviour and achievement. The research area calls for a more focused study on twins' communicative behaviour.

It would also be interesting to examine the family environment of twins. Rearing and linguistic environment might add to the understanding of their language skills and sociability. Furthermore, the nature of the relationship between co-twins might clarify the development of social skills.

The sample of twins consisted of *girls* only to control proficiency differences (which, indeed, were evidenced) between boys and girls. It is possible that a twin pair consisting of a boy and a girl is a more advantageous combination in terms of sociability. Such a twin can benefit from his/her own social connections and also from his/her sibling's social connections. The difference between twin siblings and other siblings is that twins are of the same age and are likely to have more social interaction with each other than nontwin siblings. Furthermore, it is possible that older twins benefit from the opportunities of sociability more than young twins. Personality is no more subject to big changes after puberty. A few years older subjects are likely to be more mature and less shy.

The fact that the aspect of active sociability did not generate any significant results does not mean that there are no interesting issues connected to twinship and language learning. More discussion is required. The examination of single items pointed out that there might be undetected *affective nuances* in the linguistic behaviour of twins. Besides these features, the influence of *competition* would probably generate interesting findings. It is possible that competition contributes to classroom behaviour, and it is also likely that twins are more competitive than singletons. (Skehan 1995.)

It is also possible that being a twin might influence the *process of language learning* rather than the outcomes. Possible research areas could be classroom preferences. It is possible that twins prefer interactional processes to cognitive ones. In terms of learning outcomes, a test measuring interactional versus cognitive qualities might yield interesting findings, and further research should be directed there. (Skehan 1995.) The affective differences between the twins and singletons also pointed in this direction.

Instead of pointing out achievement or proficiency, the effectiveness of communication could be emphasized. Besides learning, social behaviour might also influence the extent to which language skills help the learner attain desired purposes. Language proficiency could be seen as a tool to achieve goals rather than a product without a reference to its use. There might be twin-singletons differences in the degree in which social skills interact with linguistic skills in real life communication and in which this interaction is profitable. Such an examination would require a sample of older and more advanced students.

Nonverbal communication might also be a source of useful examination. Twins might show greater sensitivity to other people's nonverbal signs because of mutual understanding and closeness with the co-twin. The ability to notice other people's emotional states without direct communication is one aspect of emotional intelligence.

As was stated above, language learning can be studied with respect to environmental and hereditary factors by using a sample of twins and control subjects as a *methodological* choice. Such studies have been conducted of first language learning, but a more *extensive* study would be needed to explore genetic and environmental influences in second language learning. A greater

sample would also allow researchers to investigate differences between identical and fraternal twins to distinguish between two sources of family influence: nature and nurture.

Similarity in twins could be explored concerning specific linguistic features rather than proficiency, which is a fairly broad term. Such an examination could yield interesting information about which aspects of language are the most sensitive to heritability. This would also cast some more light on why oral skills had the strongest within-pair similarities among the twins. The areas of proficiency were superficially examined, but the test was not originally designed to measure different abilities: the purpose was to create a common measure where the areas that affect grades were represented.

Within-pair comparisons could also be made of different affective factors to find out something about the origins of these variables. This information could also be used to improve learning and teaching. This would require randomly chosen control pairs. This approach would not take a direct interest in twins. This procedure was not attempted here, because ESL was the core of the study.

Other twin study methods could also be used in second language research. Twins could be chosen in the sample to control hereditary and environmental influences and explore the influence of some other factor on the outcomes of learning. Such moderator variables could be studied in terms of inherited learning difficulties. It would also be possible to study some affective factors that differentiate between learners: variation could also be explained in normal and successful learning. Possible differences in learning between co-twins would be explained by these variables, because the influence of family resemblance would have been eliminated. Some environmental influences such as teacher influence could also be examined by the co-twin control method: if co-twins have different teachers or they attend different types of classes, these influences could be investigated without the influence of family environment or genetics.

There are some further implications concerning the general relationship between affective/cognitive variables and proficiency in English that do not directly point to twinship. Some factors could have been associated with more

specific findings if broken down into subcategories. Some aspects of affective factors could have had some significant associations with different subtests in English. Within-pair analyses pointed to this direction. This was also apparent when twin-singleton differences were studied in single *items*. All the potential of the test was not exploited. It was dealt with as an entity, whose purpose was to contrast the validity of grades as a measure of proficiency. Each subtest could have had different results with each operating factor. This was not carried out, because a closer analysis would have distanced the study from twin-singleton differences.

6 IMPLICATIONS

Controllability and trainability have been one theme according to which learner factors have been classified. Some suggestions can be made of how to teach and monitor individual learning processes. Most operating factors can be manipulated. Stating their existence is not enough, but an attempt should be made also to suggest how to exploit the factors and specify the contexts where they operate. This section mainly deals with how to cope with psychological factors that exist and are controllable, unlike inherited language ability, whereas the previous discussion dealt with why certain features emerge, how the development of an unfavourable affective filter can be prevented and favourable features supported. A special reference was made to the twin situation and rearing. Different approaches can be applied at school.

Language learning is strongly *communicative*. Oxford et al. (1989, 33) have identified communicative principles, which are supported, for example, by language learning *strategies*. The principle of communicative competence as a general goal of learning can be supported by indirect strategies, whereas direct strategies aid specific goals. Memory strategies strengthen grammatical accuracy, social strategies improve sociolinguistic competence, and compensation strategies aid discourse competence. (Oxford et al. 1989, 33.) Communicative competence has been recently promoted as the goal of language learning. Thus, the use of appropriate strategies should be taught and discussed at school. Strategy use can be learned, and there is evidence for the contribution they make to success.

Second language learners should get specific instruction on how to *cope with performance problems*. They are significant in communication. Teaching communication strategies is one solution. The strategies should include various verbal and nonverbal means of dealing with difficulties in everyday communication. Both the quality and quantity of learners' use of these strategies should be developed. As solutions Dörnyei (1995, 55, 80) proposes that learner awareness about the nature and communicative potential of the strategies should be raised, students should be encouraged to take risks and use communication strategies, models should be provided of the use of strategies,

cross-cultural differences in strategy use should be highlighted, communication strategies should be taught directly by presenting linguistic devices to verbalize them, and opportunities for practice in strategy use should be provided.

Besides strategies, other operating factors can be manipulated, too. *Anxiety* as a trait was not found to be a negative predictor in the present study possibly because of reliability problems, but situational anxiety can be considered a threat to learning success. The fact that communicative competence has recently been emphasized in English classrooms makes anxiety even a bigger problem than before. Speaking in a foreign language is often considered particularly stressful. Horwitz (1986, 125-132) suggests that teachers can help students to cope with stressful situations causing anxiety and make the learning context less stressful. Relaxation exercises, support, advice on strategies, behavioural constructing, journal keeping, instructional error correction techniques instead of those that provoke defensive reactions, etc. could be solutions to the problem of anxiety.

Donley (1997, 17) suggests considerations that seem relevant for reducing anxiety. He proposes different type of strategies for coping with foreign language anxiety in the classroom. The strategies include such as discussing feelings with instructor and other students, relaxing, exercising, eating well, preparing for and attending every class, keeping foreign language class in perspective, seeking opportunities to practise the language, accepting errors being a part of the learning process, and developing individual standards and rewards for success. (Donley 1997, 17.) Some of these strategies were, in fact, included in the indirect strategies of the present study, but it became apparent that they were underused. By favouring some affective ways of action the strength of negative affective factors can be reduced.

Something can be done about *self-concept* and *motivation*, too. Laine and Pihko (1991, 106-108) suggest on the basis of their study of Finnish ninth graders' foreign language self-concept that parents, friends, classmates, teachers, pen-friends, and learners themselves can contribute to student motivation and self-esteem. In other words, activities producing positive experiences and intrinsic orientation should be encouraged. The promotion of these operating factors probably contributes to learning. Harter (1980, 13)

suggests that the school system is gradually stifling children's intrinsic interest in school learning. This is why teachers should promote and raise students' own interests.

There are also some learning activities which go hand in hand with *sociability*. The importance of the non-cognitive processes and outcomes of co-operative learning should be acknowledged. Students have a natural tendency to choose social rather than solitary learning activities. Tolerance, self-esteem, and the ability to work together are likely to be affected by co-operative orientation. Co-operation is also possibly connected with interactional orientation, which should be related to communicative competence. The use of social learning strategies could be promoted simultaneously. Group condition creates more talk than teacher-fronted condition. It will provide students with an opportunity to learn negotiating and other communication skills. (Slavin 1983, 346; Wesche 1994, 237.)

There is variation in the needs of students at different *levels of proficiency* and with different talents. The perceived competence of gifted students should be further encouraged. Vallerand et al. (1994, 172) suggest some good advice for teachers and parents. Gifted students should be provided with encouraging and challenging environments with positive feedback, so that they can test and develop their perceived competence. This will support and retain the intrinsic motivation towards the school.

Different methods work in different *situations*. Responding to learners' affective needs may have an impact on success, particularly in a rare language, because of the linguistic and psychological barriers. Anxiety, risk taking, and motivation are considered significant factors in these learning situations (Samimy 1994, 29-33).

Besides manipulating operating factors, one further point can be made on the basis of the findings of the present study. It was speculated whether teachers treat twins - especially identical twins - as one person. This clearly goes against the core of the present study, the acceptance, improvement, and exploitation of individual differences, and leads to the question of *individual support*. Although individual guidance and attention are often impossible in today's school world, which is a matter of resources, teachers should at least

make the effort to pay attention to individual differences and not think that all students learn in the same way. Teachers should, instead, accept the fact that there are individual differences in behaviour, and it is difficult for some students to adapt to traditional classroom situations. Knowledge contributes to understanding, which in turn helps in solving problems.

Finally, the importance of *effort* can be brought up. Compensation for lack of talent can be found in hard work, conscientiousness, and confidence at least to some extent. The findings included some indication in this direction. If there really are strong hereditary influences in language learning, it seems that the lack of natural competence can be overcome with effort, at least concerning writing skills. Social behaviour might be a key to success in communicative competence.

7 CONCLUSION

The introductory discussion of individual differences began with the view from the traditional perspective suggesting that language learning is primarily a gift. Consolation to this fatalistic view was found. It was shown that affective factors such as intrinsic motivation, a high degree of foreign language self-concept, active prosociality, and the use of some language learning strategies enhance learning outcomes. It was also found out that not all good language learning qualities are found in one person. There are different learner types. The results supported the importance of personal choices and effort to improve one's potential qualities. Strategy use can be learned, positive attitudes are likely to promote self-concept and intrinsic motivation, and sociability can be supported by co-operative learning rather than solitary work. These characteristics can be developed. These are factors which can lead to progress in second language learning.

It also became evident that hereditary-environmental factors are significant predictors of success. Twins were similar in oral skills, in particular. In formal learning and in an early age, family background factors may even be superior in strength to some other factors. The results also indicated some evidence suggesting that reading skill and grammatical skills might be inherited, although the strength of this area of inheritance was not as extensive in relation to other influences as the strength of the general heredity of oral skills.

Genetics may constitute the basis of learning, but by developing a favourable affective profile it is possible to overcome the limitations defined by genes or succeed even better, even if hereditary endowment is promising. In the sixth grade in formal learning hereditary/environmental similarity in the twins was stronger than affective similarity in the nontwins regarding learning outcomes. When it comes to the environment, parents and teachers have the duty to provide young learners with encouraging circumstances.

After the area of successful learning qualities had been examined, individual differences between twins and singletons as well as males and females were investigated. The underlying assumption in the discussion was

that certain type of behaviour would predict language learning success, and there was a possibility that this socially or intrinsically orientated behaviour would be found in twins and girls. It was found in girls, but not in twins.

Twins, however, did not suffer from a potential early cognitive disadvantage in second language learning at the age of 12, at the point of their lives when they are not much longer children, but not yet adolescents either. This is the most important finding of the study, since the study was conducted to investigate what twinship signifies in second language learning. The findings also serve as the basis for a new research area, which calls for further investigation.

Twins' linguistic behaviour seems also otherwise interesting. Some affective features were more apparent in the twins than in the singletons. The twins' orientation to deal with affective states was minor when compared to the equivalent behaviour of the singletons. The twins did not seem to be bothered by peers' nasty behaviour to the extent that the singletons were annoyed. The former might be a disadvantage and the latter an advantage in some circumstances and language use situations. But the factors that these features represent were not particularly crucial to proficiency. Still, they suggest that there might be other types of characteristics in linguistic behaviour that could be more closely examined in twins.

Furthermore, the twins' perceived pronunciation competence was significantly lower than that of the singletons. It may point to a residue of twin language, which is often characterized by abnormal phonological processes. This possible deficit may indicate a twin-singleton difference in linguistic skills due to the early problems involved in twinship, but it appears not to affect proficiency that is measured at school. The finding points to specific linguistic rather than general cognitive delay.

The results pointed to the importance of social behaviour in language learning. Social competence is a factor that probably influences language use, in particular. Instead of emphasizing proficiency, i.e. the product of language learning, language use should be highlighted. Twins might show different patterns of behaviour in language use and the process of learning.

The study provided new information about the role of twinship in linguistic behaviour. The application of the study lies in its reference to education, the ground for further research areas, and potential for new twin methodology in SLA. Linguistic environment and rearing patterns that support social development provided by parents are particularly important in the case of twins. By paying equal and individual attention parents can contribute to the development of twins' intrapersonal skills, whereas interpersonal skills are developed in interaction with the co-twin. Twinning is an ideal situation where the significance of affective factors may become highlighted if problems are avoided, but it requires further investigation. It became evident that examining the process of learning and communicative behaviour instead of proficiency might be keys to a deeper understanding.

The findings from a rather novel type of research also support the existence of individual differences in second language learning. These differences have implications for the teaching of English. Be the learner a male or a female, a twin or a singleton, language learning is subject to individual differences, and these differences should be accepted. Learners should make the best of their potential qualities. Teachers, too, can find ways to bring the best out of their students.

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APPENDIX 1 Questionnaires

KIELIKÄYTTÄYTYMINEN

Arvoisa kuudesluokkalainen!

Opiskelen Jyväskylän yliopistossa ja teen tutkimusta kielen oppimisesta. Tässä monisteessa on väittämiä, jotka koskevat englannin opiskeluasi. Sinun tulisi arvioida niiden todenmukaisuutta omalla kohdallasi merkitsemällä sopivin annettu vaihtoehto. Lue väittämät huolellisesti ja ympyröi sopivat vaihtoehdot. Viimeiseen osaan on erillinen ohje. Älä käytä liikaa aikaa pohdiskeluun, vaan merkitse välitön reaktiosi. Jos sinusta tuntuu, ettei mikään vaihtoehto sovi kohdallasi täydellisesti, valitse lähinnä totuutta oleva vaihtoehto. Älä hermostu, vaikka sinusta tuntuisi, että jotkut kysymykset muistuttavat toisiaan! Tarvittaessa kysy neuvoa.

Huomaa, että tässä ei ole olemassa oikeita tai vääriä vastauksia, vaan tarkoitus on kartoittaa mielipiteitä, oppimistapoja ja asenteita. Ole hyvä ja vastaa siis rehellisesti! Tietojasi käsitellään luottamuksella, niitä ei lueta koulullasi eivätkä ne vaikuta missään tapauksessa arvosanoihisi. On tärkeää, että palautat kyselyn!

Tuhannet kiitokset jo etukäteen avustasi!

Marjukka Sinkkonen

OSA A

Vaihtoehtojen numerointi on seuraavanlainen:

Olen väitteen kanssa

1 = täysin eri mieltä

2 = hieman eri mieltä

3 = vaikea sanoa

4 = hieman samaa mieltä

5 = täysin samaa mieltä

Lue siis väite ja ympyröi numero (1-5), joka parhaiten kuvaa näkemystäsi asiasta!

Seuraavat väitteet koskevat englannin opiskeluasi

täysin eri mieltä				täysin samaa mieltä			no
1	2	3	4	5	Haluaisin olla todella etevä vieraiden kielten opiskelija.		01
1	2	3	4	5	Minusta tuntuu usein, että kielenopiskelijana olen todella huono.		02
1	2	3	4	5	Vierasta kieltä käyttäessäni tunnen itseni mukavalla tavalla melkein "eri ihmiseksi".		03
1	2	3	4	5	Haluaisin olla toisten arvostama kielten puhuja.		04
1	2	3	4	5	Haluaisin osata kirjoittaa englanniksi niin kuin syntyperäinen englantilainen tai amerikkalainen.		05
1	2	3	4	5	Toivoisin pystyväni hallitsemaan englantia kaikin puolin niin kuin syntyperäinen puhuja.		06
1	2	3	4	5	Usein tuntuu, ettei minusta ole englannin sanojen oppijaksi.		07
1	2	3	4	5	Osaan kirjoittaa hyvin englanniksi.		08
1	2	3	4	5	Haluaisin pystyä puhumaan englantia niin kuin syntyperäinen puhuja.		09
1	2	3	4	5	Englannin puhetaitoni on mielestäni oikein hyvä.		10
1	2	3	4	5	Opin hyvin englantia.		11
1	2	3	4	5	Joskus tuntuu, että englantia on minulle mahdoton kieli.		12
1	2	3	4	5	Minusta tuntuu, että äännän englantia huonosti.		13
1	2	3	4	5	Osaan hyvin englannin kielen sääntöjä (esim. miten lauseita muodostetaan oikein).		14
1	2	3	4	5	Toisiin verraten en ole mikään taituri englannissa.		15

OSA B

Vaihtoehtojen numerointi on seuraavanlainen:

Väite pitää paikkansa kohdallani

1 = ei koskaan tai lähes ei koskaan

2 = ei yleensä

3 = joskus

4 = usein

5 = aina tai lähes aina

Seuraavat väitteet koskevat englannin opiskeluasi sekä englannin tuntejasi

(lähes) ei koskaan		(lähes) aina				no
1	2	3	4	5	Pyrin yhdistämään mielessäni uusia ja vanhoja opittuja asioita.	01
1	2	3	4	5	Sijoitan uusia sanoja mielessäni kokonaisesti lauseisiin muistaakseni ne paremmin.	02
1	2	3	4	5	Muodostan mielikuvia uusista sanoista muistaakseni nämä sanat paremmin (esim. näen mielessäni kissan kun opettelen sanaa <u>cat</u>).	03
1	2	3	4	5	Kirjoitan uusia sanoja paperille muistaakseni ne paremmin.	04
1	2	3	4	5	Kertaan usein tunnilla oppimiani asioita.	05
1	2	3	4	5	Muistan uudet sanat tai lauseet muistelemalla niiden paikkaa vaikkapa kirjan sivulla tai taululla.	06
1	2	3	4	5	Yritän tunnistaa englanninkielisiä sanoja musiikissa tai mainoksissa.	07
1	2	3	4	5	Lausun tai kirjoitan uusia sanoja useita kertoja harjoittelumielessä.	08
1	2	3	4	5	Yritän matkia englantia äidinkielenään puhuvien puhetyyliä.	09
1	2	3	4	5	Harjoittelen englannin kielen äänteitä.	10
1	2	3	4	5	Käytän tietämiäni sanoja uusissa tilanteissa (esim. uusissa lauseissa).	11
1	2	3	4	5	Katselen englanninkielisiä TV-ohjelmia tai elokuvia.	12
1	2	3	4	5	Kirjoitan muistilappuja, viestejä tai kirjeitä englanniksi.	13
1	2	3	4	5	Etsin yhtäläisyyksiä englannin- ja suomenkielisten sanojen väliltä.	14
1	2	3	4	5	Yritän löytää oudoista sanoista ja lauseista jotain tuttua.	15
1	2	3	4	5	Minulle on tärkeämpää ymmärtää lauseen perusajatus kuin suomentaa joka sana.	16
1	2	3	4	5	Arvailen tuntemattomia sanoja.	17
1	2	3	4	5	Käytän eleitä, jos en muista oikeaa sanaa (esim. viiton käsilläni tai ilmeilen).	18
1	2	3	4	5	Keksin uusia sanoja, jos en tiedä oikeaa sanaa.	19
1	2	3	4	5	Luen englanninkielistä tekstiä etsimättä joka sanan merkitystä.	20
1	2	3	4	5	Jos en muista englanninkielistä sanaa, yritän sanoa saman asian eri tavalla.	21
1	2	3	4	5	Etsin mahdollisuuksia käyttää englannin kieltä eri tavoin.	22
1	2	3	4	5	Kiinnitän huomiotani tekemiini virheisiin, ja pyrin oppimaan niistä.	23
1	2	3	4	5	Kiinnitän huomiotani englantia puhuviin ihmisiin.	24

(lähes) ei koskaan					(lähes) aina		
1	2	3	4	5	Yritän miettiä, miten tullaan paremmaksi kielenoppijaksi.		25
1	2	3	4	5	Suunnittelen ajankäyttöni, jotta minulla olisi tarpeeksi aikaa opetella englantia.		26
1	2	3	4	5	Minulla on selviä päämääriä englannin taitoni kohottamiseksi.		27
1	2	3	4	5	Mietin, olenko edistynyt englannin kielessä.		28
1	2	3	4	5	Pyrin tietoisesti vähentämään jännitystä (tai olemaan jännittämättä), silloin kun pelkään englannin kielen käyttämistä.		29
1	2	3	4	5	Rohkaisen itseäni käyttämään englantia, silloinkin kun pelkään tekeväni virheen.		30
1	2	3	4	5	Palkitsen itseäni, silloin kun pärjään englannissa.		31
1	2	3	4	5	Huomaan heti, jos olen hermostunut puhuessani englantia, esim. tunnilla.		32
1	2	3	4	5	Kirjoitan muistiin kokemuksiani kielen oppimisesta tai käytöstä esimerkiksi päiväkirjaan.		33
1	2	3	4	5	Puhun jonkun muun ihmisen kanssa siitä, miltä kielen oppiminen ja kielten tunnint minusta tuntuvat.		34
1	2	3	4	5	Pyydän englannin kielen puhujaa (esim. opettajaa) hidastamaan tai toistamaan, jos en ymmärrä.		35
1	2	3	4	5	Haluan, että virheitäni korjataan.		36
1	2	3	4	5	Harjoittelen englantia muiden oppilaiden tai kavereiden kanssa.		37
1	2	3	4	5	Pyydän tarvittaessa apua niiltä, joiden kanssa puhun.		38
1	2	3	4	5	Kysyn opettajalta, jos en ymmärrä jotain.		39
1	2	3	4	5	Pyrin oppimaan englantilaista tai amerikkalaista kulttuuria.		40
1	2	3	4	5	Haluan tutustua englantilaisiin tai amerikkalaisiin ja heidän kieleensä vaikkapa kirjeenvaihdon välityksellä.		41

OSA C

Seuraavaksi sinulle esitetään vastakkaisia väitepareja. Kunkin väiteparin kohdalla sinun tulee valita yksi neljästä vaihtoehdosta. Sinun kannattaa ensin miettiä, kumpi vierekkäisistä väitteistä on totuudenmukaisempi kohdallasi ja sen jälkeen harkita, onko se täysin vai jokseenkin totta. Lue siis molemmat väitteet ja laita rasti sinun kohdallasi parhaiten sopivan vaihtoehdon kohdalle sulkuihin. Huomaa vaihtoehtojen järjestys monisteessa!

Vaihtoehdot ovat seuraavat:

ensimmäinen väite on täysin totta kohdallani
 ensimmäinen väite on jokseenkin totta kohdallani
 toinen väite on jokseenkin totta kohdallani
 toinen väite on täysin totta kohdallani

Seuraavat väiteparit koskevat englannin opiskeluasi ja englannin tuntejasi

täysin totta kohdallani	jokseenkin totta kohdallani		MUT- TA		jokseenkin totta kohdallani	täysin totta kohdallani
01 ()	()	Jotkut pitävät vaikeista tehtävistä, koska ne ovat haasteita.	MUT- TA	Toiset pitävät helpoista tehtävistä, jotka he varmasti osaavat tehdä.	()	()
02 ()	()	Jotkut kuluttavat aikaa ongelmien parissa oppiakseen selvittämään niitä.	MUT- TA	Toiset kuluttavat aikaa ongelmien parissa, koska heidän oletetaan tekevän niin.	()	()
03 ()	()	Jotkut opiskelevat englantia, koska opettaja käskää tehdä niin.	MUT- TA	Toiset opiskelevat englantia, koska ovat aina halunneet oppia sitä.	()	()
04 ()	()	Kun jotkut tekevät virheen, he haluaisivat mielellään selvittää oikean vastauksen itse.	MUT- TA	Virheen tehtyään toiset kysyvät mielellään opettajalta, miten oikea vastaus saadaan.	()	()
05 ()	()	Jotkut haluavat oppia vain sen, mitä tunnilla on pakko oppia.	MUT- TA	Toiset oppivat mielellään niin paljon kuin pystyvät, vaikkei niin paljon tunnilla tarvittaisikaan.	()	()
06 ()	()	Kun jotkut juuttuvat ongelmaan, he haluavat, että opettaja auttaa heitä.	MUT- TA	Kun toiset juuttuvat ongelmaan, he haluavat selvittää sen omin päin.	()	()
07 ()	()	Jotkut haluavat edetä uusiin vaativampiin tehtäviin.	MUT- TA	Toiset haluavat pitäytyä vanhoissa tutuissa tehtävissä.	()	()
08 ()	()	Jotkut tekevät tunnilla kysymyksiä oppiakseen uusia asioita.	MUT- TA	Toiset tekevät tunnilla kysymyksiä, jotta opettaja huomaisi heidät.	()	()

täysin totta kohdal- lani	jokseen- kin totta kohdal- lani		MUT- TA		jokseen- kin totta kohdal- lani	täysin totta kohdal- lani
09 ()	()	Jotkut haluavat, että opettaja auttaa heitä suunnittelemaan, mitä he tekevät seuraavaksi.		Toiset haluavat suunnitella itse, mitä tekevät seuraavaksi.	()	()
10 ()	()	Jotkut haluavat oppia tunnilla pelkäästään oikeat vastaukset tehtäviin.		Toiset haluavat selvittää tunnilla uusia asioita.	()	()
11 ()	()	Jotkut tekevät ylimääräistä työtä saadakseen parempia numeroita.		Toiset tekevät ylimääräistä työtä, koska niin he voivat oppia heitä kiinnostavia asioita.	()	()
12 ()	()	Jotkut haluavat tehdä tehtävänsä itse ilman apua.		Toiset haluavat, että joku auttaa heitä tehtävissä.	()	()

Kiitoksia kovasti urakasta!

Nimi:

Koulu:

Luokka:

Viimeisin englannin numero todistuksessa:

Tähän tai etusivulle voit kirjoittaa kommentteja kyselystä:

PERSOONALLISUUS / SOSIAALINEN KÄYTTÄYTYMINEN

Konstruktivisuus

- (1) Aina ystävällinen
- (2) Yrittää toimia järkevästi
- (3) Selvittää asiat keskustelemalla
- (4) Pitää pienempien puolta
- (5) Kaikki voivat luottaa
- (6) Aina toisten seurassa
- (7) Auttaa toisia

Ahdistuneisuus

- (8) Pahoittaa helposti mielensä
- (9) Arastelee toisia
- (10) Pelkää ja jännittää uusia asioita
- (11) On usein huolestunut

APPENDIX 2 Items of the questionnaires in English

Note. The items are numbered according to the Finnish version of the questionnaire (see Appendix 1). They are arranged here according to subclasses.

FOREIGN LANGUAGE SELF-CONCEPT (Part A)

General foreign language self-concept:

- (1) I would like to be very good at learning foreign languages.
- (2) I often feel that I am very bad at learning languages.
- (3) When I use a foreign language, I almost feel like a different person, which is a good feeling.
- (4) I would like to be an admired speaker of languages.

Target language self-concept:

- (6) I would like to have a native-like knowledge of all aspects of English.
- (11) I learn English well.
- (12) I sometimes find English an impossible language.
- (15) I am not very good in English compared with others.

Task self-concept:

- (5) I would like to be able to write in English like a native Englishman or American.
- (7) I often feel that I am not good enough to learn English words.
- (8) I can write well in English.
- (9) I would like to be able to speak English like a native speaker.
- (10) I am satisfied at my spoken English skills.
- (13) I think I pronounce English poorly.
- (14) I know the rules in English well, e.g., how to form sentences.

LANGUAGE LEARNING STRATEGIES (Part B)

Memory strategies

- (1) I think of relationships between what I already know and new things I learn in English.
- (2) I use new words in a sentence so I can remember them.
- (3) I remember a new English word by making mental pictures. (I think of a cat when I am learning the word).
- (4) I write down new words to remember them better.
- (5) I review English lessons often.
- (6) I remember new words and phrases by remembering their location on the page or on the board, for example.
- (7) I pay attention to English words in music and commercials.

Cognitive strategies

- (8) I say or write new English words several times.
- (9) I try to talk like native English speakers.
- (10) I practice the sounds of English.
- (11) I use the English words I know in different ways (in new sentences, for example).
- (12) I watch English language TV shows spoken in English or go to movies spoken in English.
- (13) I write notes, messages, or letters in English.
- (14) I look for words in my own language that are similar to new words in English.
- (15) I try to find something familiar in new words and phrases in English.
- (16) I try not to translate word for word.

Compensation strategies

- (17) To understand unfamiliar English words, I make guesses.
- (18) When I cannot remember a word, I use gestures (use hands and facial expressions, for example).
- (19) I make up new words if I do not know the right ones in English.
- (20) I read English without looking up every new word.
- (21) If I cannot think of an English word, I use a word or phrase that means the same thing.

Metacognitive strategies

- (22) I try to find as many ways as I can to use my English.
- (23) I pay attention to my English mistakes and use that information to help me do better.
- (24) I pay attention when someone is speaking English.
- (25) I try to find out how to be a better learner of English.
- (26) I plan my schedule so I will have enough time to study English.
- (27) I have clear goals for improving my English skills.
- (28) I think about my progress in learning English.

Affective strategies

- (29) I try to relax whenever I feel afraid of using English.
- (30) I encourage myself to speak English even when I am afraid of making a mistake.
- (31) I give myself a reward when I do well in English.
- (32) I notice if I am tense or nervous when I am speaking English, during a lesson, for example.
- (33) I write down my feelings in a language learning diary.
- (34) I talk to someone else about how I feel when I am learning English.

Social strategies

- (35) If I do not understand something in English, I ask the other person to slow down or say it again.
- (36) I want to be corrected when using English.
- (37) I practice English with other students or friends.
- (38) I ask for help from those I speak English with.
- (39) I ask my teacher questions if I do not understand something.
- (40) I try to learn about culture of English speakers.
- (41) I want to get to know English speakers and their language by getting pen-friends, for example.

ORIENTATION IN THE CLASSROOM (Part C)

Preference for Easy Work Assigned vs. Challenge:

(1) Some kids like hard work because it is a challenge vs.

Other kids prefer easy work that they are sure they can do

(5) Some kids would rather just learn what they have to in school vs.

Other kids would rather learn about as much as they can

(7) Some kids like to go on to new work that is at a more difficult level vs.

Other kids would rather stick to the assignments which are pretty easy to do

(10) Some kids only like to learn the right answers at lessons vs.

Other kids want to figure out new things during lessons

Pleasing the Teacher/Getting Grades vs. Curiosity/Interest:

(2) Some kids work on problems to learn how to solve them vs.

Other kids work on problems because you are supposed to

(3) Some kids study English because the teacher tells them to vs.

Other kids study English because they have always wanted to learn it

(8) Some kids ask questions in class because they want to learn new things vs.

Other kids ask questions because they want the teacher to notice them

(11) Some kids do extra projects so they can get better grades vs.

Other kids do extra projects because they learn about things that interest them

Dependence on the Teacher vs. Independent Mastery:

(4) When some kids make a mistake they would rather figure out the right answer by themselves vs.

Other kids would rather ask the teacher how to get the right answer

(6) If some kids get stuck on a problem they ask the teacher for help vs.

Other kids keep trying to figure out the problem on their own

(9) Some kids like the teacher to help them plan what to do next vs.

Other kids like to make their plans for what to do next

(12) Some kids like to do their work without help vs.

Other kids like to have the teacher help them do their work

PERSONALITY

Active prosociality:

- (1) always friendly to others
- (2) tries to act reasonably even in annoying situations
- (3) thinks that if one negotiates, everything will be better
- (4) sides with smaller and weaker peers
- (5) considered a reliable classmate
- (6) is always in others' company during breaks and after school hours
- (7) offers to help other children who are having difficulty with the task in the classroom

Anxiety:

- (8) easily takes offence if others are nasty to him/her
- (9) is afraid of other children
- (10) tends to be fearful or afraid of new things or new situations
- (11) often worries

APPENDIX 3 English test**A. ENGLANNIN KOE**

Nimi _____

1. KUULLUN YMMÄRTÄMINEN

Vastaa kuulemasi perusteella kysymyksiin suomeksi.

1. Kenen luona Bradley vietti lomaansa? _____

2. Kuinka kauan Bradley oli siellä? _____

3. Mitä kerrotaan säästä? _____

4. Mitä jännittävää tapahtui seuraavana päivänä? _____

5. Mitä museossa sanottiin? _____

6. Mitä Bradley teki kotiin päästyään? _____

/6p (x2)

2. REAGOINTI

Tapaat irlantilaisen turistin eläintarhassa. Ryhdyt keskustelemaan hänen kanssaan. Opettaja esittää tämän henkilön puheenvuorot, ja sinä kirjoitat omat vastauksesi alla oleville viivoille taukojen aikana. Yritä vastata useammalla sanalla ja olla kekseliäs! Vastaa englanniksi.

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

/10p (x2)

3. LUETUN YMMÄRTÄMINEN

Lue kertomus ja vastaa kysymyksiin suomeksi.

It is the 24th of December. Mr. Stevenson comes home from town. It is six o'clock. He is very tired. He has got all the Christmas presents for his family.

Mrs Stevenson opens the door. She helps Mr. Stevenson to put the boxes in the bedroom. Brian and Susan, their children, are in the livingroom.

When the children go to bed, they hang up their long socks and stockings at the end of their beds. When they are asleep Mr. and Mrs. Stevenson open the boxes. They put the small presents into Brian's and Susan's socks and the big ones under the children's beds. Then they put the empty boxes near the fireplace.

Next morning the children look for the presents. Brian finds a computer game, a pair of ski boots and a watch.

Susan also gets a computer game, a sweater and a ring. After breakfast the family begin to play computer games. Then they read the books and sing Christmas songs. They have a lovely time.

1. Mistä perheen isä oli tulossa? _____
2. Mitä hänellä oli mukanaan? _____
3. Minne pienet esineet laitettiin? _____
4. Minne suuret esineet laitettiin? _____
5. Mitä Brian sai? (3 asiaa) _____
6. Mitä Susan sai? (3 asiaa) _____
7. Mitä koko perhe teki sitten? _____

/7p (x2)

4. RAKENNETEHTÄVÄ

Haastattele englanniksi ulkomaalaista. Kysy esimerkiksi, missä hän asuu, pitääkö hän Suomesta, pitääkö hän talvesta, mikä on hänen ammattinsa, mitä kieliä hän puhuu jne. Kirjoita kysymykset ja vastaukset. Käytä molemmissa kokonaisia lauseita.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

/12p (×2)

B. OPETTAJAN OHJE

Ohjeet on kirjoitettu koepaperiin, mutta ne selitetään vielä oppilaille (tarvittaessa).

Kokeen kaikkia osia koskien täysin tuntemattomat tehtävän kannalta oleelliset sanat (niitä tuskin on, koe lienee helppo) voidaan kertoa luokalle etukäteen.

Ohessa on arvosteluohjeet sekä kuullun ymmärtämisen ja reagointitehtävän viitetekstit.

ARVOSTELU

1. KUULLUN YMMÄRTÄMINEN

1 p täysin oikea vastaus

0,5 p vastaus sisältää pienen virheen, muuten oikein

2. REAGOINTI

Tässä voidaan hyvin pitää periaatteena, että vain parhaimmat vastaukset ovat pisteen arvoisia.

1 p kysymykseen sopiva järkevä vastaus, joka osoittaa tarvittaessa kekseliäisyyttä, kommunikatiivisuutta tai toisen huomioon ottamista: sis. "please", "thank you" tms.)

0,5 p kysymykseen sopiva hyvin lyhyt vastaus

3. LUETUN YMMÄRTÄMINEN

Sama kuin kuullun ymmärtämisessä

Kysymyksissä 5. ja 6. 0,5 p kahdesta oikeasta asiasta

4. RAKENNETEHTÄVÄ

2 p täysin oikein muodostettu kysymys ja vastaus

1,5 p pelkk(i)ä pieni(ä) kirjoitusvirhe(itä), lauseet muodostettu oikein

1 p kysymys muodostettu oikein (kohdassa voi olla merkityksettömiä kirjoitusvirheitä)

0,5 p vastaus muodostettu oikein (kohdassa voi olla merkityksettömiä kirjoitusvirheitä)

0 p kummankin lauseen muodostuksessa on virhe

C. VIITETEKSTIT

1. KUULLUN YMMÄRTÄMINEN

Ohessa on kasetti.

Opettajan ohje oppilaille: "Kuulette kohta Bradleyn kirjoittaman aineen hänen parhaasta lomapäivästään. Teillä on paperit nurin päin, jotta voitte paremmin keskittyä kuuntelemaan. Kun olette kuulleet kertomuksen, paperit käännetään oikein päin ja tutustumme yhdessä kysymyksiin. Sitten kuulette kertomuksen uudelleen, tällä kertaa tauotettuna, ja vastaatte taukojen aikana."

"THE BEST DAY OF MY HOLIDAY" BY BRADLEY MILES

My Uncle Bill lives in a fishing village in Wales. He has a nice little house there. I often visit him on my holidays. // (1) Last summer I stayed there for a week. // (2) One day we went fishing in an old boat with some fishermen. The weather was not very good. It was cold and windy. But we caught a lot of fish. // (3) The next day something interesting happened. We stopped to pull in the net. It was very heavy. I thought there was a big fish or perhaps a whale. When the net came up we saw that there was an old gun. // (4)

When we were back in the village we took the gun to a museum. They were very interested in it. They studied it carefully. They told us that it was from an old Spanish ship. // (5) That was the most exciting day of the summer. When I came back home I went to the library. I read all about old ships. // (6)

2. REAGOINTI

Tämä tehtävä mittaa mieluummin reagointia ja kommunikatiivisuutta (vaikka onkin kirjallinen) kuin oikeakielisyyttä ja kirjoitusasua. Opettaja esittää oheiset puheenvuorot ja oppilaat kirjoittavat niihin vastaukset. Älkää tuhlatko liikaa aikaa tähän, jotta koko koe ennätettäisiin tehdä. (Tarvittaessa toistakaa lauseet kerran.)

1. Hi! I'm Michael Williams from Ireland. Where are you from?
2. You seem to like animals. Do you come here often?
3. Which are your favourite animals?
4. Why do you like them best?
5. I have got some bread here. Would you like to feed those camels?
6. I have got some sweets here, too. Would you like some?
7. Do you think that animals suffer here?
8. Your English is very good. Have you ever been to England?
9. Is Finnish an easy language?
10. I'm afraid that I must go now. Have a nice day!

APPENDIX 4 Questions of the test in English

1. LISTENING

See the reference text that is listened: "The best day of my holiday" by Bradley Miles.

The student gives written answers in Finnish to the Finnish questions.

The English versions:

1. Who did Bradley stay with on his holidays?
2. How long did Bradley stay there?
3. What is told about the whether?
4. What happened the next day?
5. What did they say in the museum?
6. What did Bradley do when he got home?

2. REACTION

The teacher says the lines of an Irish tourist who visits a zoo, and the student writes in English the answers that he has invented. See the reference text: 10 lines.

3. READING

The student reads the English text that is printed on the test paper and answers the questions about it. He writes answers in Finnish to the Finnish questions.

The English versions:

1. Where did the father come from?
2. What did he have with him?
3. Where were the small presents put?
4. Where were the big presents put?
5. What did Brian get? (3 things)
6. What did Susan get? (3 things)
7. What did the family start doing?

4. GRAMMAR

The student interviews a foreigner. He writes the questions and answers in English. Some examples are given.