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Learning to read and spell in Albanian, English and Welsh : the effect of orthographic transparency

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Learning to read and spell in Albanian, English and Welsh: the effect of orthographic transparency

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Abstract

Effects of orthographic transparency on literacy acquisition were examined by comparing data from children learning to read in Albanian, Welsh, and English. The Welsh and especially Albanian orthographies are extremely transparent, whereas the English orthography is notorious for its lack of transparency.

In the pilot study, twenty Year 1 Albanian children were given a reading test consisting of a 100-word stratified sample of decreasing written frequency. These children were able to read accurately 80% of the words; reading latency was a direct effect of word length ($R^2 = .89$); and errors tended to be mispronunciations rather than real word replacements, with hardly any null responses. These results were compared with Ellis and Hooper (2001), where the same design was used with English and Welsh children of the same age, but with one more year of formal reading instruction. The Albanian children read more words than the English and Welsh children, but they had longer reading latencies. Like the Welsh children, but unlike the English children, the Albanian children made more nonword errors. These results suggest that children acquire reading faster the more transparent the orthography, and that shallow orthographies promote an initial reliance on a phonological recoding strategy.

The main study examined reading, spelling, phonological and orthographic skills of 6-, 8- and 10-year old Albanian, English and Welsh children. No cross-language differences were found in reading. In spelling, however, Albanian children could spell significantly more words correctly than the Welsh children, who in turn could spell more words than the English children. Furthermore, the youngest Albanian children outperformed same-age English and Welsh children in the Phoneme Deletion task and Nonword Spelling. English children, however, were extremely fast and accurate on the Wordchains task, whereas Albanian children were not. These results suggest that children acquire spelling faster the more transparent the orthography, and that shallow orthographies promote a fine-grained level of phonological awareness in young children. Deep orthographies encourage children to rely more on strategies based on word-level orthographic representations.

Finally, regression analyses, revealed that phonological skills predicted early reading ability of Albanian and Welsh children only. Orthographic skills predicted skilled reading, however, the contribution of these skills was much stronger for the older English group. In spelling, phonological skills were the only predictor in Albanian across the three age groups. For the English sample, phonological skills predicted early spelling and orthographic skills were the best predictors of spelling ability in older children. The Welsh age-groups showed mixed patterns. These findings, suggest the contribution of phonological and orthographic skills to reading and spelling development is dependent on orthographic transparency.

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1.1 Introduction

In today's modern society, being able to read and write means that one is better equipped to achieve personal, cultural and professional success. Reading and writing skills (together with arithmetic) are probably the most important skills that children acquire in the first years of formal education and the development of these skills has raised much interest among researchers. Indeed, the acquiring of such skills is associated with many cognitive and biological changes of higher mental and neural processes.

In order to read and understand written text, one must be able to recognise the characters and letters, the individual meaning of words and integrate them into meaningful sentences. According to Gough & Tunmer (1986), reading skills can be described as the product of decoding and linguistic comprehension skills. However, some people fail to learn to read and write not because of a lack of opportunities but because of some kind of difficulty that considerably slows down and even prevents the learning process. Furthermore, speed of learning to read and write and strategies involved in these processes differ across languages. This thesis examines the effects of orthographic transparency on literacy acquisition were examined by comparing data from children learning to read in Albanian, Welsh, and English. The Welsh and especially Albanian orthographies are extremely regular, whereas the English orthography is not. These differences are discussed in detail in the following sections.

Before such differences are discussed a description of the history of the development of writing systems is presented.

1.2 The history of the writing systems development

A writing system is a set of visible or tactile signs that represent units of language in a systematic way (Coulman, 1996). Several writing systems developed independently at different periods in different parts of the world (Crystal, 1987). The earliest and most primitive written records discovered are pictographic. Pictographs developed into ideographic, logographic, syllabic, and finally into alphabetic writing systems. Pictographic and ideographic systems are regarded as forerunners of alphabetic systems. The earliest written signs represent the form of objects and are usually recorded on natural materials.

1.2.1 Pictographic writing system

Pictographs were used to record language by the means of simple pictures. Pictures of familiar entities, for example that of animals, were easily identified. Thus, pictures represented spoken words. However, pictographs that were used to represent complex or abstract ideas, especially when out of context, proved difficult to understand. In addition, the reader had to remember a great number of symbols.

1.2.2 Logographic writing system

The writing system used by the Sumerians, who lived between the Euphrates and Tiger rivers circa 3500 B.C., consisted of a series of simplified pictures—otherwise known as *logographs*—that were presented on clay tablets. One word or idea was noted down by one logograph. In addition to information about entities, the Sumerian system was able to represent abstract ideas: it did this through *ideographs.*

Hieroglyphs on the other hand, initially used by ancient Egyptians, contain three different types of writing symbols: (a) ideograms (these represent whole words) (b) phonograms (these represent a few consonants), and (c) determinative symbols (these have no phonetic value and tell the reader what kind of meaning the word has). Thus pictographic writing systems developed into logographic systems; in logographic systems each symbol represents an individual word. This development is also known as logographic writing, where one symbol represents a single word.

Logographic and ideographic writing systems are limited in their expressive range (languages have thousands of words; moreover, the grammatical structure of all languages is sophisticated), and many pictures can be ambiguous. Therefore, a large number of symbols are needed to represent the words, ideas and grammatical structure of the language.

Although logographic writing dates back many centuries, it is still used in some languages (e.g. modern Chinese and Japanese Kanji). In Chinese, each logograph represents one word; these words tend to be monosyllabic.

1.2.3 Syllabic writing systems

The logographic writing systems developed into systems that had fewer symbols and that incorporated phonology into graphemic characters: these new systems were *syllabic* writing systems. In these, the symbols represent sounds of the language at the syllabic level; they do not rely on pictures of real objects (Adams, 1990). Although syllabic logographs do not employ pictures of entities, the number of symbols they use is significantly smaller than the number in logographic writing systems in which thousands of symbols represent the thousands of words of the language.

The Japanese syllabary *Kana* has two written forms, *Katakana* and *Hiragana.* Each form has 47 basic signs; however, the number of signs increases to 60-70 if redundant phonetic information is presented (Henderson, 1982).

1.2.4 Alphabetic writing systems

After adaptations from the syllabic writing systems, the ancient Phoenicians began to use symbols in which only the first consonant of a syllable was represented in writing. The ancient Greeks adapted the Phoenician writing system and developed the first alphabet in which each symbol (or grapheme) represented one sound of the spoken language. Many, though not all, modern languages use an alphabetic writing system. Logographic and syllabic languages are still used by millions of people. For example, modern Chinese and Japanese Kanji are logographic, and Japanese Katakana is syllabic. Although the Chinese writing system has around 10,000 symbols, most Chinese people know between only 2,000 and 3,000—this suffices for normal written communication. There are other languages where only certain categories of sounds of the spoken language are represented in writing. For example, in Hebrew only the consonants are spelled; the vowels are indicated by special marking—diacritics—or omitted from written text.

Writing began with pictographic and ideographic symbols. These systems were followed by logographic, syllabic, and alphabetic writing systems. During this development, although the number of symbols within each writing system decreased, each system became more abstract in the sense that they used no resemblance between the visual appearances of symbols and the words they represented.

Letters and Sounds. Reading and writing abilities are not innate. The convention between symbols and sounds has to be learned in order to make sense of written language. Writing is a product of human intellect developed over a long period of time in order to pass information through the use of visual symbols. Daniels and Bright (1996) define writing as a system of more or less permanent marks that are used to present an utterance in such a way that it can be recovered more or less exactly without the intervention of the reader.

According to this definition, pictographic and ideographic systems are not true writing systems; this is because they do not represent individual sounds (Gelb, 1963). In contrast, the ancient Greek writing system was based upon symbols that represent the phonology of the language. *Phonology* comprises the different sounds or phonemes of a language. *Orthography* comprises the written symbols (letters, or graphemes), that represent the sounds (the phonology) of a language.

An alphabetic writing system has its advantages and disadvantages. Firstly, the assignment of the sounds to the letters is arbitrary. Secondly, visually similar graphemes such as *'b'* and *'d'* or *'p'* and *'q'*, can be easily confused. Finally, in many languages the correspondences between letters and sounds are not always consistent. A good example of consistent correspondences in English comes from the letter *B* as it is almost always pronounced as the sound /b/. Letter *i* on the other hand, can be read in different ways depending upon the position in the word and its neighbours (e.g., b*i*rd /bə:d/, g*i*ve /giv/, and l*i*fe /laif/).

By definition, writing systems that have a large number of inconsistent correspondences between letters and sounds are regarded as deep orthographies (in literature also referred to as not transparent or not phonetic). Writing systems, in which correspondences between letters and sounds are highly consistent are regarded as shallow orthographies (also referred to as transparent or phonetic orthographies).

The present research investigated the effect of *orthographic depth* on the literacy development of young children learning to read and spell in Albanian, English, and Welsh. Orthographic depth is the consistency of the relationship between the orthography and the phonology of the written language. All three languages use an alphabetic writing system in which the graphemes (letters) come from the Latin alphabet. The English orthography is considered as having a deep orthography—its Grapheme-Phoneme (PG) and Phoneme-Grapheme (GP) correspondences are inconsistent. The Welsh and Albanian orthographies are considered as shallow (their GP and PG correspondences are regular).

1.3 The Albanian language and orthography

Albanian forms a single branch of the Indo-European family of languages (Bopp, 1854) and is spoken by more than seven million people, of whom almost three and half million live in Albania (the rest in parts of the Kosovo, Greece, Macedonia, Germany, USA, Switzerland and Italy). Albanian has an extremely phonetically transparent orthography. Other orthographies like Italian, German, Greek, Dutch, French, and Spanish are transparent but not to the extent of Albanian.

1.3.1 Dialects of Albanian Language

Albanian has two dialects: Gheg dialect (spoken north of the Shkumbini River) and Tosk (spoken south of the same river). Both dialects are subdivided into minor dialect (Lloshi, 1999). The most striking differences between the major dialects are presented in Table 1.1.

Differences	**Gegh**	**Tosk**
nasal vowels in Gheg, missing in Tosk	*bâ*	*bëj* "I do'
ë (schwa) very frequent in Tosk and also stressed at times, missing in spoken Gheg and replaced with the nasal *â*	*hân*	*hënë* 'moon'
ue diphthong or long *u* in Gheg, corresponds to *ua* in Tosk (and from *uo>o* diphthongisation)	*due* *grue*	*du - dua* 'I want' *gru - grua* 'woman'
the initial *vo-* in Gheg in a very small number of cases, corresponds to *va-* in Tosk	*voj*	*vaj* 'oil'
the intervocalic *-n-* in Gheg, to which Tosk corresponds with rhotacism *-r-*	*ranë* *venë*	*Rërë* 'sand' *verë* 'wine'
terminal voiced consonants in Gheg are heard devoiced in Tosk	*kalb* *i madh*	*kalp* 'make rotten' *i math* 'big'
the consonant clusters *mb, nd, ng, ngj* in Tosk are heard as distinct sounds, while reduced to *m, n, nj* in Gheg	*mush* *ven* *nas* *njesh*	*mbush* 'fill' *vend* 'place' *ngas* 'tease' *ngjesh*'press'
intervocalic *nj* in Tosk is reduced in *j* in Gheg	*rrâj*	*rrënjë* 'root'
imperfect tense forms ending in *-sha, -she* in Gheg have Tosk correspondences *-nja, - nje*	*punojsha*	*punonja* 'I worked'
Turkish loan-words in Gheg are paroxytonic, in Tosk oxytonic	*káfe*	*Kafé* 'coffee'
difference in the definite forms of the nouns in *ue/ua*:	*thue - thoni*	*Thua - thoi* 'finger-nail'
Gheg preserves the endings of verbs with consonantal stem, Tosk omits the endings	*un hapi*	*unë hap* 'I open'
Tosk preserves the endings of the participles, Gheg omits the endings	*Hap* *la*	*Hapur* 'opened' *larë* - 'washed'
presence of the reflexive pronoun *i vet* 'his own' in Gheg, missing in Tosk;		
presence of an infinitive form in Gheg replaced by a circumlocution in Tosk	*me shkue*	*për të shkuar* 'to go'
long vowels in Gheg with phonological values, missing in Tosk		
presence in Gheg of a future tense with the present of the auxiliary "to have" plus the infinitive of the verb, missing in Tosk	*kam me shkue*	'I will go'
deverbative adjectives in Gheg, absent in Tosk, expressing possibility with the suffix *-shem*, different from passive participial adjectives	*i punuem* 'cultivated'	*i punueshem* cultivable

Table 1.1. Dialectical differences between Gheg and Tosk (Source: Lloshi, 1999).

1.3.2 History of written Albanian

The first written Albanian text dates back to the 15th century. This is a baptismal formula written with Latin letters in 1462 by the Archbishop of Durrës, Pal Engjëlli. The first printed book in Albanian, documented so far, under the title *Meshari* (Missal), was published in 1555 by Gjon Buzuku (Skendi, 1967). During the 17th century a number of other works on didactic religious themes were published; these include a bilingual Latin-Albanian dictionary put together by Frang Bardhi in 1635.

Between the 15th and early 20th century Albania was under Ottoman occupation. Teaching of the language or publishing of any literature in Albanian was strictly forbidden. As a result, the struggle for the establishment of an Albanian alphabet which began in the early 19th century continued until the early part of the 20th century. The development of the alphabet went through extensive changes and revisions, and required the efforts of many distinguished leaders and scholars of Albania (Skendi, 1967). Geographically, activities on behalf of a unified Albanian alphabet extended to the Albanian communities of Manastir in the north, Thessalonica in the east, and Saranda in the south with major alphabet contributions from Tirana (the capital city), Elbasan, and Korçe.

The first significant movement for the construction of a common Albanian alphabet was undertaken in 1824 by Naum Veqilharxhi. He believed that the Greek, Latin, and Arabic alphabets used during that period, not only did not correspond to Albanian sounds but for religious reasons would not be accepted by all Albanians. He also believed that Albanian, as an independent language, should have its own script so that foreign scripts would not be carriers of foreign political influences. By borrowing elements from old Latin alphabets, Veqilharxhi formed a new 33-letter alphabet which was used for a primer published in 1844 under the title *EVETOR*. This was received with enthusiasm and widely adopted in southern Albania.

Nevertheless, the Arabic, Greek and Latin scripts continued to be used; many Albanian intellectuals of the time could not agree on which script to use because of different historical, political and religious reasons. An alphabet used by the Catholic north and by the Arbereshe (Italo-Albanians), referred to as the *Catholic Alphabet*, was restricted in scope and proved to be inconvenient because it utilized the complicated alphabet of the Ancient Writers of the North (such as Budi, Bardhi, Bogdani).

The Istanbul Society for the Printing of Albanian Writings adopted a new alphabet devised by Sami Frasheri (famous Albanian Renaissance writer). The majority of the letters were borrowed from the Latin script; certain Greek characters and some of his own inventions were implemented for Albanian sounds that the Latin alphabet could not convey. This alphabet was founded on the principle of one letter for one sound. Known as the *Istanbul alphabet*, it spread widely in a short time because several Albanian educational books were printed utilizing it. Different reports show that by 1905 the Istanbul alphabet was used by the majority of the Albanian population, Christian and Muslim.

An Albanian literary society *Bashkimi* (The Union), based in Shkoder in northern Albania, in collaboration with the Albanian Catholic clergy, particularly the Franciscan brothers, set as its first task the formation of a simpler alphabet. This alphabet was based on Latin characters; in addition, compound letters, known as *diagraphs*, were introduced (the second letter was always *'h'*). It was named the *Bashkimi* alphabet and several textbooks for Catholic schools were printed in it. This was subsidized by the Austro-Hungarian government.

In 1901, Dom Ndre Mjeda, a Catholic clergyman, who also was a philologist and a poet, formed in Shkoder another literary society *Agimi* (The Dawn). He devised a new script using Latin letters, but contrary to the *Bashkimi* alphabet, he used diacritical marks (¨) for Albanian sounds; the one letter for one sound principle was employed. This alphabet, known as the *Agimi alphabet*, found approval in the 1902 International Congress of Orientalists, held in Hamburg, Germany, and in the meetings of May, 1902 the majority of the higher Catholic clergy in Shkoder were in favour of it.

Whilst these alphabets helped the Albanian people preserve their national identity, culture and traditions under Ottoman occupation, they caused division amongst the nation. In November 1908, the first Alphabet Congress was held in Manastir (in Macedonia); this was attended by delegates from Albanian clubs and societies, towns and schools, both from Albania proper and from Albanian colonies abroad. After many discussions, the Congress decided that the Istanbul alphabet alone would be sufficient to answer the needs of the Albanian nation, but in order to have books printed abroad and telegrams, a purely Latin alphabet was necessary. Thus, two alphabets were accepted for future use: the Istanbul one and a new Latin one. This was a significant step toward the unification of education and the union of the Albanians. Although an ideal solution was not found, it opened the way for a new single alphabet to be used by all Albanian speakers.

In a second congress held in Elbasan a year later, it was decided that it was the duty of the Manastir club to introduce the Albanian language in all the schools of Albania; this also meant the introduction of one single alphabet—Latin. It was further decided to request that all the Albanian publicists and journalists use only the dialect of Elbasan, as it was intelligible to both Ghegs in the north and Tosks in the south, and it was thought that it would form a link between the north and the south (Skendi, 1967).

This decision received mixed reactions throughout Albania and Albanian communities abroad. However, in March, 1911, a circular from Turkey's Ministry of the Interior in Istanbul was forwarded to the various Albanian districts ordering the re-opening of Albanian schools and allowing use of the Latin alphabet. Eventually all Greek characters which represented certain sounds of the Albanian language were discarded and a much-revised version of the *Bashkimi* alphabet, which was always considered very close to the *Istanbul alphabet*, appears to be the one currently in use (Skendi, 1967).

Nevertheless, because of two main dialectical differences of spoken Albanian, the standard orthography and standard spoken Albanian proved difficult to establish. The establishment of the communist dictatorship in Albania after the World War II, had a significant impact in the Standard written Albanian. The recommendations set up by the National Conference on Orthography in 1953 implied that literary Albanian should be based on the Tosk modified orthographic variant. The most effective step towards standardization was taken in 1967 with the publication of a set of orthographic rules: *Rregullat e drejtshkrimit të shqipes* (The rules of the Albanian orthography), aiming to represent a *uniform standard national language.* The Linguistic Conference of Prishtina, Kosovo in 1968, adopted the literary language in use in Albania. Finally, the *Congress of Orthography* in 1972 in Tirana, is considered the turning point in the standardization of the Albanian language where the use of the uniform standard language became obligatory and new literary texts were no longer printed in the Gheg dialect. The 1972 Congress had immediate effects throughout the entire Albanian-speaking world and the use of the standard Albanian became widely accepted.

To conclude, north-south divisions, and the prolonged Turkish rule had a profound effect in the development of the Albanian alphabet. The modern Albanian alphabet is Latin-based; it comprises 36 letters.

1.3.3 The sounds and syllable structure of Albanian

Spoken Albanian has seven vowels. These are presented in Table 1.2. Vowels *i* and *e* are produced at the front of the mouth, *u* and *o* at the back, whereas *y*, ə and a are produced at the centre.

Literary Albanian, has 29 consonant sounds. There are ten pairs of voiced-voiceless obstruents. Four pairs are stops, four are fricatives and two are affricates. One of the three approximants (otherwise known as glides), sound *j*, is a semi-vowel. The full classification of the sounds is presented in Table 1.3.

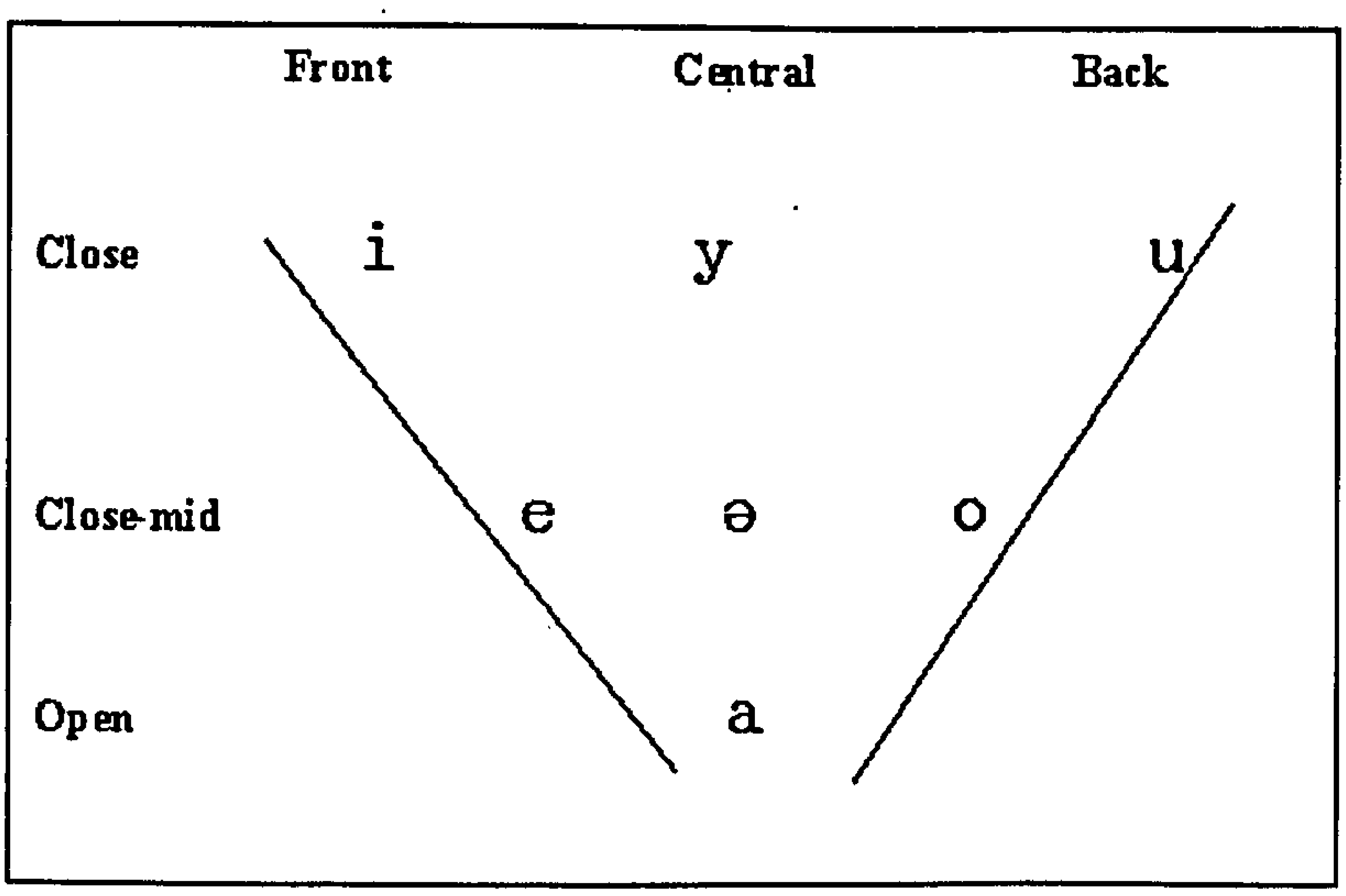

Table 1.2. Vowel sounds of the Albanian language.

		Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Palatal	Velar	Glottal
STOPS	Voiceless	p			t		c	k	
	Voiced	b			d		ɟ	g	
NASALS		m			n		ɳ		
FRICATIVES	Voiceless		f	θ	s	ʃ			h
	Voiced		v	ð	z	ʒ			
AFRICATES	Voiceless			ts			tʃ		
	Voiced			dz			dʒ		
APPROXIMANTS							j		
LATERAL APPROXIMANTS					l			L	
TRILL					r r^1				

Table 1.3. The classification of consonant sounds of the Albanian language.

Syllable structure. The most frequent form of the syllable structure is open ended (CV). However, there are other forms that appear in the spoken language. Other frequent forms include VC (e.g., yt 'yours'), CVC (e.g., ata 'they'), CCV (e.g., shko 'go'), CCVCC (e.g., shkëmb 'rock'). In addition there are words were CCCV syllable structure is present but these words rather infrequent (e.g., zmbërthej 'take appart').

Word final closed syllables usually end with one consonant (e.g., *ëndërr* 'dream', *gëzim* 'joy'), and on rare occasions they end with a double consonant (e.g., *komb* 'nation', *peng* 'hostage').

Unfortunately, a full inventory of the syllable structures does not yet exist in Albanian. A few attempts to statistically analyse written word forms were carried out in late 1960s and early 1970s. Basho (1974) analysed the phonemic and graphic system of written Albanian. The proportions of the literary language phonemes according to their position in words are presented in Table 1.4. According to his analysis, for all the words that contain phoneme *a*, for example, 11% of these words will start with phoneme a, 59.9% will have this phoneme in the body, and 29% will end with this phoneme. Furthermore, 0.5% of the time this will appear alone (as an article). For all the words that contain phoneme *b*, 60% of the time *b* will appear on an initial position, 39% in the body, and only 1% on a final position. This indicates that very few Albanian words end with the phoneme *b*. Phonemes *c, x, xh, zh*, on the other hand, never appear in a word-final position.

In an earlier study, Basho (1969) was able to carry out syllable analysis of the Albanian language. Table 1.5 gives the absolute and relative frequencies of the number syllables within words. One-syllable words are the most frequent words (46.4%), followed by two syllable words (36.1%) and so on.

Phoneme	a	b	c	ç	d	dh	e	ë	f	g	gj	h
Initial	11	60	21	54	52	60	3	1.5	63	24	52	44
In body	59.5	39	79	34	44	36	47	37.5	36.5	74	45	22
Final	29	1	-	12	4	4	34	61	0.5	2	3	4
Alone	0.5	-	-	-	-	-	16	-	-	-	-	-
Phoneme	*i*	*j*	*k*	*l*	*ll*	*m*	*n*	*nj*	*o*	*p*	*q*	*r*
Initial	2	15	54	22	3	51	30	75	3	69	50	4
In body	68	68	36	73	88	40	45	23	80	29	45	75
Final	23	17	10	5	9	9	25	2	16	2	5	21
Alone	7	-	-	-	-	-	-	-	1	-	-	-
Phoneme	*rr*	*s*	*sh*	*t*	*th*	*u*	*v*	*x*	*xh*	*y*	*z*	*zh*
Initial	43	36	34	35	52	5	71	3	75	3	36	36
In body	52	44	52	44	46	58	28	97	25	80	56	64
Final	5	20	14	21	2	12	1	-	-	17	8	-
Alone	-	-	-	-	-	5	-	-	-	-	-	-

Table 1.4. The percentage of the literary language phonemes according to their position in words. (Source: Basho, 1974).

Number of syllables (*i*)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Total**
Absolute frequency n (i)	51065	39953	13065	5064	767	106	7	110027
Relative frequency p (i)	0.4641	0.3631	0.1187	0.0460	0.0070	0.0010	0.0001	1.0000

Table 1.5. The absolute and relative frequency of *i*-syllable words of Albanian (Source: Basho, 1969).

Stress pattern. Generally, the Albanian language has a fixed stress during inflection. For word stems the stress falls mainly on the last syllable (Bevington, 1974; Newmark, 1998), whereas for inflected words, (especially in the noun system) stress falls mainly on the penultimate syllable (Dodi & Gjinari, 1983). For example, for word forms mál 'mountain', mále 'mountains' and máleve 'of the mountains' the stress remains on the sound a.

Word stress is not marked in written Albanian orthography.

Morphology. Albanian is a highly inflected language. Nouns are inflected for number (singular, plural), case (nominative, dative, accusative, ablative) and definiteness. An unusual feature is that nouns are further inflected obligatorily with suffixes to show definite or indefinite meaning.

For example; *tavolinë* "table" => *tavolina* "the table."

Noun plurals are also remarkable for the irregularity of a large number of stems. When a definite noun or one taken as already known is the direct object of the sentence, a pronoun in the objective case that repeats this information must also be inserted in the verb phrase. For example, *ia dhashë topin atij* is literally translated "him-it I-gave the-ball to-him," which in literary English would be "I gave the ball to him."

Verbs have roughly the number and variety of forms found in French or Italian and are highly inflected and quite irregular in forming their stems. There are five different tenses, two different voices (passive and active) and 5 moods (indicative, subjunctive, optative, imperative and admirative).

Adjectives—except numerals and certain quantifying expressions—and dependent nouns follow the noun they modify. Furthermore, they are notable in requiring a particle preceding them that agrees with the noun. Thus, in *një burrë i* *madh* "a big man" the word *burrë* "man" is modified by *madh* "big," which is preceded by *i*, and which agrees with the term for "man". Likewise, in *dy burra të mëdhenj* "two big men," *mëdhenj*, which is the plural masculine form for "big," follows the noun burra "men" and is preceded by a particle *të* that agrees with the noun.

1.3.4 GP and PG correspondences in Albanian

The writing system is young, hence its transparency (Crystal, 1987). The official Albanian language is based on the Tosk dialect, which is spoken in the south of the country. Standard Albanian alphabet has 36 graphemes: 29 representing consonants and seven representing vowels. Twenty of the consonants are individually represented by Latin graphemes; five in combinations with *h* (*dh, sh, th, xh, zh*), two with *j* (*gj, nj*); two are doubled (*ll, rr*); and one with diacritic (*ç* for /tʃ/). The consonants are further divided into the voiced (*b, v, d, z, x, xh, zh, dh, gj, g*), unvoiced (*p, f, t, s, c, ç, sh, th, q, k, h*), and sonorants (*m, n, nj, r, rr, l, ll*). The alphabet has 7 simple vowels (*a, e, ë, i, o, u, y*) and a diacritic is used for the schwa *ë*. The Albanian alphabet does not have the letter *w*.

The nine consonants presented in the alphabet as bigraphs (*dh, gj, ll, nj, rr, sh, th, xh, zh*) are explicitly taught to the children as separate graphemes of the alphabet and if they appear together are never considered as separate letters (this rule does not apply to compound words, which occur rather infrequently). The bi-directional grapheme-phoneme and phoneme-grapheme mapping is consistent for both consonants and vowels. This is illustrated in Table 1.6 which shows examples of words for each letter of the alphabet. Each letter maps to the same sound regardless of whether it is placed initially, medially, or finally, and each sound maps to the same letter regardless of its position in the word.

The Albanian orthography is extremely transparent and inconsistencies between the official spoken language and the written language are very rare. In some textbooks and dictionaries (Bevington, 1974; Drizari, 1975; Newmark, 1998) one may find that the schwa *'ë'* is dropped at word endings and that sounds like /b/ and /d/ in final positions are devoiced to /p/ and /t/, respectively. The first phenomenon relates to the spoken dialect of the North, whereas the second is only used in colloquial speech, mainly in the South. Similarly to Finnish, another highly transparent orthography, occasionally, the pronunciation of *'n'* changes from /n/ to /ŋ/ if it is followed by g.

Phonemes and Graphemes		Word initial	Word medial	Word final
/a/	a	/aˈni.jə/ anije 'boat'	/ˈkap/ kap 'catch'	/ˈkəŋgə/ kënga 'the song'
/b/	b	/ˈbukə/ bukë 'bread'	/ˈmbi/ mbi 'over'	/ˈkomb/ komb 'nation'
/t͡s/	c	/ˌt͡sɛnˈtral/ central 'central'	/ˈmat͡sə/ mace 'cat'	/məˈmət͡s/ memec 'mute'
/t͡ʃ/	ç	/t͡ʃaˈti/ çati 'roof'	/fuˈt͡ʃi/ fuçi 'barrel'	/ˈʟat͡ʃ/ llaç 'mortar'
/d/	d	/ˈdet/ det 'sea'	/kəˈndoj/ këndoj 'to sing'	/aˈt͡sid/ acid 'acid'
/ð/	dh	/ˈðə/ dhe 'earth'	/ˈbarðə/ bardhë 'white'	/ˈndoð/ ndodh 'happen'
/e/	e	/ˈe.rə/ erë 'wind'	/aˈdre.sə/ adresë 'address'	/səˈpsə/ sepse 'because'
/ə/	ë	/ˈəndər/ ëndërr 'dream'	/ʃtəˈpi/ shtëpi 'house'	/ˈəʃtə/ është 'is'
/f/	f	/ˈfuʃə/ fushë 'field'	/diˈsfa.tə/ disfatë 'defeat'	/ˌɟerˈɟef/ gjergjef 'embroidery frame'
/g/	g	/gəˈzim/ gëzim 'joy'	/aˈgim/ agim 'dawn'	/ˈzog/ zog 'bird'
/ɟ/	gj	/ˈɟak/ gjak 'bbod'	/ˌdiriˈɟent/ dirigjent 'conductor'	/ˈliɟ/ ligj 'law'
/h/	h	/ˈhənə/ hënë 'moon'	/ˈftohtə/ ftohtë 'cold'	/ˈmpreh/ mpreh 'to sharpen'
/i/	i	/in.stiˈtut/ institut 'institute'	/iˈric/ iriq 'hedgehog'	/kaˈʟi/ kalli 'spike'
/j/	j	/ˈjetə/ jetë 'life'	/ˈɲəjtə/ njëjtë 'identical'	/ˈmbaj/ mbaj 'to hold'
/k/	k	/ˈkohə/ kohë 'time'	/ˈt͡sikəl/ cikël 'cycle'	/ˈʃok/ shok 'friend'
/l/	l	/ˈlumə/ lumë 'river'	/ˈlulə/ lule 'flower'	/mal/ mal 'mountain'
/ʟ/	ll	/ˈʟat͡ʃ/ llaç 'mortar'	/pəˈʟumb/ pëllumb 'dove'	/ˈpyʟ/ pyll 'forest'
/m/	m	/ˈmirə/ mirë 'good'	/ˈfamə/ famë 'fame'	/ˈkθim/ kthim 'return'
/n/	n	/ˈnatə/ natë 'night'	/kaˈnal/ kanal 'canal'	/liˈmon/ limon 'lemon'
/ɲ/	nj	/ɲəˈri/ njeri 'man'	/asˈɲə/ asnjë 'none'	/ˈθoɲ/ thonj 'finger-nails'
/o/	o	/oˈriz/ oriz 'rice'	/ˈʃkoʟə/ shkollë 'school'	/kərˈko/ kërko 'seek'
/p/	p	/ˈpemə/ pemë 'tree'	/ˈsipər/ sipër 'above'	/ˈplep/ plep 'poplar'
/c/	q	/ˈcen/ qen 'dog'	/buˈce.tə/ buqetë 'bunch'	/iˈric/ iriq 'hedgehog'
/r/	r	/riˈni/ rini 'youth'	/baˈri/ bari 'shepherd'	/ˈmur/ mur 'wall'
/r:/	rr	/r:eˈzik/ rrezik 'danger'	/ˈbur:ə/ burrë 'man'	/ˈzjar:/ zjarr 'fire'
/s/	s	/ˈski/ ski 'ski'	/diˈsfa.tə/ disfatë 'defeat'	/siˈpas/ sipas 'according to'
/ʃ/	sh	/ʃtəˈpi/ shtëpi 'house'	/ˈbaʃkə/ bashkë 'together'	/ˈɟyʃ/ gjysh 'grandfather'
/t/	t	/ˈtop/ top 'ball'	/ˈditə/ ditë 'day'	/ˈreʃt/ resht 'line'
/θ/	th	/ˈθem/ them 'to say'	/ʃpərˈθim/ shpërthim 'breaking'	/ˈmakθ/ makth 'nightmare'
/u/	u	/ˈujə/ ujë 'water'	/ˈbukur/ bukur 'beautiful'	/ˈulu/ ulu 'seat down'
/v/	v	/ˈvezə/ vezë 'egg'	/t͡siˈvil/ civil 'civil'	/efeˈktiv/ efectiv 'effective'
/d͡z/	x	/ˈd͡zid͡zə/ xixë 'spark'	/ˈnd͡zeh/ nxeh 'to heat'	/ˈd͡zind͡z/ xinx 'male firefly'
/d͡ʒ/	xh	/ˈd͡ʒep/ xhep 'pocket'	/oˈd͡ʒak/ oxhak 'chimney'	/ˈd͡ʒud͡ʒ/ xhuxh 'dwarf'
/y/	y	/ylˈber/ ylber 'rainbow'	/ˈgrykə/ grykë 'throat'	/ˈsy/ sy 'eye'
/z/	z	/ze.mər/ zemër 'heart'	/gəˈzim/ gëzim 'joy'	/fiˈliz/ filiz 'tender shoot'
/ʒ/	zh	/ʒviˈʟim/ zhvillim 'development'	/vaʒˈdoj/ vazhdoj 'to continue'	/peiˈzaʒ/ peizazh 'landscape'

Please note that (ˈ) is used to indicate stressed syllables, and (ˌ) is used to indicate semi-stressed syllables.

Grapheme x /d͡z/ does not occur in final position (the example given here is a colloquial word, which does not appear in any of the Albanian dictionaries).

Table 1.6. Albanian alphabet and word examples.

1.3.5 Vocabulary

Albanian has many loan words, relatively few short words and many compound words. It is assumed that the majority of the words (Bloomfield, 1933) used today are borrowed from Latin, ancient and modern Greek, Slavic languages, and Turkish. More recently Italian, French, and English loan words have been included in the written language in order to satisfy the needs of modern technology, science, politics, media, culture and art. The number of modern international loan words in Albanian is of similar quantity to that of other European languages (Lleshi, 1999). Despite the numerous borrowings, the language has retained its originality as a separate Indo-European language.

1.3.6 Primary education system in Albania

About one quarter of the Albanian population are either teachers or students (ACER, 2002). The overall ratio of students to teachers in Albania is normal but the number of teachers is relatively high in rural areas and low in urban areas. In order to cope with limited teaching and classroom capacity, many schools, especially in urban areas, have two or three shifts of students in a day with short class periods.

The literacy rate in Albania is similar to the Southeast European average rate. Literacy is lower for those living in the North, and those living in rural areas, and those over the age of 50 (ACER, 2002). Differences between men and women are not substantial except among those over 50 years old. Overall, eight percent of males and 22% of females over the age of 15 are illiterate.

Normally, Albanian children begin their primary education at the age of six (see Table 1.7). Few of these children experience pre-school education. In recent years the number of pre-schoolers attending kindergartens has decreased. Many, though not all, of these Albanian kindergartens are similar in ethos to the Austrian ones described by Wimmer and Hummer (1990), where activities such as word exposure and letter recognition are explicitly discouraged. The consequence is that most first graders in Albania enter school without letter or written word awareness (Hoxhallari, 2000).

Age group	Years	Level
Up to 6		Kindergarten
6-14	1-8	Primary
14-18	9-12	High School
14-18	9-12 (or 13)	Technical/Vocational
18-23	1-4 (or 5)	University

Table 1.7. The educational system in Albania.

1.3.7 Teaching methods in Albanian primary schools

When considering the nature of the orthography—Grapheme to Phoneme (GP) and Phoneme to Grapheme (PG) correspondences are regular—it would be reasonable to assume that the primary education for literacy should be based on a phonics approach. However, during the last decade's educational reform, the Albanian government has recently proscribed a whole word-method, known as the Global Method for all state schools in the country. The most likely reason for this change is to copy the methods that are 'fashionable' in more advanced western countries (e.g., Great Britain, USA, France). However, due to a lack of relevant research concerning the literacy acquisition in Albanian the official proscribing such a teaching method are not aware that the orthography of these western countries is rather different to that of Albanian; hence, unaware that a teaching method used in country may not be suitable for another. Many of the newly trained Albanian teachers use the new method, whereas most of the experienced teachers who used to teach a phonics method (including the teachers who taught the children who participated in the present research), use a mix of the whole-word and phonics methods.

1.4 The English language and orthography

English is an Indo-European language. It is known as the international language of business, technology and politics: it is spoken by millions worldwide. There are many varieties of English (e.g. British English, American English, Australian English, New Zealand English, South-African English, etc.), which differ in word pronunciation, word stress, and vocabulary. The origins of the language trace back to the Anglo-Saxons, Germanic people who settled in Britain 15 centuries ago. The Germanic Anglo-Saxons used a runic script (Daniels and Bright, 1996). The first written English dates back to the 7th century in Latin Church documents. At the time the language was spelled the way it was pronounced; thus it was highly transparent

The Anglo-Saxon's original language is not the only influence of the modern spoken and written English language (Crystal, 1987). The most influential events that shaped the English language were the invasions from Danish and other Scandinavian tribes during the 9th and 10th century, and the arrival of the French-speaking Normans in early 11th century. The influence of Roman languages had a significant impact in the vocabulary of the language. These events also affected the written language. Many foreign words adopted in English maintained the original spelling thus reducing the transparency of the language. A large number of loan words were introduced during the Renaissance period from Latin and Greek—this was done in order to satisfy the needs of education, art, science, industry and technology development. Another reason that accounts for the lack of transparency relates to the introduction of printing. Different printers, who usually were foreigners (Dutch), began to add letters to English words which reflected similarities of their own languages (e.g., 'yacht' replaced the native spelling 'yott'). In addition efforts made by different people who tried to reform the English spelling, and, the 'great vowel shift' of Middle English also 'disturbed' the clear waters of the written language.

The first dictionaries appeared in the 15^{th} century, subsequently establishing the way the English words were spelled. One of the most influential of these dictionaries was the one compiled by Samuel Johnson—this was published in 1755.

1.4.1 GP and PG correspondences in English

The English alphabet has 26 letters[1], of which 20 represent the consonants and six the vowels of the language (*a, e, i, o, u, y*). The consonants can be voiced or unvoiced and the vowels can be long (e.g., b*ea*t) and short (e.g., b*i*t).

The English orthography is notorious for its lack of transparency. There are 52 major spellings: 32 for consonants and 20 for vowels, representing over forty phonemes (Venezky, 1976). The simple GP correspondences may use all 26 letters, thus overlapping in spelling and reading pattern occur. There are multi-letter graphemic units for both consonants and vowels, for example digraphs (e.g., *'ch', 'sh', 'oo', 'au'*), and trigraphs (e.g., *'sch'*, and *'tch'*). These graphemes are regarded as digraphs or trigraphs as correspondences cannot be predicted from their separate letters (Venezky, 1995). Consonant clusters such as *'br'* are not regarded as digraphs because the same rules that predict the phonemes these letters correspond to on their own, also apply to the combination of these letters.

[1] The 26 letters of the English alphabet are used to create graphemes, which in turn are used to represent the phonemes of the language. For example, the two letters *s* and *h* are combined into a digraph *sh* to represent a single phoneme /ʃ/. Graphemes can consist of single letter, double letters (e.g., *ee*), or letter combinations (e.g., *ck, th, sh* etc.).

In addition, there are single letters or digraphs which have multiple pronunciations (e.g., *'c', 'h', 'gh', 'e'*, can be read in different ways). The orthography also has phonemes which can be represented by more than one graphemic unit (e.g /f/ => *'f', 'ff'* and *'ph'*)(Adams, 1990). Thus, the bi-directional GP and PG mappings can be inconsistent for both consonants, and vowels. In addition to this, there are many exception words such as *yacht*, and *pint*, and there are words which have silent letters (e.g. comb, sing, etc).

Even though the English orthography can be irregular at the GP or PG level, it can be highly regular and predictable for larger spelling units such as at the morphemic level (Chomsky & Halle, 1968; Venezky, 1970). For example, the *–ing* word ending is always read the same way.

In some cases, the lack of one-to-one correspondences may be justified and even seen as advantageous. Firstly, when considering silent letters, if these are to be dropped completely, as *'g'* in *sign* but not in *signature*, the relationship between these two words which belong to the same family may be obscured. Thus, for the sake of the semantic relations, phonological regularity is sacrificed. Secondly, different spelling can help identify between homophones. And finally, the graphic form of certain morphemes can help the reader identify the relevant syntactic class. For instance, words that end with the morpheme *–ed*, indicate the past tense, even though the *–ed* ending may differ phonemically (talked /to:k<u>t</u>/ and moved /mu:v<u>d</u>/). The same applies to the morpheme *–s* at the end of words: whether it sound like /s/ or /z/ it usually indicates the plural syntactic feature of the word (e.g. houses /hauzi<u>z</u>/ and doors /do:<u>s</u>/).

Stress placement in English is highly complex. Stress depends on the morphological structure (whether there are affixes or not), word category (nouns, verbs, or adjectives), number of syllables in a word, and the phonological structure of the syllable (Roach, 1983).

1.4.2 Primary education system in England

English children start their primary education at the age of four or five years old. Before they enter primary education they have the opportunity to attend nursery school; this is not compulsory.

The primary education system is divided into two parts, infants (Key Stage 1) and juniors (Key Stage 2) (DfES, 2003). During the first year of primary (infant) school the main focus is placed upon phonic awareness, where children become familiar with the letters of the alphabet and their individual sounds. In later years, as they progress through Key Stage 1 and 2, their literacy skills develop further. Most schools use a mixed method approach, where both phonics and whole word methods are consistently employed in teaching literacy.

1.5 The Welsh language and orthography

The modern Welsh language is of Celtic origin; it is identified as a member of the Brythonic division, part of the Indo-European languages (Ball, 1988). The Welsh language has seen major changes over five distinct periods in the last 12 centuries (Evans & Tomas, 1953). 'Early Welsh' dates back to late 8th century (the language developed from Brythonic). From the beginning of 9th century until the end of 11th century the 'Early Welsh' developed into 'Old Welsh', which was followed by 'Medieval Welsh' (between 12th and end of 14th century). 'Early Modern Welsh' developed from the 14th to the 16th century. This led to the 'Late Modern Welsh', which is the language spoken at present in Wales.

The modern Welsh orthography is transparent. Between 6^{th} and 16^{th} century the standard literary orthography was maintained. However, in the 14^{th} century the standard orthography began to deviate. In 1567, William Salisbury in his translation of the New Testament in Welsh began to use spelling that resembled Latin words (Jones, 1988b). This translation was not widely used, but it served as the basis for the new translation made by Bishop William Morgan in 1588, who instead of Salisbury's Latin spellings, used the formal literary Welsh. This proved to be crucial for the future of the Welsh language (Nash, 1991). A later adaptation of this translation in 1620, replaced some of the dialectical words but the spelling of Bishop Morgan was maintained. The Bible was recognized as the standard orthography until William Owen Pugh changed the spelling of hundreds of words in his dictionary in 1803.

From this point forward the Welsh orthography began to lose its transparency. It was the *Dafydd ap Gwilym Society* which throughout the 19^{th} century made many attempts to establish a standard Welsh orthography. The Celtic Information Board of the University of Wales, continued this work and in 1977, the Information Board reformed some of the irregular spellings which were still in use. In 1983, the *Orgaff yr Iaith Gymraeg* 'The Welsh Orthography' was published; this was based on phonetic principles, that conformed more to the archaic pronunciation rather than to the various vowel pronunciations of contemporary Welsh (the contemporary Welsh varied considerably from north to south (Spencer, 2000)).

1.5.1 Vocabulary

The Welsh language has inherited many of the old Brythonic words (Lewis, 1943). Old Welsh borrowed many Latin words, especially religious words. For example the Welsh word *ysbryd* 'spirit', comes from the Latin word *spiritus* (Lewis, 1943). Also it borrowed many English words, words from Old Norse, and a few French words, which entered the language due to the English influence.

1.5.2 Dialects of Welsh

Four main dialects were identified by Evans and Thomas (1953); these are spoken in North Wales, North-East and Mid-Wales, South-West Wales and South-East Wales. The most major differences lay between the North and South dialects. For example, in North Walian the word 'out' is *allan*, whereas in South Walian 'out' is *mas* (Spencer, 2000).

The Welsh Academy is the main organization which promotes and assists to maintain the standards of the literature in Wales (The Welsh Academy, 1999). The standardization of the literary Welsh (Jones, 1988b) is influenced by the fact that it is recognized as the official and business language; it is used as the medium of teaching in the Welsh education system; it is used by media broadcasting organizations, such as the BBC Wales and S4C; and it is used to publish a variety of books in Wales.

1.5.3 GP and PG correspondences in Welsh

The Welsh alphabet has 29 graphemes (28 if the 'j', which comes from borrowed English words, is not included), of which seven are vowels (a, e, i, o, u, w, y). Vowels' pronunciation—depending on the position—may be short, medium, or long. The alphabet, like the Albanian alphabet, includes several digraphs (dd, ff, ng, ll, ph, rh, th). These digraphs are explicitly taught to children as single units. There are very few exception words where these digraphs are read as two separate letters; for example in *Bangor* the 'ng' is not pronounced as the usual /ŋ/ but as two separate sounds /n/ and /g/.

The Welsh orthography, unlike English, is highly transparent, enough at least that Welsh dictionaries do not need to illustrate the pronunciation of words using a phonetic notation (Ellis & Hooper, 2001). Nevertheless, certain features of the orthography obscure its transparency. For example, some written vowels in Welsh map to more than one sound the language. Orthographic "y", may be realised as a schwa in non-final syllables of polysyllables; it may also represent the first non-vocalic part of a diphthong ("yw", /iu/), or the second consonantal part of the diphthong ("wy", /ui/). Welsh also permits epenthetic vowels, these being vowels which are pronounced but which are not shown in the orthography. The graphemes "i" and "w" are also variable - "i" can be either a long or short vowel (/ii/, /i/), or the palatal glide /j/. The grapheme "w" is the hardest to realise with four or five possible interpretations. Hence, the Welsh writing system is not as transparent as the Albanian writing system, where each grapheme corresponds only to one sound.

Another interesting feature of the Welsh languages is the mutation system. There are three kinds of mutations: soft, nasal and aspirate. The consonants 'p' /p/, 't' /t/, and 'c' /k/, undergo all three changes; 'b' /b/, 'd' /d/, and 'g' /g/ undergo two changes (soft and nasal); and 'll' /ɬ/, 'm' /m/, and 'rh' /rh/ can have only aspirated changes. In words of more than one syllable, stress will usually fall on the penultimate syllable. Evans & Thomas (1953) identified many words—especially verb nouns and emphatic personal pronouns—that are stressed on the last syllable, whereas words borrowed from English are stressed as they are in English.

1.5.4 Primary education system in Wales

In terms of starting age and teaching methods, primary education in Wales is similar to the English primary education. However, Wales is a bilingual country, where both Welsh and English are spoken in many areas. Welsh is a compulsory subject for all pupils in Wales. This means that all pupils in Wales study Welsh (either as a first or a second language) for 11 years, from the ages of 5 to 16.

The 1988 Education Reform Act included Welsh in the National Curriculum. In Welsh-speaking schools, Welsh is a core subject; in other schools it is taught as a foundation subject (Baker, 1993). The language policy adapted from LEAs can vary depending on whether Welsh is the mother tongue or not. In 1929, the Board of Education suggested that the language spoken at home should be the medium of instruction in primary schools; thus, in areas where Welsh is predominant, the medium of instruction should be in Welsh—English should be taught as a secondary language. The opposite applied for areas where English is predominant. The Education Act of 1944 allowed LEAs to consider opening Welsh-medium schools. The first Welsh-medium state primary school was established in Llanelli in 1947. Initially, these schools catered for children whose Welsh was their first language but by the 1960s increasing numbers of pupils in Welsh-medium education came from non-Welsh speaking homes (Baker, 1993)..

In 2000/2001, over 25% of children in Wales were attending Welsh-medium schools. The majority of these pupils came from non-Welsh-speaking homes. There were 440 Welsh-medium or bilingual primary schools, and 51,087 primary pupils were mainly taught through the medium of Welsh. A further 6,860 pupils were taught a percentage of their curriculum through the medium of Welsh and 223,328 pupils were taught Welsh as a second language. Of the 229 secondary schools maintained by LEAs in Wales, 72 taught Welsh as a first and second language and the remaining 157 schools taught Welsh as a second language only. According to the Welsh Language Board (2003), a total of 52 secondary schools were defined as Welsh-speaking schools. Finally, with regard to the instructional approach, most schools use a mixed method approach, where both phonics and whole word methods are consistently employed in teaching literacy.

1.6 Differences and similarities between Albanian, English and Welsh

Table 1.8 shows the differences and similarities between the three languages described above. All three scripts are alphabetic: the base of each alphabet is the Latin alphabet (but the Albanian alphabet has a higher number of graphemes, 36). The instruction in primary education in all three countries is mixed; phonics and whole word approaches are used. However, Albanian children do not start school until they are six years old whereas the English and Welsh children start at around five. Similarly, Wimmer and Hummer (1994), who examined the nonword reading of English speaking and German speaking children, pointed out the same problem with the children's ages. The English children were approximately 10 months younger than their Austrian counterparts.

	Albanian	**Welsh**	**English**
Script	Alphabetic		
G-P mapping	Consistent	Consistent	Inconsistent
P-G mappings	Consistent	Few inconsistencies	Inconsistent
Irregular words	A few foreign words	A few	Many
Instruction	Mixed		
School entry	Not before 6 y.o.	Around 5 y.o.	

Table 1.8. Differences and similarities between Albanian, English and Welsh.

Finally, the Albanian orthography seems to be the most consistent where a one-to-one mapping exists for both GP and PG correspondences; Welsh is highly phonetic, especially for the GP correspondences, whereas the English orthography is extremely irregular.

Rules of graphemic parsing are easier in Albanian and Welsh where most digraphs are part of the alphabet.

1.7 Final summary

In this chapter a description of the historical development of written language has been presented. The current thesis aimed at examining the literacy development of Albanian, English and Welsh children. These languages differ in the degree to which sounds of the language are presented in written symbols. Welsh and especially Albanian orthographies are highly transparent, whereas the English orthography is highly inconsistent and has many irregular words.

Research has shown that orthographic depth affects the literacy development across languages. The next chapter reviews various theoretical models of reading and spelling development and cross-linguistic research in literacy development.

Chapter 2 : Reading and spelling development

2.1 Introduction

Reading and writing, unlike spoken language, are formally taught at a young age. No one would be able to independently decipher a script. The reading process allows the reader to visually identify, comprehend, and convert written symbols to sound. The visual recognition deals with constraints such as shape of individual letters and spatial variability. Based on the visual characteristics the reader can gain access to stored information about the pronunciation and meaning of individual words. These processes lead to comprehension or understanding the message in its relevant context (Ellis, 1993).

In spelling, words, and smaller language units (e.g., syllables and single sounds, see Figure 2.1), are converted into print based on the phonological and orthographic representations stored in the mental lexicon (Ellis, 1993). Words can be divided into smaller sound segments. The first level is the *syllable*. This divides into *onset* and *rime*: onset is the initial consonant (or consonant cluster); the rime includes the vowel and the remaining consonants. The rime is further subdivided into the peak (the vowel) and coda (the end consonants). The division of the initial and final consonants into single phoneme is the final level.

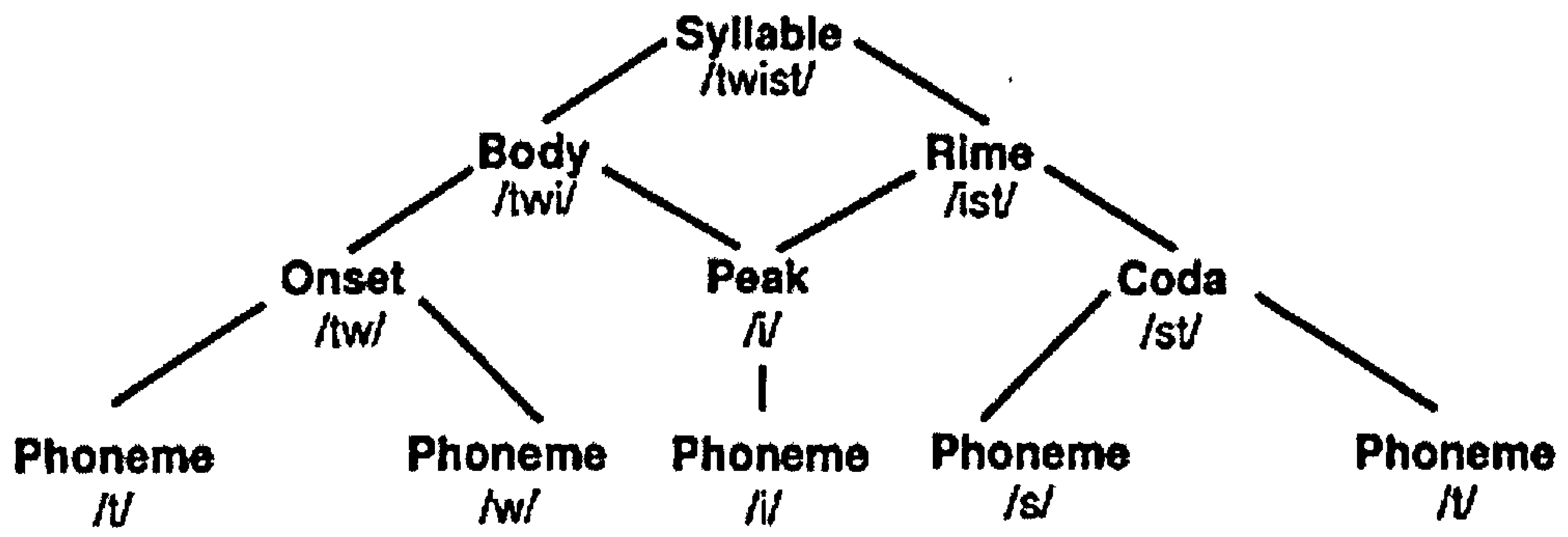

Figure 2. 1. Syllable structure (Source: Seymour, Duncan & Bolik, 1997).

Many researchers have tried to provide literacy development models. These have proved difficult to apply universally because literacy development depends upon:

(1) the type of script—logographic versus alphabetic (Wang & Geva, 2003);

(2) transparency of the orthography (Wimmer & Goswami, 1994; Öney & Durgunoglu, 1997; Ellis & Hooper, 2001; Spencer & Hanley, 2003);

(3) syllable structure of the spoken language (Seymour, Aro and Erskine (2003);

(4) teaching methods—phonics versus whole word approaches (Lundberg, Frost & Petersen, 1988);

(5) children's starting age of formal education: there are differences between countries (Seymour et al., 2003);

(6) individual differences in general ability and strategy employed—visual versus phonological (Goswami & Bryant, 1990; Ellis & Hooper, 2001; Spencer & Hanley, 2003);

(7) socio-economic background (SES) (Duncan and Seymour, 2000; Lundberg, 2002); and

(8) learning disabilities (e.g dyslexia and dysgraphia).

Nevertheless, many of the traditional stage models of reading and spelling development outline various distinct stages, through which children progress. These models have been mainly based on the error types that children make and strategies they use as their literacy skills develop. Models of reading and spelling have been developed in a parallel fashion and include similar characteristics: they emphasise the crucial role that phonological skills play in the initial stages of literacy acquisition and the development and reliance upon orthographic knowledge in the final stages.

Next, the dual-route model of word recognition and developmental models of reading acquisition are presented. These are followed by a review on spelling development.

2.2 The dual-route model of reading

The dual-route model (Coltheart, 1978, 1982; Coltheart, Curtis, Atkins, & Haller, 1993) proposes two separate ways of processing orthographic (written) and phonological (spoken) information. A simple version of this model is presented in Figure 2.2. The lexical route is a direct route where high frequency, familiar words are recognised from LTM. The alternative sub-lexical route employs GP conversions to recognise new words, where individual sounds are assembled into phonologically plausible pronunciations.

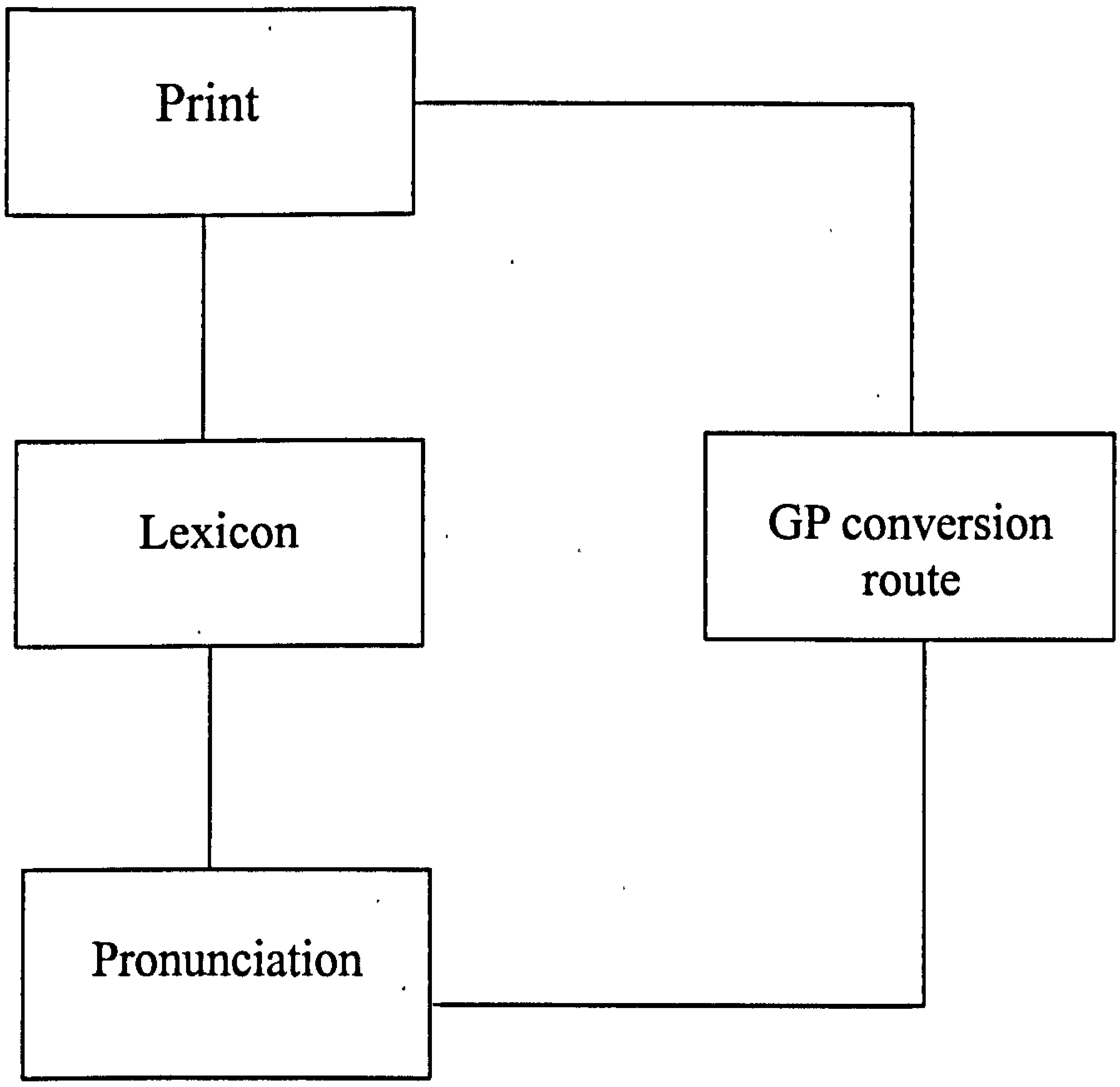

Figure 2. 2. A simple version of the dual-route model of reading.

Paap and Noel (1991) have suggested that a competition exits between routes. Words are processed by both routes but the lexical route is much faster in recognition familiar words, therefore, usually wining the competition. The sub-lexical route is slower but GP conversions are important for learning new words.

Supporting evidence for the existence of these two distinct routes comes from studies with from normal and disabled readers. Paap and Noel (1991) assuming that the sub-lexical route is more demanding on memory than the direct lexical route, predicted that if the sub-lexical route is disrupted by high memory load, then the lexical route should continue to operate in isolation. In order to test this prediction they asked the subjects to retain either five digits or one digit while performing a reading task. They found that naming latencies for low-frequency orthographically irregular words were faster when holding five single-digit numerals in STM than when holding only one. Given that low-frequency (LF) words take longer to name, even if retrieved from the mental lexicon, the phonological route becomes more competitive for retrieving these words. In this case the output from both routes can be the same. However, orthographically irregular words can result in false output by the phonological route. Thus low-frequency orthographically irregular words cause a conflict between the incorrect output of the phonological route and the correct output of the lexical route. In order to solve this conflict additional time is required, leading to very long latencies for words of the low-frequency orthographically irregular words. This lead Paap and Noel to suggest that when STM is occupied, the indirect phonological route will slow down even further, thus allowing the lexical route with the correct output to win the race.

Contrasting cases of phonological dyslexia and surface dyslexia have been reported by several researchers. Patient WB (Funnell, 1983) could read regular and irregular words (with accuracy 90% and 80% respectively) but reading of non-words was severely impaired (0% correct). The case of WB reflects phonological dyslexia. Contrary to this, McCarthy and Warrington (1986) reported the case of KT whose real word reading and nonword reading was intact (96% and 100% correct respectively) but very poor at reading of low-frequency irregular words (26% correct). The case of KT reflects surface dyslexia. This double dissociation in reading ability seems to confirm the existence of the two distinct routes in word recognition

However, the dual route model has received criticism. Glushko (1979) found that reading time for non-words is affected by the pronunciation of similar real word. For example, 'zaid' which has two body neighbours that differ in pronunciation ('raid' and 'said) is read more slowly than 'prink' which shares a body with consistent pronunciation ('pink' and 'clink'). The same effect was found for real words; words which share a 'consistent' body pronunciation are read faster than regular words whose body pronunciation varies. These findings led Glushko (1979) to suggest the concept of 'reading by analogy' and that grapheme to phoneme conversions may not be as simple as suggested by the simple dual-route model of reading.

To summarise, evidence form normal reader studies and neuropsycological research suggests a modular system of reading with separate orthographic and phonological lexicons, which are bi-directionally connected to each-other. These lexicons are both connected to the semantic lexicon, and that a separate non-lexical route is responsible for the application of rules used in converting graphemes to phonemes.

2.3 Developmental models of learning to read

Over the years, knowledge on the acquisition of reading in English has accumulated. First, children learn to associate a printed word with its sound. Then they are taught the correspondences between letters and sounds. Words are then read by blending letters and sounds and recognising a word sound. With much practice, children learn to recognise words quickly. Various stage models have been developed to explain developmental processes in young readers (Ellis, 1993).

The developmental reading model first proposed by Marsh, Friedman, Welch, and Desberg (1981), identifies four developmental stages. In the first stage, *linguistic substitution*, children begin reading by learning rote association between unsynthesised visual stimuli and unanalyzed oral responses. Thus, words are read as logographs. In the second stage, *discrimination net substitutions*, children begin to use context in combination with linguistic cues and rudimentary analogies are made in order to spot similarities between new words and familiar ones. In the third stage, *sequential decoding*, in order to analyse words into phonemes and employ grapheme-phoneme correspondences to decode new words they use combinatorial rules. In the forth and final stage, *hierarchical decoding*, children are able to use higher order conditional rules. For example, the pronunciation of 'c' is conditional upon the following grapheme.

Marsh's theory has its limitations: children's early phonological skills such as rhyme awareness and associations of larger speech units such as rimes with letter sequences are ignored. Frith (1985) modified Marsh's developmental model by devising a three-stage theory of reading development: (i) *logographic*, (2) *alphabetic* and (iii) *orthographic*. Each stage is a stepping-stone which is needed before the next stage can be achieved. In the first stage children read words as logographs (*logographic stage*). For example, the *Coca-Cola* trademark can be easily recognised by young children; however, if they are presented with the words Coca-Cola in a different format they fail to recognise these words.

In the second stage, *alphabetic stage*, the reader uses a sequential decoding system, thus applying grapheme-phoneme conversion rules to read new words. While in this stage the child is likely to make nonword errors, the readers begin to understand the basic grapheme-phoneme relationship. For example, if the letter 'a' is given to a child and they were asked what the letter was, the child would be able to give the phonetic sound for /a/.

The alphabetic stage gives way to the *orthographic stage*, the final stage of the model. In the orthographic stage the reader is able to recognise the words through direct access of the orthographic word recognition and include the use of morphological spelling patterns. The process of word identification differs from the logographic stage because words are analysed in terms of orthographic properties and not visual properties. This stage also differs from the alphabetic stage in the sense that word recognition can follow directly from orthographic analysis not requiring phonological mediation.

There are several issues that limit the strengths of such stage models. For example: the mechanisms responsible for the transitions between the stages are not described (Snowling & Hulme, 1999); reading strategies children adopt depend upon the language the children learn (Wimmer & Hummer, 1990) and different teaching methods (Johnson & Thompson, 1989); and children with developmental dyslexia could skip the alphabetic stage and reach later stages of the reading development (Snowling, Hulme & Goulandris, 1994). Furthermore, Seymour (1990, 1993, 1997) proposed a 'dual foundation' model of learning to read. In his model, the logographic lexicon and the alphabetic system merge into one orthographic system and the reading difficulties can be regarded as difficulties within the first or the second sub-system.

In a more recent reconsideration of Frith's model, Ehri (1999) argues that the term logographic is misleading because true logographic readers (e.g. of Chinese) remember all of the visual forms of the sight words as unified wholes, whereas English children remember only selected visual cues of the written word. Therefore, each logograph is represented by one symbol. Further, she suggests that the term orthographic is inadequate and ambiguous and that the use of this term for the final stage greatly underplays the role of phonology in skilled reading. Such considerations motivate her model of the developments of sight word reading which describes the processes by which words are read by accessing them from memory (Ehri, 1992,1999).

Ehri (1999) developmental model comprises four phases characterized by the degree of involvement of the alphabetic system: (i) *pre-alphabetic*, where one or more visual cues of the word are remembered; (ii) *partial alphabetic*, where one or few letters, which correspond to the appropriate sounds detected in pronunciations, are used to recognize a written word; (iii) *full alphabetic*, where connections are created between graphemes in spelling and phonemes in pronunciation of the words; and (iv) *consolidated alphabetic*, where written words become sight words, which means that letter patterns recurring in different words become consolidated into larger pronunciation units (e.g., syllabic and sub-syllabic units).

All the developmental models of reading described above share common features. For example, they regard reading development as a series of discrete steps; they propose that initially children read and spell in a logographic manner; and that after adopting an alphabetic decoding strategy, children master complex, phonological and orthographic rules that allow them to read and spell by using direct lexical access.

2.4 Dual-route model of spelling

In comparison to reading there has been less research in spelling processes and spelling development. Spelling involves producing the correct order of graphemes in a word. Individual words and smaller language units (e.g., syllables and single sounds) are converted into print based on the phonological and orthographic representations stored in the mental lexicon (Ellis, 1993).

Similarly to reading, a dual-route model of spelling has been suggested (Barry, 1994). The first route, also known as the lexical route, uses direct processes for spelling letter sequences of already memorised words in the orthographic lexicon. During spelling, a spoken word would activate its representation in the orthographic lexicon via the word's meaning or via its phonology (Barry, 1994). The lexical route is used for irregular words as well as for familiar regular words already stored in the lexicon. Theoretically, this route cannot be used to spell non-words because they have never been encountered previously: word-specific knowledge is built up over exposures to print. The second route, also known as the phonological route, is used to produce the spelling of words by breaking up the word's individual phonemes and then using the knowledge of sound to spelling correspondences to assemble the correct spelling (e.g. /d/ 'd', /o/ 'o', /g/ 'g' is assembled into the correct spelling for 'dog). During spelling, the phonological form of a spoken word is held in the phonological temporary buffer in short term memory whilst the PG conversion rules are applied (Barry, 1994). The phonological route would always produce the correct spelling of regular words. The use of this route may result in plausible spellings of unfamiliar words and nonwords.

Supporting evidence for the dual processing model of spelling comes from cognitive neuropsychological research. Beauvois and Dérouesne (1981) presented the selective impairment case of RG who had no difficulty in producing plausible nonword spellings, whereas the spelling of real words was severely impaired, especially for ambiguous, low-frequency words. After taking into account that RG's spoken and written comprehension were normal and the similar pattern of performance in all spelling tasks regardless of the input modality, it has been argued that damage to the orthographic lexicon is responsible for this kind of errors. This case is referred to as surface dysgraphia.

In contrast to the case described above, following brain damage, patient PR (Shallice, 1981) could correctly spell 94% of the real words (regular and irregular), and only 18% of the non-words. More interestingly, PR was also poor at spelling single phonemes (56% correct), suggesting that knowledge of PG mappings was damaged. This patient is referred to as suffering from phonological dysgraphia.

However, similar to the dual-route model of reading, evidence from spelling by analogy remains a problem (Campbell, 1983, 1985). Campbell (1983) presented participants with lists of spoken words, and asked them to spell the nonwords only. She found that nonword spelling of children and adults was influenced by prior knowledge of real words.

2.5 Developmental models of spelling

For a long period of time, it was thought that children learn to spell by using serial learning of letter strings and rote memorisation of whole words. However, Read (1971, 1975, 1986) after careful examination of children's invented spelling in naturalistic settings and spelling errors from experimental research, viewed spelling as a linguistic process in which sounds are grouped together in print according to shared phonetic cues. Following this theoretical framework, and further research by Henderson and Beers (1980) and Bissex (1980), Gentry (1982) suggested a five stage model of spelling development. In the first stage, the *precommunicative stage*, children write strings of letters in a random fashion. For example, the word 'monster' may be spelled as 'btrss', which reflects a complete lack of letter-sound or letter-name knowledge (Ellis, 1993). Next, in the *semiphonetic stage* children begin to understand that individual letters correspond to individual sounds (which make up each word). The letters used in spelling reflect partial mapping of the phonetic representation of spelled words and letter names are used to represent whole words or syllables (e.g 'u' for 'you). When reaching the third state, the *phonetic stage*, children's phonological segmentation becomes evident, therefore, the spelling of words has the complete sequence of sounds in pronunciations. All surface features of words are represented in spelling and certain details of phonetic forms (e.g. *–ed* endings, preconsonantal nasal, tenseness of vowels, etc.) are systematically represented with particular spellings. Children assign letters on the basis of sound regardless of spelling conventions of the English orthography and acceptable letter sequences. In the *transitional stage*, children adhere to the more basic conventions of the English orthography (e.g., vowels appear in every syllable; specific letter sequences, etc.). Children move away from the letter-name strategy, and begin to use the relations of word meanings to help them with their spelling. The final stage of Gentry's model is called *the correct stage.* In this stage the knowledge acquired above in combination with knowledge of the structure of English words writing system allows children to spell multi-syllable words.

Gentry's (1982) model suggests that spelling development is essentially separate from reading development. Research (Ehri, 1979, 1984; Ellis & Cataldo, 1990) has shown that improvements in phonological awareness on which reading development depends are themselves a consequence of how single sound segments of words are spelled conventionally (Ellis, 1994). Therefore, Ehri (1986, 1997) and Frith (1985) have suggested models where reading and spelling are integrated. Ehri's model or reading and spelling development suggests that children's spelling progresses through four stages. The first three stages, *semiphonetic, phonetic, morphemic* are similar to Gentry's semiphonetic, phonetic and transitional stages. In the fourth stage Ehri (1997) combines all advanced levels in one stage. She describes three processes by which words may be spelled. Firstly, spelling by analogy requires the speller to recognise the phonological similarity between the target word and other known words. During spelling by analogy parts of the known spellings that represent the similarity between the words are transferred to the new spelling. Secondly, spelling a word by memory requires that the speller already knows the correct spelling of a target word. Finally, spelling by invention requires that spellers analyse words into single phonemes and use alphabetic knowledge of phoneme-grapheme correspondences to create spellings. Children who are just beginning to read and write have little knowledge of words' spellings. They cannot spell many words using memory or analogy and must often rely on invention.

Frith's model (1985) consists of three stages. In the *logographic stage* children's spelling is based on visual copying of symbols, or on very basic spellings which may include only an initial sound of a word. In the second stage, *alphabetic stage*, children begin to master the alphabetic principle and in the *orthographic stage* children make use of orthographic patterns for spelling words. Similarly to Ehri's model (1997) Frith's model does not view reading and spelling as separate developmental processes. Her integrative model of reading and spelling has been highly influential in the recent literacy research: it assumes that reading and spelling development are closely related and that this relationship changes over time (see Table 2.1).

Step	Reading	Spelling
1a	Logographic 1	(Symbolic)
1b	Logographic 2	Logographic 2
2a	Logographic 2	Alphabetic 1
2b	Alphabetic 2	Alphabetic 2
3a	Orthographic 1	Alphabetic 3
3b	Orthographic 2	Orthographic 2

Table 2. 1. Frith (1985) literacy development theory

According to this model, logographic representations for spelling become available only after they have become available for reading. In the alphabetic stage the relationship between phonemes and graphemes is required first for spelling.

Desire to write and the knowledge that writing represents sounds of the language encourages children to spell. Once the alphabetic principle is achieved for spelling, it serves as the pacemaker of alphabetic reading.

During the orthographic stage, increasing experience with the orthography gives the child the opportunity to understand the regularities and spelling patterns of the language. The reading process becomes non-phonological as the spelling patterns become larger orthographic units in the mental lexicon. These larger units are then used in the spelling process. Hence, orthographic reading serves as a pacemaker of orthographic spelling.

2.6 Cross-linguistic research on literacy development

The developmental and dual-route models of literacy described above capture the way children learn to read English. The question is: How well do these models account for the acquisition of reading and spelling in more transparent languages? The following sections evidence from Serbo-Croatian, Italian, German, Welsh, Finnish and Turkish.

Serbo-Croatian and Orthographic Depth Hypothesis (OHD)

The Serbo-Croatian writing system is bi-directionally transparent. The syllable structure of Serbo-Croatian is simple (open syllables) and its morphology is highly inflected. The writing system is unusual because it uses two partially overlapping alphabets to represent the spoken form—Roman and Cyrillic. Each alphabet has 30 letters and in both alphabets each letter corresponds to only one sound. Most of the letters are unique, however, there are seven common letters (A, E, O, J, K, and M) which represent the same phonemes and four letters which are ambiguous (Roman alphabet: H /h/, P /p/, C /ts/ and B /b/; Cyrillic alphabet: H /n/, P /r/, C /s/, and B /v/). Given the properties of these two alphabets, it is possible to generate letter strings that can be legally read in more than one way (Lukatela, Lukatela, Carello & Turvey, 1999). For example, the word '*wind*' is written as BETAP /vetar/ in the Cyrillic alphabet and VETAR /vetar/ in the Roman alphabet. The Cyrillic spelling BETAP can be read using the Roman letters but this would be a nonword and would sounds as /betap/. The Roman spelling would be impossible to read when using the Cyrillic alphabet. The important aspect here is that BETAP is phonologically ambiguous because letters B and P correspond to the sounds /v/ and /r/ when the Cyrillic alphabet is used and to the sounds /b/ and /p/ when the Roman alphabet is used.

Feldman, Kostic, Lukatela, and Turvey (1983) and Feldman and Turvey (1983) exploited these properties of the Serbo-Croatian by conducting lexical-decision tasks with bi-alphabetic readers. They found that words which contained letters pronounceable in both alphabets took longer to read than words with unique letters. The phonological ambiguity effect was present in words as well as in nonwords, but the effect was larger for words. Furthermore, they found that the magnitude of the effect depended on the number and distribution of the ambiguous letters in ambiguous letters strings. These findings lead Feldman and Turvey (1983) to propose that for fluent readers phonological analysis is mandatory in the visual recognition of Serbo-Croatian words, hence, readers of transparent orthographies rely exclusively on the assembled route which is non-lexical. According to these findings, the dual-route model does not fully apply to readers of transparent orthographies as only one of the routes is necessary; the direct lexical route is not required.

Although various researchers have argued against this claim (e.g., Hung and Tzeng, 1981; Besner & Smith, 1994; Baluch & Besner, 1991; Besner, Patterson, Lee,

& Hilderbrandt, 1992) here it is assumed that this modification of the dual route model applies to beginning readers of transparent orthographies because word representations are not yet established in the orthographic memory. Turvey, Feldman and Lukatela (1984) suggested that in the extremely transparent orthography of Serbo-Croatian for beginning and fluent readers there are few enticements to try other strategies than the phonologically analytic one, because this strategy is economical, efficient and most benefiting. Frost, Katz and Bentin (1987) proposed that children learning to read in transparent orthographies may find it easier to do so than children learning to read in more deep orthographies. They examined the effect of orthographic depth on visual word recognition by comparing readers of Hebrew, English and Serbo-Croatian. In Hebrew consonants are presented by letters where as vowels by diacritical marks. Although, both consonants and diacritical marks are taught in the first two years of schooling the former are omitted in literature, newspapers etc. As a result, the adult reader is exposed to an unvowelised writing system. This makes the Hebrew orthography extremely ambiguous many words share the same consonantal patterns but depending on the context many of these words may have different pronunciations. Thus, the phonemic code is less transparent than in English and Serbo-Croatian. In order to examine the effect of orthographic depth in these languages Frost et al (1987) conducted three experiments. In the first experiment, they compared reaction times for lexical decision and naming of high frequency words, low frequency words and nonwords in, Hebrew, English and Serbo-Croatian. The results showed that the type of stimulus (high frequency, low frequency or nonword) affected naming speed in Hebrew more than in English, and in English more than in Serbo-Croatian. The effect of lexical decision due to the type of stimulus was observed only in Hebrew.

In the second experiment Frost et al. (1987) examined the effect of semantic priming in naming. They argued that semantic priming facilitates lexical access, therefore, given the different orthographic depth of these three languages, semantic priming should facilitate naming more in Hebrew than in English and More in English than in Serbo-Croatian. The results supported this hypothesis: a strong semantic facilitating effect was found in Hebrew, a small but significant effect was found in English but no facilitation in Serbo-Croatian.

In the third and final experiment, Frost et al. (1987) gave participants from each language group a list of 160 items which contained both words and nonwords. They found that non-lexical items (nonwords) affected reading of real words in Hebrew and English, but not in Serbo-Croatian suggesting that when reading words and nonwords in transparent orthographies only one strategy is used (translation from graphemes to phonemes) where in deep orthographies there is a cost in switching strategies to deal with words and nonwords. The findings from all three experiments were used as evidence for the OHD, which proposes that in transparent orthographies phonology is generated directly from print (non-lexical route), whereas in deep orthographies it is derived from the internal lexicon.

Italian

The Italian orthography has 28 letters, five of which are vowels (a, e, i, o, u). The orthography is highly transparent: all of the vowels and most of the consonants correspond to one sound only and vice versa. A few of the consonants may correspond to more than one sound if followed by certain vowels. For example, letters 'g' + 'a' are pronounced as /ga/ where as 'g' + 'i' are pronounced as /dʒi/. In addition, when sound /k/ is followed by the vowel sound /u/ it can be spelled in different ways (e.g., *quadro* /kuardo/ 'picture', *cuore* /kuore/ 'heart', and *acqua* /akua/ 'water'). Occasionally, the voiceless palatal /tʃ/ and the fricative /ʃ/ before the vowel /e/ may have unpredictable spelling (e.g., *celeste* /tʃeleste/ 'light blue' and *cielo* /tʃelo/ 'sky', *scena* /ʃena/ 'scene' and *scienza* /ʃentsa/ 'science). Except these irregularities the Italian GP and PG correspondences are bi-directionally transparent (Cossu, 1999). The syllable structure is predominantly open (CV, VCV, CVCV, CVCVCVC, etc.) with relatively few variations (Carlson, Elenius, Granstrom & Hunnicut, 1985, as cited in Cossu, 1999). Although, word stress is placed mainly on the penultimate syllable, it is not fully predictable. The displacement of word stress can affect meaning of a word (e.g., *fini* 'aims' and *fini* 'he/she ended up'. Word stress is not assigned in writing therefore the reader relies upon the context and lexical knowledge.

Cossu, Gugliotta and Marshall (1995) examined reading and writing abilities of first and second grade primary school children. All children were individually tested and were presented with the same list of words and nonwords for both reading and writing. Each list contained 15 items. They found that for first grade children, reading accuracy for short words and nonwords was 95.2% and 85.1% correct, respectively, whereas writing accuracy was 90.6% and 82.1% correct, respectively. With regards to long words, reading accuracy for words and nonwords was 92.7% and 78.5% correct, respectively, whereas writing accuracy was 55.2% and 44.1% correct, respectively. This results show that length had a major impact on performance in the writing but on the reading task. The performance of second grade children was often close to ceiling, nevertheless, Cossu et al (1995) report that spelling of long nonwords was significantly different to the spelling of real words (69.5% and 92.7%, respectively). These findings confirm that in the highly transparent orthography of Italian a high degree of reading and writing accuracy can be achieved following a brief period of teaching and that reading and writing development have partially asynchronous trajectories.

In another study by Thorstad (1991), it was found that Italian children learn to read in approximately one year, whereas English children take three to five years. She examined the effect of orthographic regularity on the acquisition of literacy skills by comparing the reading and spelling of 70 Italian children, aged 6-11years, with that of 90 English children learning to read in the traditional orthography and 33 children, aged 6-7 years, learning to read English with the Initial Teaching Alphabet (ITA). The English children were taught the letter names and basic vocabulary using the traditional orthography. In ITA, the existing English alphabet was reduced to 23 letters by excluding *k*, *q*, and *x* and then extended by adding 17 new characters: five long vowels, six diphthongs and six consonant digraphs (Downing, 1962; Pitman, 1969). ITA was thus designed to be an orthographically transparent script for English. A difficult passage of 56 words, taken from an Italian journal for adults, was translated into English to be used as a reading and spelling test. The Italian children read these materials earlier than the English children learning to read in the traditional orthography, but not any earlier than the English children learning to read with ITA. Similarly, the Italian children could spell most of the words that they could read and some words that they could not read, whereas the English children could read more words than they could spell. Finally, the English children read quickly and made many mistakes, whereas the Italian children read more slowly than the English children and made fewer mistakes. Thorstad concluded that in a transparent orthography where the spelling-sound and sound-spelling correspondences are predictable and invariant, children can rapidly learn these correspondences and then use a systematic, phonological strategy to learn to read and spell.

German

Like the English alphabet, the German alphabet has 26 letters. The German orthography is considered to be more transparent than English (but not as transparent as Italian, Finnish or Serbo-Croatian). For example, the letter *a* in the words *Ball, Garten, Hand,* and *Katze* is always pronounced in the same way, /a/, whereas the for the corresponding English words *ball, garden, hand* and *cat* the pronunciation of this letter differs. In addition to the 26 letters of the alphabet, German orthography includes umlauts graphemes *ä, ö, ü,* but these are not reagarded as part of the alphabet[1]. The umlaouts graphemes broaden the orthographic vowel presentation , thus, contribute to the consistency of the orthgoraphy (Wimmer, Landerl, & Frith, 1999). For example, they allow the preservation of morpheme identity and mark morphological vowel changes such as in pluralisation (e.g., *Hand, Hände*). However, vowel length representation can be more of an issue in German because several ways can be used to indicate that a vowel is long (e.g., /a/ can be spelled *a, aa,* or *ah*). With regard to consonants phoneme /ʃ/can be spelled in two different ways *sch* and *s*. In addition, consonant doubling is common—this usually occurs after short vowels (e.g., *Sommer*). These incosistencies do not affect reading as there is enough information for word recognition but may be a problem when writing as almost all sounds can be spelled in more than one way.

The development model suggested by Frith (1985) proposes that in the first stage of reading development children read words as logographs. Wimmer and

[1] Albanian also uses diacritics *ë* and *ç* but these are included in the official alphabet.

Hummer (1990) examined reading and spelling strategies of German-speaking children in relation to this developmental model. They administered reading and spelling tasks to delayed and normally processing first grade children. They found that both normally developing and delayed Austrian children (who learn to read in German) seem to assemble pronunciation from grapheme-phoneme correspondences from the very beginning of reading. More specifically, they found that (a) most children could read and, to a lesser extent, spell most of the word and nonword items; (b) nonword reading and nonword spelling highly correlated with real word reading and real word spelling scores; (c) reading errors consisted mainly of the nonwords beginning with the initial letters of the target word items whereas most of the spelling errors were partially phonetically correct; (d) reading scores depended on word exposure time; and (e) both reading and spelling were strongly predicted by the knowledge of GP correspondences. These findings strongly suggest that the importance of the logographic strategy is limited in orthographies where the GP correspondences are highly transparent. In terms of Ehri's model, beginning readers in the shallow orthography of German completely skip the pre-alphabetic phase, spend little time in the partial alphabetic phase, and quickly move on to the full alphabetic phase. Such cross-linguistic research suggests that stage models of reading need modification to deal with reading development in shallow orthographies.

Wimmer and Goswami (1994) suggest that initial differences in reading strategy are determined by the nature of the orthography. They gave groups of 7-, 8-, and 9-year-old German and English children a numeral reading task, a number reading task, and a nonsense word reading task. They found that, for both orthographies, the reading time and error rates in numeral and number word reading were similar, whereas for the nonsense reading task, even the youngest German children (7 year olds) made significantly less errors than the older English children (9-year-olds). English children read more accurately and were faster at reading nonsense words with a familiar rime than nonsense words with an unfamiliar rime. Wimmer and Goswami (1994) suggested that at the beginning of the reading process, English children use this larger-grain phonological access strategy based on onset/rime, whereas German-speaking children begin learning to read by using the finer-grained grapheme-phoneme conversions. Austrian children begin to use the onset/rime strategy later on. Recent support for the strategy used in beginning reading comes from Landerl (2000) who examined English-speaking children being taught exclusively via a phonics approach. She found that these children were much better at reading non-words than the children in the Wimmer and Goswami's study who were not taught via a phonics approach. A second finding from Landerl's study, similar to that of Wimmer and Goswami, was that found that German-speaking children had substantially higher scores for pseudoword reading tasks than English children, suggesting that German-speaking children can learn to read faster than English-speaking children..

Turkish

Turkish is an extreme case of a transparent orthography. The orthography has 29 Roman letters (8 vowels and 21 consonants) where each letter in the alphabet directly corresponds to a single phoneme and each phoneme is represented by a single letter. Turkish, like Albanian, is characterised by total bi-directional transparency in reading and spelling. There are no silent letters in Turkish and word stress is always assigned on the penultimate syllable of multisyllabic words. A further unusual linguistic property of Turkish is its agglutinative morphology. In Turkish there are many multisyllabic words composed of linear sequences of morphemes. For example, from the word *kal* 'stay', typical derivations due to changes in tense and person would be *kal-mi-yor* ' he/she is not staying', and *kal-mi-yor-lar* 'they are not staying' (Ilhan & Brendan, 2005). Thus Turkish orthography is also predictable at the morpheme level with clearly defined syllable boundaries. Turkish words are constructed using a simple set of seven syllable types (V, CV, VC, CVC, VCC, CCVC and CVCC).

Öney and Goldman (1984), investigated decoding and comprehension skills of Turkish and American (English speaking) first and third grade children. Both groups of children were asked to read the same list of 84 pseudowords pronounceable in both languages[2]. For the comprehension task children in each language group had to answer questions on two paragraphs of text in their respective language. They found that Turkish children were faster and more accurate on the pseudoword decoding task than the American children at the first-grade level and faster but equally accurate at the third-grade level. In a second study, Öney and Durgunoglu (1997) investigated the early literacy acquisition of first grade children learning to read in Turkish at the beginning, middle, and end of the school year. Among other tests children were administered two word recognition tests, one consisting of 20 real word and the other of 20 pseudowords, and two spelling tests, one consisting of 8 real word and the other of 8 pseudowords. They found that by the end of the school year these children reached ceiling levels for both word recognition (93% correct) and spelling test (93% correct).

Welsh

As already discussed in detail in Chapter 1, the Welsh orthography is highly transparent. Spencer and Hanley (2003) compared children who were educated in Wales but were wither taught to read in Welsh or read in English. Children of each language were asked to read a list of single words. The Welsh and English single word reading tasks included 30 one-syllable highly familiar real words—these were given in a random order. Half of the English words were regular and half were irregular. The English words were between two and five letters long, and had at least 45 appearances per million (Kucera & Francis, 1982). The Welsh words contained significantly more phonemes and syllables than the English words (3.87 versus 2.93 and 1.20 versus 1.03 respectively). Spencer and Hanley found that children learning to read in Welsh performed significantly better at reading both real words and nonwords than matched children learning to read in English. Hanley, Masterson, Spencer and Evans (2004) re-examined reading abilities of English and Welsh children (Spencer & Hanley, 2003) who had been in formal schooling for six years. They found that, when reading regular words, most of the English children had caught up with children learning to read Welsh; thus, an advantage of learning to read in a transparent orthography becomes absent for 10-year-olds.

In another study by Ellis and Hooper (2001), using word-lists matched for written frequency as reading tests they determined that (i) Welsh children were able to read aloud accurately significantly more of their language (61% of tokens, 1821 types) than were English children (52% tokens, 716 types); (ii) the reading latencies for Welsh children were longer than for English children; (iii) the error patterns differed, with English children producing more visually similar real word substitutions, whereas Welsh children produced more non-word type mispronunciations; and (iv) reading latency was a clear function of word length in Welsh but not in English. These findings suggest that the transparency of the orthography has an effect on reading development. Furthermore, longer reading

[2] These were generated by changing the initial consonants of syllables.

latencies and the higher rate of nonword errors indicate that Welsh children read by a grapheme-phoneme synthetic strategy. Significantly shorter latencies together with a higher proportion of real word replacement errors indicate that English children rely on lexical retrieval on the basis of partial visual analysis of the written words.

Finnish

Like Albanian, the Finnish orthography is extremely transparent: each letter represents one phoneme and is pronounced consistently in the same way. The alphabet consists of 21 letters (13 consonants and 8 vowels; Kyöstiö 1980; Müller, Brady, 2001). Each phoneme can be either short or long and this is marked in writing by one versus two letters and the duration of a phoneme affects the meaning of the word (e.g., tuli 'fire', tuuli 'wind', and tulli 'customs').

Standard Finnish syllables, with the exception to a few words borrowed from other languages (e.g., traktori 'tractor'), do not have cluster onsets, but can end with two-consonant clusters. Syllables can be open, closed or they can consist of a single vowel. The syllable types of the Finnish language are: V, VV, VC, CV, VVC, CVV, CVC, VCC, CVCC, CVVC. Finnish is an agglutinating language where only about 50 words are monosyllabic and word stress always occurs on the first syllable.

Given the extreme transparency of the Finnish orthography once children learn how to decode, they are able to read virtually any word or nonword equally well (e.g., Holopainen, Ahonen, Tolvanen, & Lyytinen, 2000). Cross-linguistic research fully support this suggestion. Aro and Wimmer (2003), compared reading performance of Finnish children in years 1–4 with reading performance of German-, Dutch-, Swedish-, French-, Spanish-, and English-speaking children at the same grade levels. Participants from each language group were presented with three different tasks: pseudoword reading, numeral reading, and number word reading. Aro and Wimmer found that within each year-group Finnish children outperformed English children in the nonword reading task

Instead of absolute time scores for nonword reading, a reading time ratio was used to control for language and developmental differences in the speed with which children performed on the numeral reading task. Data from numeral reading task was used to create a new score to represent reading speed--pseudoword reading time was divided by numeral reading time. Aro and Wimmer argue that this method cross-language control is important as, due to the long number words, the Finnish children showed slower numeral reading speed in comparison to the children of the other languages (e.g, for each school year mean reading times per numeral were: English children 0.69, 0.61, 0.52, and 0.45 seconds; Finnish children, 1.08, 0.80, 0.78, and 0.68 seconds). They found that reading fluency scores were the highest for the Finish group and lowest for the English group (Finnish years 1-4, 2.55, 1.87, 1.80, 1.69 seconds; English years 1-4, 4.60, 3.00, 3.58, 2.29 seconds).

A similar reading time ratio was created using number word reading. Once again Finish children were much faster than the English children (Finnish years 1-4, 1.55, 0.86, 0.85, 0.90; English years 1-4, 2.12 , 1.11 , 1.64 , 1.01 seconds). In fact, it was found that in comparison to the other languages examined in this study English children had the lowest scores for every year group. Aro and Wimmer concluded that with the exception of English, the translation of new letter strings into correct pronunciations is easily acquired in all alphabetic orthographies involved in this study.

The most ambitious cross-linguistic study or reading development has been conducted by the European Concerted Action on Learning Disorders as a Barrier to Human Development (Seymour, Aro, & Erskine, 2003). Seymour et al, investigated early reading acquisition through assessment of letter knowledge, familiar word reading, and simple nonword reading by measuring accuracy, speed, and error types in 13 different orthographies including Finnish and English. Children read 18 familiar high frequency content words and 18 function words in their language. The results revealed that children who were learning to read in orthographically consistent languages (Finnish, Greek, German, Italian, Spanish) were close to ceiling in word reading by the middle of first grade. French (79% correct), Portuguese (73% correct), and Danish (71% correct) children showed lower levels of recoding accuracy; this is in line with the reduced transparency of these languages. The rate of reading development in English was more than twice as slow (34% correct) as in more orthographically transparent orthographies. Seymour et al., (2003) argue that syllabic complexity and orthographic depth are responsible for the cross-language differences.

Conclusions

The developmental models of literacy development capture the way children learn to read English, an orthographically opaque script, but they do not do full justice to children learning to read transparent languages (Wimmer & Hummer, 1990; Wimmer & Goswami, 1994). Even the dual route model of reading (Coltheart, 1982; Feldman, Kostic, Lukatela, & Turvey, 1983; and Feldman & Turvey, 1983), developed as an account for English language processing, may not fully apply to beginning readers of highly transparent orthographies. The ODH suggests that reading development depends on the consistency of the orthography (Frost, Kats & Bentin, 1987; Lukatela, Carello, Shankweiler & Liberman, 1995). Furthermore, Goswami, Gombert and De Barrera (1998) and Ellis and Hooper (2001), have suggested that writing system differences between languages may affect (i) the rate of reading acquisition, (ii) young children's awareness of the structure of their spoken language, (iii) the sort of reading strategy the children acquire, and (iv) the incidence and severity of possible reading disorders. The cross-linguistic research presented above shows that with regard to the rate of reading acquisition in Finnish, Italian, German, Turkish & Welsh children learn to read within the first year of receiving formal literacy training. This is not the case for English children. The research findings from these languages support the suggestion that reading strategy the children acquire depends on the transparency of the orthography being learned. Findings indicate that children learning transparent orthographies children rely on an alphabetic decoding strategy, whereas children learning to read in non-transparent orthographies such as English rely on lexical retrieval on the basis of partial visual analysis of the written words (e.g., Ellis & Hooper, 2001).

2.7 Methods of cross-linguistic reading comparison

The comparison of literacy development across different orthographies is important as it helps us to have a better understanding of the acquisition process itself as well as the pattern of contributing mental and linguistic skills. Should the patterns be similar across languages, then we would be confident about the universality of the skills involved in literacy development. Should the patterns be different then this would provide researchers with the opportunity to examine the impact of language, culture specific differences on literacy acquisition (Öney & Durgunoglu, 1997). However, the comparison of literacy development across different orthographies is difficult because the stimuli must necessarily be different. How do we know that same tests in different orthographies are measuring exactly the same skill/s? Literature from cross-linguistic research suggests that three main methods have been employed to address this issue. Firstly, cross-linguistic translation equivalents have been widely used in comparing reading in different languages. Frith et al. (1998) examined nonword reading in 7-, 8-, and 9-year-old English and German children. The advantage in using translated items in these two languages is that they have similar phonology and orthography. For example, the words 'park' and 'hand' exist in both languages. However, these two languages are that opposite ends of the transparency spectrum—German is highly transparent and English is not. Frith et al. found that German children's of nonword reading scores were close to ceiling after only 1 year of formal reading instruction whereas the English children did not achieve similar levels until they had experienced 3 years of formal instruction. Similarly, Thorstad (1991) translated into English a difficult passage of 56 words, which was taken from an Italian journal for adults—this was used as a reading and spelling test.

A problem with these comparisons across languages is that it is difficult to control for educational, social and cultural differences. There are differences in educational curricula, teaching methods, and demographic patterns. Spencer and Hanley (2003) addressed this issue by comparing children who were educated in Wales but were wither taught to read in Welsh or read in English. Children of each language were asked to read a list of single words. The Welsh word items for the single word reading tasks were translations from the English word reading tasks. Spencer and Hanley argue that is extremely important because the words are matched in familiarity. Given the geographical proximity, as, well as cultural, educational, socio-economic, similarities between England and Wales, matching for familiarity is very likely to be reliable. However, translated items are not always equivalent in either the relative frequencies of words or symbols or their range of usage in the respective languages. This is more of a problem for languages that do not share the Welsh/English similarities mentioned above.

Secondly, nonwords can be used to compare children learning to read across languages. Wimmer and Goswami (1994) derived nonwords from number words (e.g., *vechs* and *zieben* from *sechs* and *sieben* for German; *tix* and *feven* from *six* and *seven* for English). They found that German speaking children read more of these nonwords than English speaking children. This method provides an index of children's decoding abilities for novel material; however, nonwords themselves may not be good indicators of skill at reading real words.

Thirdly, sampling high frequency[3] words from children's school reading schemes has been widely employed in literacy research. Goswami et al. (1998), for example, compared English, French, and Spanish 7-, 8-, and 9-year-old children matched for standardized reading age. They found that Spanish children were able to read more items from a task of 8 monosyllabic and 8 disyllabic words than were English or French children. Seymour, Aro and Erskine (2003), also mentioned earlier, examined reading skill of children during their first year of education from 14 European countries. Children read 18 familiar high frequency content words and 18 function words in their language. The words were sampled from the reading material

[3] Morton (1969), suggested that word frequency affects the process of word identification. He designed a logogen model where the logogens represented the recognition units for individual words; these gathered information on the occurrences of the words from the relevant context and physical stimulus. Each time a logogen's threshold is reached, the threshold is slightly lowered; thus, logogens with high frequency words have a lower threshold than logogens for words with lower frequency. As a result less sensory resources are required to identify high frequency words. Effects of word frequency have been reported for: word naming (Preston, 1935); lexical decision task (Rubenstein, Garfield & Millikan, 1970; Rubenstein, Lewis & Rubenstein, 1971; and Forster & Chambers (1973); duration of eye fixation while reading text (Just & Carpenter, 1980; Rayner & Duffy, 1986); and on the speed of accessing words' meanings (Monsell, Doyle & Haggard, 1989; Landauer, Ross & Didner, 1979).

used in the early stage of primary schooling in each language. They found that children from a majority of the European countries became fluent and accurate before the end of the first school year. These findings were not present for children learning to read in French, Portuguese, Danish, and particularly in English. The problem with this method is that although the sampling of test items from typical school textbooks is a reasonable start at controlling exposure factors, textbook writers tune their books to their audience and to the difficulty of the task which their readers are faced with, so there is no guarantee that a reading text in one language is equivalent for comparable children in another language.

To conclude, all three methods mentioned above have their advantages as well as their limitations. This shows that comparing reading development across languages is not straightforward. One may suggest that comparison of performance on standardized reading tests in different languages can also be employed but this is unlikely to give satisfactory outcomes as the standardizations of test items are made with reference to large samples of readers of one language only. A new approach has been employed by Ellis & Hooper (2001). They suggest that reading tests must be constructed so that the items are equally representative across languages, and that children of the same age should have an equal opportunity to experience the parallel reading items. According to the sampling theory, representative samples must be randomly selected. The accuracy of these samples can be further increased by stratifying on important potential independent variables. Given that word frequency is directly related to reading experience, reading tests should be constructed as random selections of each language's lexis. These lexis should be stratified by frequency, and then pairs of items can be selected in the two languages concerned. The matching process itself, must not control for any other factors, such as word length, imageability, morphological complexity, syntactic role, semantic richness, orthographic complexity, sound–symbol consistency, or any other intrinsic aspect of the languages under study or their learnability. Thus, any factors related to language should be freed to vary, whereas everything related to learning opportunity should be matched.

The rationale for these tests is based on input-driven perspectives of language acquisition. Kempe and MacWhinney (1996), who examined cross-linguistic vocabulary knowledge, were first to use this principle in the construction of matched lexical decision tests based on log frequency stratified samples from frequency counts of German and Russian. The learnability of an item is largely dependent upon the amount of experience a learner has with it and with similar items. Thus, if children of two different languages start learning to read at the same time, have roughly equivalent time-on-task, and the two orthographies are equally difficult to learn, normally developing children of similar experience should be able to read words at roughly similar levels of frequency.

In Ellis and Hooper (2001) study, word types that composed a representative corpus of a million written words of Welsh (Ellis, O'Dochartaigh, Hicks, Morgan & Laporte, 2001) and English (Baayen, Piepenbrock & Van Rijn, 1995) were sorted in decreasing frequency of occurrence and sampled so that a test word was selected at every decreasing step of 10,000 word tokens or its nearest approximation. A list of 100 words, one for each language, was then used as frequency-matched sample of written English and Welsh. Ellis et al. (2004) argue that there are several advantages to this method. Firstly, reading tests obtained this way are matched in a principled fashion for input frequency. Secondly, because it generates a broad range of frequencies of items, from approximately 60,000 words per million to just 1 per million, it can discriminate for learners at different stages of proficiency. Finally, this method is psychophysically scaled. Psycholinguistic experimentation shows that there is more of a linear relationship between proficiency and log exposure than between proficiency and exposure (Zipf, 1965). The word sampling method used by Ellis and Hooper was successful in providing items representing log frequency strata. Hence, this sampling procedure guarantees that the test words used in each language are highly representative of that language.

The main concern here is that word frequencies will vary according to the type of written material they are based upon. Thus, if word frequencies for one language are based on scientific books and on classic literature for a second language, then the word items selected using the above method will be unrepresentative of the languages concerned and probably resulting in fake paired tests items. With regard to investigating cross-linguistic literacy development, given their advantages and limitations, it is important to highlight that there is a role for all types of methods mentioned above. This thesis attempts to examine how much of their own language can children of English, Welsh and Albanian read, therefore, it takes the alternative approach to the issue of whether it is easier to learn to read in one language than another. In order to address this issue parallel reading tests for which the items were matched for word frequency were developed for the three languages concerned—Albanian, English and Welsh. It is clear that this method serves a different purpose to a factorially controlled experiment. This different purpose is the point. It is what allows a true comparison of two or more scripts, rather than the investigation of matched fragments of two or more languages which are themselves almost certainly not representative of those two languages.

2.8 Final summary

This chapter reviews various models of literacy development. Many of the traditional stage models of reading and spelling development outline various distinct stages, through which children progress. These models have proved difficult to apply universally because literacy development depend on various factors such as the type of script, structure of the spoken language, teaching methods, learning disabilities, SES, etc. One of the factors of main interest is orthographic depth. Research from transparent orthographies like Serbo-Croatian, Italian, and Finnish has shown that children learning to read in such languages do so faster than children learning to read in deep orthographies like English and Danish. In order to increase the external validity of previous cross-linguistic research as we to further examine the universality features of literacy development further evidence is required. Therefore, the primary aim of the current research is to introduce a new language to the current cross-linguistic field. Albanian like Serbo-Croatian and Finnish has an extremely transparent orthography. First, almost 80 % of reading research comes from Angló-Saxon countries (Davis, 2005), therefore it would be beneficial to see whether findings from ongoing research in transparent orthographies can be generalised for Albanian. Secondly, as findings from research of this kind in Albanian have not been reported, policy makers and education professionals are missing out knowledge and information that can prove vital in identifying best practices and strategies in primary education. The final aim of this thesis was to examine how much of their own language can be read by English, Welsh and Albanian children thus allowing a direct examination of the effect of orthographic depth on literacy development.

Chapter 3 : The contribution of phonological and orthographic skills to reading and spelling development

3.1 Introduction

Various cognitive and linguistic skills can affect reading and spelling acquisition. However, it is the contribution of phonological and orthographic skills to literacy development that has received a large amount of attention as these are thought to be the most important skills for successful learning of reading and spelling.

3.2 Phonological skills

Broadly speaking, phonological skills (or abilities) refer to the sensitivity to the basic sound elements of the spoken word, and the ability to make use of these elements (Mann & Ditunno, 1990; Wagner & Torgesen, 1987).

Implicit phonological (epi-linguistic) awareness appears to arise spontaneously and is necessary for the later development of explicit awareness but does not normally seem to be sufficient to determine the course of learning to read. Implicit phonological awareness corresponds to the awareness of syllables, onsets and rimes (Gombert, 1992). Explicit phonological (meta-linguistic) awareness only develops in response to some external demand and appears to be related to learning to read (Gombert, 1992). Explicit awareness requires the identification and production of phonemic segments (see Figure 2.1 in Chapter 2).

Researchers have devised various tasks to measure implicit and explicit phonological awareness. In a *tapping task* children are given a wooden dowel and are asked to tap out the number of sounds or syllables in words: this can be used to measure the development of phonological awareness at the syllable and phoneme level (Liberman, Shankweiler, Fischer, & Carter, 1974). Another implicit phonological task is the *oddity* task: it aims to measure the awareness of onset and rimes (Bradley & Bryant, 1983). During this task, children are presented with a set of spoken works and are required to identify the 'odd' word out (e.g. 'bus', 'bun', 'rug'). Trieman and Zukowski (1991) employed a *same/different judgement* task, which was used to measure the development of phonological awareness at syllable, onset-rime and phoneme level. Here children were presented with pairs of spoken words and asked to judge whether they share a sound/syllable/onset-rime or not (e.g. 'broom', 'brand'). There are several tasks that measure explicit phonological awareness (at the phoneme level). For example, in a *blending* task children are required to form a word from isolated sounds, whereas in a *segmenting* task children are required to break down whole words into single sounds (Fox & Routh, 1976, 1984). Another effective task that measure phoneme awareness is the *phoneme deletion* task (Bruce, 1964). Participants are asked to delete an initial, medial or final phoneme of a given word (e.g. 'fan' without /f/, remains as /an/).

3.2.1 The development of phonological awareness

Lexical restructuring theory proposes that during the normal course of language development, phonological representation of spoken words is re-represented several times (Fowler, 1991; Metsala & Walley, 1998; Walley, 1993). Initially, when the vocabulary size is small, the representations are thought to be holistic, but as vocabulary size increases, holistic representations are gradually restructured into smaller segments such as syllables, and ultimately phonemes. The phoneme representation is not an integral part of speech processing, hence its representation in early infancy is not necessary, and it emerges as a representational unit via increasing experience of spoken language (Eimas, Siqueland, Jusczyk, & Vigorito, 1971). The main development period for this restructuring is thought to be in middle childhood when the size of spoken vocabulary increases exponentially (Metsala & Walley, 1998).

Many studies have shown that the *development* of phonological awareness progresses from the syllable level via the onset and rime level to the phoneme level (Treiman, 1987; Goswami & Bryant, 1990). Goswami and Bryant have suggested that the syllable awareness arises at the age of 3 years, whereas an awareness of onset and rimes emerges at the of 4-5 years. Liberman et al. (1974) devised and employed a tapping task to measure the development of phonological awareness. They presented 4 to 6-year-old English children with words that had either one syllable or phoneme (e.g., 'dog' and 'I'), two syllables or phonemes (e.g., 'dinner' and 'my'), and three syllables or phonemes. They asked these children to tap once for each syllable or phoneme in the words, and used a criterion of 6 consecutive correct responses as evidence of segmentation ability. Liberman et al. (1974) found that 46% of the youngest children could segment words into syllables, but none of the children could reach the criterion for the phoneme tasks. Five year olds performed slightly better, 48% and 17% respectively. Six year old children showed the highest level of success for both segmentation tasks with 90% of them reaching the criterion for syllables and 70% reaching the criterion for phonemes.

Studies in other languages like Italian, German and Czech show similar results: syllabic and onset/rime awareness appear to be present at a young age before reading is taught (Cossu, Shankweiler, Liberman, Katz & Tola, 1988; Wimmer, Landerl & Schneider, 1994; Caravolas & Bruck, 1993). Cossu et al. (1988) were able to replicate the Liberman et al. study with Italian speaking children. They found that 67% of the 4-year-old children reached the criterion at the syllable level, and only 13% for the phoneme level. For the 5-year-old the figures were 80% and 27%, whereas for a school-age sample the figures were 100% and 97% respectively.

3.2.2 Phonological awareness and literacy development

The main argument for the lexical restructuring theory is based on the emergence of phonemic representations as a result of spoken vocabulary growth. However, from the perspective of literacy acquisition, it seems more likely that phonological awareness at the phoneme level is acquired and developed through explicit literacy instruction and experience. Studies from Liberman et al. (1974) and Cossu et al. (1988), presented earlier, indicate that fine grained phonological awareness may be a consequence of literacy instruction. However, the lack of a control group, in this case a group of illiterate children, makes these findings suggestive but not convincing. A better picture of the effect of literacy on phonological awareness has emerged from two research areas: alphabetic versus non-alphabetic literates and literate versus illiterate adults.

Firstly, the standard Chinese orthography (for Mandarin and Cantonese) is logographic. However, there is also an alphabetic script which is taught in China—Hanyu Pinyin. In a study by Read, Zhang, Nie, and Ding (1986) two groups of participants were compared: one that could read the standard logographic script and one who could read both logographic and Hanyu Pinyin. The group who could read only the logograms performed poorly on the phonemic awareness tasks, while the group who could read both scripts preformed very well on the same tasks. Similarly, Huang and Hanley (1997) found that phonological awareness skills of Chinese-speaking children improved considerably after the children had learnt to read in an alphabetic script.

Secondly, Morais, Cary, Alegria and Bertelson (1979) examined phonemic awareness with illiterate adult[1] participants and found that these adults could not delete or add phonemes to nonwords. More recently, Mann and Wimmer (2002) compared German and American children on a phoneme identity judgement and on a phoneme deletion task. Young German children who lacked literacy exposure were outperformed by the American English-speaking children, whereas first and second graders performed as well as their American counterparts. These findings in pre-literate children suggest that lexical restructuring largely take the form of phonological representations that correspond to syllables, onsets and rimes. Thus, this restructuring is implicit, involving epi-linguistic representation (Gombert, 1992). Explicit restructuring involving meta-linguistic representation occurs following literacy exposure.

However, Stanovich (1986) suggests that the relationship between phonological awareness and reading is not unidirectional but reciprocal in nature—early reading is dependent on having some understanding of the internal structure of words, and explicit instruction in phonological awareness skills is very effective in promoting early reading. Liberman (1985) proposed that there is a relationship between phonological development and learning to read. Lundberg, Frost, and Petersen (1988) suggest that children who are good at phonemic segmentation skills had an advantage in learning to read and spell. Maclean, Bryant and Bradley (1987) found that knowledge of nursery rhymes at the age of 3, highly predicts later reading and spelling ability. Indeed, many researchers have proposed that learning to read enhances phonemic awareness (Bryant & Goswami, 1987; Morais, Alegria & Content, 1987), and that training in phonological skills prior to formal reading instruction has positive effect on early reading acquisition (Bradley & Bryant, 1985; Brady, Fowler, Stone & Windbury, 1994; Byrne & Fielding-Barnsley, 1993, 1995).

3.2.3 Phonological awareness in different orthographies

The present literature indicates that phonological awareness develops sequentially from large to small units (from syllable to onset/rime and finally to phoneme awareness) and that literacy instruction affects phonological awareness. Nevertheless, the transparency of the orthography that children learn to read and spell can have a profound effect on the early development of phonological awareness. From the lexical restructuring theory point of view the consistency of the feedback from reading and spelling plays a very important role in the speed of restructuring. In deep orthographies, children might take longer to restructure their phonological representation even for words with dense phonological neighbourhoods where phonological similarity should heavily pressure toward phoneme-level restructuring (Goswami, 2000). Children who are learning to read and spell in transparent orthographies like Finnish, Albanian, Serbo-Croatian, where feedforward (spelling-to-sound) and feedbackward (sound-to-spelling) consistency is high, might acquire phoneme-level representations much faster than children who are learning to read in deep orthographies.

Caravolas and Bruck (1993) tested 101 English-speaking (Canadian) and 100 Czech first grade children in a range of phoneme awareness tasks. Children in each

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[1] Please note that these illiterate participants are adults who had never been exposed to literacy instruction, as opposed to adult participants who failed in acquiring literacy skills.

language group were given three tasks using nonwords: a same/different judgment task using consonant clusters onsets, an initial phoneme isolation and a phoneme deletion task requiring children to delete the initial phoneme of a nonword. In the first task, both language groups performed at a similar level—91% correct. However, in the second and third tasks Czech children (98% and 86% correct) performed better than Canadian children (89% and 39% correct). Durgunoglu and Öney (1999) compared Turkish and American English-speaking children. Three tasks were used to assess phoneme awareness: a phoneme tapping task, an initial phoneme deletion, and a final phoneme deletion task (For the phoneme deletion tasks CVC nonwords were used.). Turkish children's scores for all three tasks were significantly higher that scores of American children. These studies clearly suggest that phonemic awareness emerges more quickly in learning to read in transparent orthographies.

According to the onset and rime principle (Goswami, 1986; Goswami & Bryant, 1990) even the very beginning English readers can read new words by analogy. These analogies are based on the graphemic clusters that correspond to onset and rime sub-syllabic units. Through experience of reading they become aware of the phonemic basis of an alphabetic script and this allows them to begin to segment words. For example, if children are taught *beak*, they can apply the sound of the rime *eak* when reading a new word such *peak*. Goswami and Mead (1992) found than children's use of onset and rime analogies correlated with their awareness of rhyme. The onset and part of the rime analogies were more strongly related to their awareness of phonemes. Decoding larger 'chunks' reduces memory load involved in phonological units which have to be assembled in pronouncing whole words. When taking into account the greater orthographic regularity of English at the rime level, teaching larger units may prove more efficient in learning to read[2] (Treiman, Mullennix, Bijeljac-Babic & Richmond-Welty, 1995).

Therefore, explicit awareness of phonemes may be irrelevant to the acquisition of literacy skills for English-speaking children[3] (Goswami and Bryant, 1990; Cossu and Marshall, 1990).

Further evidence for the predictive relations between onset/rime awareness and reading acquisition for English comes from Bradley and Bryant (1983), who in a longitudinal study used one alliteration and two oddity tasks to investigate the relationship between phonological awareness and the acquisition of literacy skills. In this study they followed the progress of almost 400 children from the age of 4 years old. They found that that there was a strong relationship between children's sensitivity to rhyme and alliteration when they begin school and their progress in learning to read and spell over the following three years, even when the effects of

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[2] This contradicts the hypothesis put forward by Marsh et. al. (1981) and Frith (1985), that proposes that analogies can only be used at the final stage of learning to read. Indeed, Stuart and Coltheart (1998) suggest that it is incorrect to assume that the first stage of reading development involves non-phonological procedures (such as logographic processing) and that phonological skills play a vital role with the phonologically adept children.

[3] In contrast, Morais, Mousty and Kolinsky (1998), argue that awareness at the phonemic level plays an important role in reading development. Their argument is based on two strands of evidence: first, explicit teaching of phoneme awareness, combined with training in segmentation skills, has a positive effect in reading development (Lundberg et. al., 1988; Hatcher, Hulme & Ellis, 1995); second, explicit phonemic awareness is necessary for irregular word reading—phonological decoding skills help irregular word reading. Morais et al. (1998) argue that because explicit awareness of phonemic presentation forms the basis for explicit awareness of higher-order GP rules, children who know these rules are in a better position to identify words which depart form these rules.

intelligence, memory and economic class were controlled for. Other researchers, independent of Bryant and colleagues have reported similar results (e.g. Ellis and Large, 1987; Bowey & Francis, 1991; Chaney, 1994; Greaney, Tunmer, & Chapman, 1997). In spelling, however, it has been suggested phoneme awareness plays an important role. Cataldo and Ellis (1988) found that explicit phoneme awareness predicted spelling ability during the first three years of schooling, with its influence increasing over time, but predicted reading only in second year.

In transparent languages like Swedish and Norwegian only weak predictive correlations have been found between reading development and onset/rime awareness (Hoien, Lundberg, Stanovich, & Bjaalid, 1995; Lundberg, Olofsson, & Wall, 1980), whereas in German no early predictive relations have been found (Wimmer, Lander, & Schneider, 1994). Geudens and Sandra (1999) compared the speed of naming nonwords (e.g. 'wot'), with the speed of naming onset-rime (e.g. 'w ot') or body-coda (e.g. 'wo t') segmentations in beginning readers of Dutch. Unlike English (Treiman et al., 1995), the Dutch orthography is transparent at the grapheme–phoneme level. They found that the naming of onset-rime items covaried with reading: it had an inhibitory effect for good readers but a facilitatory effect for poor readers. This suggests that onset and rime units in reading phonologically transparent writing systems may not be very helpful to the reading process of good Dutch readers.

In transparent orthographies, phoneme awareness appears to be the best predictor of reading development. Öney and Durgunoglu (1997), for example, investigated the early literacy acquisition of first grade children learning to read in Turkish at the beginning, middle, and end of the school year (the Turkish orthography is very transparent) by assessing their phonobgical awareness, letter recognition, word and pseudoword recognition, syntactic awareness, spelling ability, and listening comprehension. They found that phonological awareness was the best predictor of reading skill, however, this was limited to the early stages of reading acquisition. They suggest that for transparent orthographies, an emphasis on developing decoding proficiency may be unnecessary because the systematicity of the written language facilitates decoding proficiency. This may not be the case for more irregular orthographies and developing decoding proficiency through instruction may facilitate reading comprehension.

Although, the relationship between reading and phonological awareness has been extensively researched, the relationship between phonological awareness and spelling skills has attracted less attention. As mentioned previously, children's ability to segment phonemically is a subsequent result of learning to read—during this learning process knowledge that printed graphemes represent speech segments of spoken language is gained. Therefore, young children cannot use phonological spelling until they receive formal teaching instruction.

In the early stages of spelling acquisition, English-speaking children tend to rely on knowledge of letter names. They are inclined to use one letter (usually an initial consonant, and occasionally a final one) to represent a word (Treiman, 1994). Treiman (1993) analysed children's free writing during their first year in school. She found that from the beginning of literacy instruction children relied upon phonology, and soon replacing the strategy of spelling by letter names with that of spelling using letter sounds.

Furthermore, spelling of words and nonwords that contain consonant clusters proves difficult for young children. Treiman (1985) reported that 27% of the errors made by first-grade children affected initial consonant clusters. They were prone to omitting the last consonant of the cluster (usually the second phoneme for CC onset, and the third phoneme for CCC onsets). In addition, the first-graders showed a tendency to omit one of the phonemes from the final consonant clusters. For example, *bank* was spelled as *bak*. The tendency to reduce final consonant clusters persists for a longer period of time than the tendency to reduce initial clusters. These findings reflect the level of awareness of phonological representations of spoken words. These error types indicate immature segmentation strategies; however, as children learn more about the written language, their spelling becomes more accurate in terms of phonological content.

Goswami and Bryant (1990) argue that the ability to segment spoken words into phonemes is a critical skill for spelling development. Burns and Richgel (1989) assessed invented spellings of 4-year-old children for phonological plausibility. These children who could produce invented spellings were compared with children who could not spell on a battery of tests comprising reading skill, letter knowledge and phoneme segmentation. The non-spellers were inferior to their peers who were inventive spellers in letter-sound knowledge, and segmentation skills, although only 44% of later group could read. Burns and Richgels (1989) concluded that in the early stage of literacy development, phonemic segmentation and letter-sound knowledge were vital precursors of spelling ability, whereas reading was a related but separate skill from word writing.

Further evidence about the relationship of phonological awareness and reading in different orthographies comes from dyslexic children. Many studies have shown that an impaired performance on phonological awareness tasks is evident in English dyslexic children (Bradley & Bryant 1978; Olson, Wise, Connors, Rack, 1990; Bruck & Treiman 1990; Snowling, & Olson, 1992). Phonological deficits in dyslexia are less marked in children who learn to read in more transparent orthographies. For example, Landerl, Wimmer and Frith (1997) showed that German speaking children perform much better at reading nonwords words than English dyslexics. Wimmer (1993) found that compared to normal readers, instead of an impairment for nonword reading accuracy, German children show a speed deficit. Furthermore, De Gleder and Vroomen (1991) presented 11-year-old Dutch dyslexic children with phonological tasks at the syllable, rhyme and phonemic level. In comparison to chronological-age and reading-level matched controls, the phonological deficit was evident only at the phonemic level. English dyslexic children find the final tasks extremely difficult (Bruck, 1992; Rack, Snowling, & Olson, 1992)

Finally, phonological decoding (recoding) functions as an independent self-teaching mechanism, which enables the reader to acquire visual patterns of words. (Share, 1995; Share & Stanovich, 1995). The self-teaching mechanism hypothesis suggests that that low frequency words require phonological recoding because they are not recognised visually. In contrast, high frequency words do not require phonological recoding because, because they are stored in the mental lexicon and hence are recognised visually (Share, 1995).

To summarize: Research has shown that: (1) the representation phonological units develop from large to small as result of the effect of vocabulary growth on lexical restructuring; (2) explicit phonological awareness at the phoneme level is a subsequent result of exposure to print and formal instruction; (3) the relationship between phonological awareness and reading is reciprocal; (4) the consistency of the orthography can affect the awareness of the structure of the spoken language (references); and (5) phonological skills can serve as reliable predictors of reading and spelling skill

In the main study of this thesis, nonword reading, nonword spelling and phoneme deletion tasks will be administered to Albanian, English and Welsh speaking children. First, if the nature of the written orthography has an effect on the awareness of spoken language then young Albanian and Welsh children should perform better at this task than English children. Second, according to Frith's model, phonological tasks should be the best predictors of both reading and spelling in the early stages of literacy development. However, in transparent orthographies of Albanian and Welsh phonological skills should be best predictors of reading only in the first years of schooling.

3.3 Naming speed

Wagner and Torgesen (1987) identified three types of phonological ability: *phonological awareness* (already discussed in the above sections), *phonological coding in short term memory*, and *retrieval of codes from long term memory*. Phonological coding in short term memory has been further denoted as verbal working memory and is related to the temporary storage of verbal information. To date, findings suggest that the relation between working memory and word decoding is correlational. Wagner et al. (1997) found that the effects of verbal working memory on word recognition were small and could be fully accounted for by phonological awareness. In addition, dyslexic children generally perform at the same level as that of their age-matched reading controls on these measures (Siegel & Ryan, 1988; de Jong, 1998) and the effects of training of verbal working memory on reading development have not been reported. Therefore, in this thesis only the first and the last type of phonological ability were measured.

The third type of phonological ability, retrieval of codes from long term memory, has been further denoted as rapid naming and concerns the speed of access to the pronunciation of digits, letters and words. Naming skill, which is the fluent retrieval of verbal labels, is also very important in the process of reading acquisition (De Jong & Van der Leij, 1999). Denckla (1972), and Denckla and Rudel (1974, 1976), found that the speed with which the names of colours were retrieved, rather than accuracy, differentiated between dyslexics and normal readers. The *Rapid Automised Naming* (RAN) task, designed by Denckla (1972), consists of 50 stimuli (e.g. five single digits, five letters, five colours, or five pictures of familiar objects repeated 10 times on a board). Mayer, Wood, Hart and Felton (1998) propose that numbers and letter naming speed are more likely to reflect the impact of early learning to read (including alphabet mastery), whereas colour and object naming speed are not very well related to prior alphabet or reading mastery. According to Van den Bos, Zijlstra and Spelberg (2002), this could be due to elementary education, as both reading and arithmetic practice interacts with naming speed development of numbers and letters. Indeed, they did go on to find that there was a relationship between word-reading and naming speed of letters and numbers—this was not the case with the naming of colours and objects.

Bowers and Wolf (1993; Wolf & Bowers, 1999) argue that RAN tasks assess the functioning of a precise timing mechanism that is important in the process of amalgamation of phonological and visual representations into orthographic codes for words. Upon this assumption, they proposed the *Double Deficit Hypothesis* (DDH), which is based on the finding that the correlations between rapid naming and phonological awareness are modest in dyslexics and that dyslexics can exhibit both phonological and naming difficulties. These two independent sources of reading dysfunction can result in three dyslexia subtypes—two single deficits and one double deficit. Thus, some dyslexics with a single phonological deficit have only phonological processing difficulties but no or little naming deficit whereas dyslexics with single naming speed difficulties have naming speed problems only. The double-deficit subtype is characterised by both deficits; this represents the most severely dyslexic readers. In fact it was Lovett (1987) who first distinguished between poor readers who had a reading rate difficulty and those who had a reading accuracy difficulty. Reading-rate disabled children exhibited a naming speed deficit only. Reading-accuracy disabled children (who also showed a rate difficulty) exhibited a phonological awareness deficit as well as a naming speed deficit.

Bowers, Golden, Kennedy, and Young (1994) suggested that rapid naming deficits are directly related to variation in orthographic skill. They found that rapid naming accounted for independent variance in orthographic skills that was not explained by print exposure. Bowers et al. (1994) argued that beginning readers who are slow at identifying letters in a printed word do not activate letters stored in memory close enough in time to encode combinations of letters that occur most frequently in print. As a result, children with a naming speed deficit may be slow in gaining knowledge of orthographic patterns and/or forming orthographic representations of written words. Sunseth and Bowers (1997), found that children with a single naming deficit and children with a double-deficit were impaired on measures of orthographic skills relative to children with a single phonological deficit, thus, further supporting the hypothesis that naming speed deficits are directly related to variation in orthographic skill.

However, naming deficits are often overlooked in the diagnoses of English-speaking dyslexics because their word recognition is very poor (Compton & Carlisle, 1994). In other languages where the grapheme phoneme mappings are more consistent, naming deficits are found to be more useful in identifying reading disorders. This is because even poor readers can rely on the very regular GP conversions, which results in high accuracy (Klicpera & Schabmann, 1993). There is ample research which shows that dyslexic children learning to read in transparent orthographies show high accuracy for both word and nonword reading (*German*, Landerl et al., 1997 and Wimmer, 1993; *Spanish*, Rodrigo & Jimenez, 1999; *Dutch*, Van den Bos, 1998; and *Italian*, Zoccolotti, De Luca, Di Pace, Judica, Orlandi, & Spinelli, 1999). Their main problem is slow decoding for words that are read rapidly by normally reading children. In such transparent orthographies, naming speed seems to be a better predictor of reading ability than phonological awareness (Torgesen, Wagner, Rashotte, Burgess, & Hecht, 1997; Wolf & Bowers, 1999). The opposite stands for the English language, where phonological and decoding skills may be better predictors.

It has been documented that the contribution of rapid naming is present during the initial stages of reading acquisition—later on, this contribution is reduced considerably (Torgesen, et al., 1997; Wagner et al., 1997; Walsh, Price, & Gillingham, 1988). These findings are not consistent with the DDH. In a recent longitudinal study, for example, De Jong and van der Leij (1999) examined the effect of phonological abilities on early reading acquisition. Kindergarten and Grade 1 Dutch children were assessed on various cognitive measures including rapid naming tasks (RAN). They found that the contribution of rapid naming was limited from kindergarten to the end of first grade. However, in this study only rapid naming of objects was used. In a follow up study naming of letters and digits were included in the RAN tasks (de Jong & van der Leij, 2002). The results confirmed the previous study's finding that the contribution of RAN was limited to Grade 1, thus supporting previous findings that the contribution of rapid naming is only present during the initial stages of reading acquisition.

These research findings indicate that results may depend on type of RAN task used. In order to avoid such problems, in this thesis seven types of RAN tasks were employed (rapid naming of letters, digits, words, numerals, colour names, boxes of colours, and pictures) and two composite scores were formed for subsequent analysis: the first consisted of all the alphanumeric stimuli (*RAN Alphanumeric*) whereas the second consisted of actual colours and pictures of familiar objects (*RAN Object and Colours*). Presently, RAN is viewed as part of the phonological abilities family (Wagner & Torgesen, 1987), hence, the main hypothesis concerning naming speed is that the contribution of RAN tasks will be significant only the initial stages of reading acquisition.

As mentioned above, Van den Bos et al. (2002) found a relationship between word-reading and naming speed of letters; thus, a second hypothesis with relation to rapid naming that is assessed in this thesis is that RAN Alphanumeric but not RAN Objects and Colours will be associated with measures reading ability.

3.4 Orthographic Skills

During the early stages of reading, words are primarily decoded phonologically. Following print exposure, children begin to recognise familiar spelling patterns. With increasing exposure, the reader may automatically recognise these familiar patterns. Unfamiliar orthographic patterns, however, would still be processed phonologically. Furthermore, deep orthographies like English have a number of irregular words which cannot be decoded on the basis of phonology alone

(Venezky, 1976; Ziegler & Goswami, 2005). Words that have irregular spellings have to be recognised using specific orthographic knowledge.

Orthographic knowledge—the retrieval and use of knowledge about the orthographic representation of words (Barron, 1994)—involves a complex set of skills, including both knowledge of the spelling of particular words; and higher-level conceptual skills, such as the recognition of the properties of words (e.g. word length, consonant-vowel structure, syllabic structure, morphological complexity, meaning), letter sequences, and common letter positions in words.

Frith's (1985) model of reading development considers orthographic processing skills as an independent source of variance in word recognition ability. Developmental arrest prior to or during the start of alphabetic stage would result in poor readers who are deficient with spelling-to-sound decoding or phonological skills. Developmental arrest at the orthographic stage would result in reading problems related to orthographic processing skills. This suggests that phonological skills are necessary but not sufficient for the development of fluent word recognition.

Stanovich and West (1989) investigated whether orthographic processing ability accounted for variance in reading and spelling in 241 undergraduates. In addition to phonological tasks, two orthographic processing measures were used: *orthographic choice task* and *homophone choice task*. On the orthographic choice task, subjects viewed pairs of letter strings that sounded alike (e.g., rume/room) and were asked to indicate which one was spelled correctly by pressing one of two buttons on a computer keyboard. On the homophone choice task, questions were read orally (e.g., 'Which is a fruit?'), immediately followed by the visual presentation of two homophones (e.g., pair/pear). Subjects pressed a computer key to decide between the alternatives. The subjects' performance on the orthographic choice task and the homophone choice task was thought to reflect the quality and accessibility of their orthographic representations because phonological processing of the letter strings could not answer the questions adequately. They found that the orthographic tasks accounted for additional variance in reading and spelling, after the effect of phonological tasks was partialled out—these results have been replicated by other investigators (Barker, Torgesen, & Wagner, 1992; Braten, Lie, Andreassen, & Olaussen, 1999; McBride-Chang, Manis, Seidenberg, Custodio, & Doi, 1993; Olson, Forsberg, & Wise, 1994, Cunningham, Perry, & Stanovich, 2001).

Other types of tasks have been used to measure orthographic skills. For example, knowledge of word-specific information such as correct spelling of irregular words, has been used in several studies to measure orthographic skills (Bruck & Waters, 1988; Lennox & Siegel, 1993). Olson, Kliegl, Davidson and Foltz (1985), used a *word-pseudohomphone choice* tasks—Stanovich and West (1989) used a similar version of this task. The participants were presented with 80 pairs of homophones (e.g., rain/rane) on a computer screen and had to respond as quickly as possible by pressing a left/right button. Participants had to recognise the correct orthographic pattern independent of words' phonology. They found that dyslexic participants were more accurate and faster than reading control group and that the correlation between orthographic and phonological factors was lower for disabled readers than for controls. This suggests that orthographic processing plays a greater role in word recognition for disabled readers and that for these readers there is less impairment in orthographic factors than in phonological factors.

According to Lennox and Siegel (1998), an alternative way to measure orthographic skills, which is different from knowledge of word-specific information, involves the ability to determine whether a specific letter combination is allowed in the language or not (Pennington, McCabe, Lefly, Bookman, Kimberlin, & Lubs, 1986; Siegel, 1994; Siegel, Geva & Share, 1990; Siegel, Share & Geva, 1995). The orthographic awareness task designed by Siegel et al. (1995) has 17 pairs of nonsense words; for each pair, one member contained an orthographic sequence that never occurs in English or that occurs with an extremely low frequency. This task was used to assess the development of the orthographic skills in dyslexics and normal readers. Here the participants have to identify the word that looks more like a real word (e.g *filv* and *filk*). Many studies (Bradley & Bryant 1978; Olson, Wise, Connors, Rack, 1990; Bruck & Treiman 1990; Snowling, & Olson, 1992) have shown that dyslexics have phonological awareness difficulties. The finding of Siegel et al (1995) study supported this—dyslexic subjects performed significantly worse than normally developing children but they also found that dyslexic readers performed better on the orthographic awareness task than the normal readers. Therefore they suggest that the dyslexic readers may use a different processing mechanism in reading.

In the *orthographic verification* task (Manis, Szeszulski, Holt, & Graves, 1990), participants listen to a word, then are asked to indicate which printed word is spelled correctly (e.g., 'street': *street* and *streat*). Similarly, the *Peabody Individual Achievement Test* (PIAT) for spelling (Dunn & Markwardt, 1970) is another task that has been used to measure orthographic skills. A target word is presented orally, followed by a presentation in a sentence, and finally is presented individually. Participants have to make a selection by choosing one of the four similar alternatives printed on a card (e.g., 'cloudy': *clowdy cloady cloudy cloudley*).

Most of the tasks described above are forced-choice tasks and there is a debate whether these can be fully dissociated by phonological skills (Foorman, 1994). Researchers that support the dissociation between these two measure emphasize the visual processing necessary for deciphering written words. Thus if orthographic processing relies on the visual code then the above tasks assess the quality of this code. For example, Leslie and Shannon (1981) presented preschool, kindergarten, first grade and second grade children with pairs of items like *GSP G8P*; *WOC RSD*; and *GRISP TSACL* and asked to identify the items that looked the most like a word. They found that accuracy was directly linked to reading ability and this suggests that word recognition is the process of accessing the visual features of the test items. The alternative interpretation of these findings may also indicate that phonological processing alone mediates accuracy. For example in *WOC RSD* and *GRISP TSACL* pronounceability of each item would have a significant impact in the decision process. Therefore, Vellutino, Scalnon and Tanzman (1994) suggest that orthographic tasks are word recognition and spelling tasks.

However, orthography is the visual stimulus of the written language therefore, if the initial sensory input is distorted then subsequent processing will be impaired (Foorman, 1994). Wimmer (1993) presented second, third and fourth grade German-speaking dyslexic children with digits very briefly so that sequential processing was not possible. After the presentations and a mask each child was asked to name one of the digits at a specified position. Wimmer found that the scores of this task were not related to naming speed. Furthermore, second and third grade normally developing and dyslexic children's performance on the visual processing tasks was not significantly different. Fourth grade children's performance differed from age-matched controls; however, they did not differ from second grade age-matched controls. He argues that these lower scores on the visual processing tasks for fourth grade children are a consequence and not a cause of impaired reading speed.

Frith (1985) suggests that the deficit in forming orthographic representations may be due to global processing that has insufficient attention to individual letters or group of letters. Perfetti (1992) argues that these insufficient orthographic representations are caused by the poor quality of the underlying phonological representations. This goes against the view of full dissociation between phonological and orthographic processes. However, Olson et al (1994) who presented dyslexics with test items like *sammon salmon* found that they performed worse than younger normally developing readers, but on nonword choice tasks (e.g., *filv filk*) dyslexic children were comparable or even better than younger children. This is because the second task does not require a response to a real word. The phonological processes are dissociated in these tasks they tap on a general level of orthographic processing.

In addition, the effect of forced-choice measures that evaluate orthographic skills has not been reliability observed and some of the conclusions are incompatible. Considering the nature of these tasks, Stanovich, West and Cunningham (1991), have suggested that deficiencies in orthographic processing skills may be characteristic of poor readers. On the contrary, Siegel et al. (1995) reported a better performance on the orthographic awareness task for dyslexics than for normal readers, whereas Olson, Wise, Connor and Rack (1990) report comparable levels of performance between reading level matched poor and normal readers on the orthographic choice task.

These different findings undermine the validity of the orthographic tasks. Vellutino, Scanlon, and Chen (1995) point out that in addition to orthographic skills, these discrimination tasks may also measure word identification or word spelling skills; and Olson et al (1993) indicate that these tasks can be highly vulnerable to guessing strategies. Further, Willows & Geva (1995) suggest that homophones can be challenging and confusing (e.g., *Which is a fruit*? *pair* or *pear*), especially when phonological representation is underdeveloped, and sometimes it may be difficult to separate meaning from graphic information.

An alternative to the tests presented above is the *Wordchains* task. Jacobson and Lundberg's (2000) study, aimed at predicting individual growth in reading in disabled and normal school boys. They used a wordchains task on three occasions to assess word decoding performance (The Wordchains task has been adapted in English by Miller-Guron, 1998). A wordchain consists of a three or four words linked together (e.g. 'sandcoffeeblue') and participants are required to identify all words within a chain by separating them with a pencil slash (e.g. 'sand/coffee/blue'). The participants have to divide as many chains as possible within 3 minutes. Very young children have to sound out each letter before they can identify each word, whereas older children and adults can identify words by using immediate lexical access based on rapid recognition of orthographic patterns (Jacobson & Lundberg, 2000). Although originally this task was designed to measure word recognition ability, it may also serve as a good measure of orthographic skill. As this is a time-limited test, performance is enhanced if children have accurate orthographic representation of the words stored in memory. A lack of orthographic representations would result in low socres.

In this thesis two orthographic knowledge tests will be used to measure orthographic skills in Albanian, Welsh and English children: the *orthographic awareness* (Siegel et al., 1990) and *wordchains* (Miller-Guron, 1998). The first task is popular in the ongoing literacy research. However, given the limitations of force-choice tasks wordchains will also be used.

Treiman's (1993), who examined young children's spelling errors, suggests that young children are sensitive to orthographic conventions from an early stage.

They rarely violated constraints on the positions of graphemic patterns in spelling. For example, they might have spelled 'cake' as 'kack' but never as 'ckak'. In addition, the spelling of '-ed' endings was soon learned, regardless of the pronunciation (e.g. 'jumped' which ends with the sound /t/ and 'liked' which ends with the sound /d/).

Furthermore, Ellis and Cataldo (1990) found that the contribution of phonemic awareness to spelling increases over time, whereas Sprenger-Charrolles, Siegel, and Béchennec (1997) show that during literacy development even in highly opaque French, the role of the orthographic skills was secondary to the role of phonological skills, which increased as a function of age. On the contrary, stage models of reading and spelling suggest that children initially rely on phonological skills but later move onto an orthographic strategy. Stanovich (1986) found that phonemic awareness accounts for variance only in beginning stages of reading development, and Juel, Griffith, and Gough (1986) argue that following literacy exposure, there is indeed a shift from phonological to orthographic skills in reading and writing.

The main hypothesis emerging from the literature is based upon the assumptions of Frith's model: orthographic knowledge will be the best contributor only in the later stages reading and spelling development. Thus orthographic tasks are expected to be significant predictors only for older children who have been exposed to print for several years.

3.5 Hypotheses and predictions

From the literature reviewed in Chapters 1 and 2, a number of hypotheses[4] and predictions emerge. These relate to the rate of reading and spelling development and the strategies employed by young native children learning to read and spell in these languages.

First, orthographic depth will have a significant impact on reading accuracy. In more transparent the orthographies reading accuracy will be higher than in less transparent orthographies. More precisely, it is predicted that Albanian and Welsh should be able to read more words of their language than English children.

Second, orthographic depth will affect the strategy used by learners in different orthographies. Young Albanian and Welsh children will rely on an alphabetic decoding strategy, whereas English children will rely on lexical retrieval on the basis of partial visual analysis of the written words.

The third hypothesis concerns spelling skills. Children learning to spell in shallow orthographies will be more accurate than children learning to spell in deep orthographies. It is predicted that Albanian will have higher spelling accuracy scores than Welsh children, who in turn will show better scores than English children.

A fourth and final hypothesis emerges from the description of the Albanian orthography where the bi-directional relationship between letters and sounds is extremely transparent. If Albanian children rely on alphabetic decoding skills then there should be no discrepancy between their reading and spelling accuracy scores.

The developmental reading and spelling models presented in Chapter 3 propose that children initially rely on phonological skills but with print exposure they

[4] A more detailed list of hypotheses and predictions is presented at the beginning of each experimental chapter.

move on to an orthographic strategy. The current research presented in this thesis tries to examine this using various tasks, tapping phonological, orthographic, and other cognitive skills. Following previous research findings, the hypotheses presented below have been set for examination.

1. It is predicted that both reading and spelling phonological skills will contribute to early literacy development. Following print exposure and formal teaching instruction orthographic skills will soon be acquired—these will allow the learners to become more confident readers and spellers. In transparent orthographies of Albanian and Welsh explicit phonological skills should be best predictors of reading only in the first years of schooling.

2. If the nature of the written orthography has an effect on the awareness of spoken language then young Albanian and Welsh children should perform better at phonological tasks than English children.

3. The contribution of RAN tasks will be significant only the initial stages of reading acquisition

4. RAN Alpha numeric but not RAN Objects and Colours will be associated with measures reading ability.

5. Orthographic tasks are expected to be significant predictors only for the older children who have been exposed to print for several years.

Chapter 4: Materials and procedure

4.1 Introduction

This chapter describes the test materials and the procedures for each task employed in this thesis. Materials used in the pilot study are presented first—these are followed by the description of materials used in the main study which compares literacy development in Albanian, English and Welsh in three different age-groups.

4.2 Pilot study on learning to read and spell in Albanian

4.2.1 Measurement tools

4.2.1.1 Compilation of word-lists

In the first part of the pilot study, an attempt was made to extend the findings of the Ellis and Hooper (2001) study. They compared the rate of literacy acquisition in Year 2 English and Welsh children matched for reading instruction, background, locale, and maths ability. Twenty children from each language group were given a word reading test, where reading accuracy, reading latencies (using a stopwatch), and word error types were assessed. In order to do this, lists of 100 test-words for English and Welsh were designed by taking the word types that composed million token word frequency counts for English (CELEX, Baayen, Piepenbrock & Van Rijn, 1995) and Welsh (Ellis, O'Dochartaigh, Hicks, Morgan & Laporte, 2001), sorting them in decreasing frequency of occurrence, and sampling them so that a test word was selected which matched (roughly) every decreasing step of 10,000 word tokens.

Eighty words were selected following this procedure and another 20 words were randomly selected from words with a frequency of one per million.

The Albanian reading test was designed by randomly sampling one word from each of 100 successive strata of decreasing *log10* written word frequencies from an Albanian Text Corpus (ATC) created by the author of this thesis, comprising just over one million words, from a novel, the New Testament from the Christian Bible, one children's book, one on-line Albanian newspaper (dates ranging form early January to late February 2001), and two short passages from books advertised on the internet. This method is broadly equivalent to the 1 in 10,000 token sampling method used by Ellis and Hooper, but slightly improves upon it in that it produces strata which are separated by equal intervals of *log10* frequency. The most frequent word of the list was *të 'you'* with frequency 67713 in a million, and one of the last words was *shkumës 'chalk'* which occurred only once. The Albanian test words and their frequencies are shown alongside those for English and Welsh in Appendix 1.

The reason for this adaptation is that the original method used by Ellis and Hooper (2001), although broadly satisfactory in producing equal strata in terms of log10 frequencies, at lower frequencies it did cause some deviation from linearity (as already mentioned above, the last 20 words were randomly selected from words with a frequency of one per million). The adaptation corrects for this lack of linearity, however, this resulted in slightly higher frequencies for Albanian word-items. This may undermine direct comparisons between the concerned languages and thus any possible findings may be difficult to interpret. This is a problem in the pilot study, and in order to verify any possible effects of language on accuracy are not due to minor differences between the token frequency distributions of the parallel test items in the three languages, ANCOVAs with *log10* frequency as the covariate will be run along regular ANOVAs.

4.2.1.2 100-word reading

The lists were printed in decreasing frequency order with 17 words per A4 page, double-spaced, centred in bold lower case 20 point Times font.

The children were tested indiyidually in a quiet room. They were asked to read the words and to speak loudly and clearly because they would be recorded. A piece of plain card was used to cover the list. The child was asked to move the card down when the experimenter said 'next', and to read the word immediately. A stop watch was used to record reaction times, from the onset of word presentation to the response onset. If the child made no response after 15 seconds, the experimenter would ask them to try the next word. All children were given a few practice trials to show that they understood the instructions. The reading test was discontinued if five consecutive errors were made. The maximum score for this test was 100 and the reading errors were recorded on a separate sheet by the experimenter.

Table 4.1 shows the frequency distribution of the length of the words for the three languages and shows that the lists are well matched in their sampling for word length [Albanian $M = 5.36$, SD = 2.94; English $M = 5.84$, $SD = 3.14$; Welsh $M = 5.60$, $SD = 2.97$; $F\ (2,98) = 1.47$, *n.s.*]. For the subsequent Albanian analyses, words containing less than four letters are regarded as short words, whereas words containing five letters or more are regarded as long words. There are 51 short words and 49 long ones.

Word length number of letters	Frequency		
	Albanian	English	Welsh
1	4	2	5
2	15	12	11
3	11	12	12
4	18	14	9
5	10	16	16
6	10	7	11
7	8	10	13
8	7	5	7
9	6	6	7
10	5	6	4
11	2	5	2
12	3	2	0
13	1	2	1
14	0	0	1
15	0	1	0
16	0	0	1

Table 4.1. Word length and the frequency for the Albanian, English and Welsh reading test.

Figure 4.1 reveals the distribution of the Albanian test words as a function of word length and *log10* frequency. It is clear that the relationship is as predicted by Zipf's law (Zipf, 1965): longer words are less frequent than shorter words ($B = -0.34$, SE B $= 0.030, \beta = -0.756, F(1, 98) = 130.9, p < .001$).

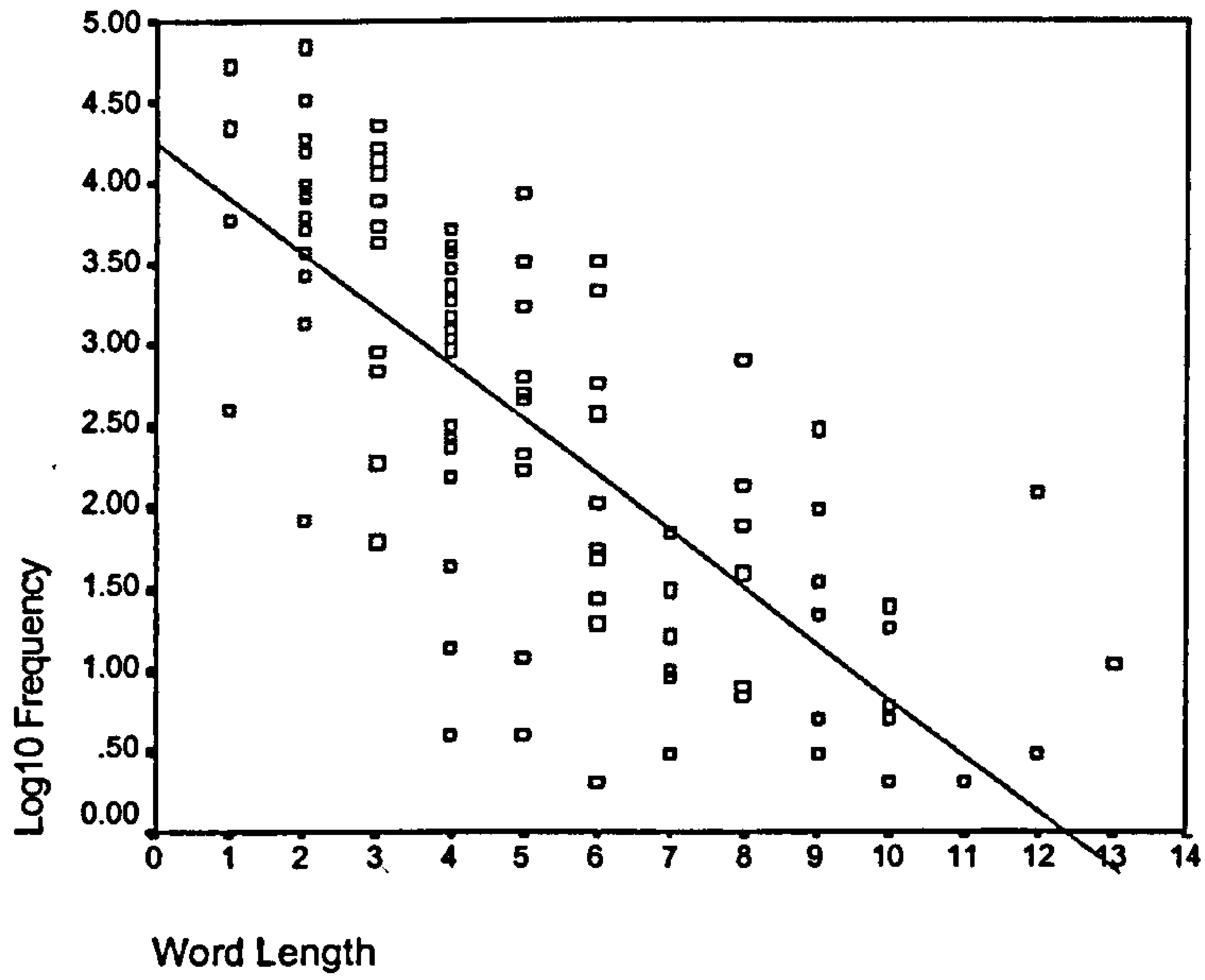

Figure 4.1. Distribution of the Albanian test words depending on length and log10 frequency.

4.2.1.3 Word Comprehension test

After the reading test was completed, in order to assess word comprehension ability, each child was asked to explain the meaning of each word by giving a synonym, an explanation, or a correct usage in a sentence. Each word was presented visually and was also read aloud by the experimented. The responses were noted on a separate sheet. If more than five consecutive meaning errors were made the test was discontinued.

4.2.1.4. Spelling test

The 100-word reading test list was also used as a spelling test. The words were administered to the same children approximately one week later. It was hoped that by administering the test a week later memory effects would be minimised. Given that the word list has 100 items it was very unlike that the children remembered every test item. Nevertheless, this issue should have been taken into consideration during the testing period. For example, the experimenter could have counterbalanced the order of test administration—this would have controlled for any possible memory effects. Another solution would have been to use different word items for each test (In fact the second solution was used in during the main study (Chapter 6)).

The spelling test was administered in a classroom setting and each child had to write down each individual word that was read by the experimenter (not in a sentence). All children worked at their own pace and the next word was read only when every child was ready. Each word was read three times and the maximum score was 100. Spelling accuracy was assessed at a later date and if five consecutive spelling errors were identified, marking was discontinued.

4.2.1.5 Nonword reading and spelling tests (NWR and NWS).

Both tests had 20 nonwords each. The first ten items were three-letter long and the last ten were four-letter long. Most of the nonwords were CVC and CVCV (Appendix 2); only five of the nonwords did not have CVC or CVCV structure (two items were VCV, two were CVCC and one was VCCV). In order to derive the non-words one or two letters (usually the initial ones) of real words were altered, thus creating orthographically legal pronounceable nonwords.

In the NWR tasks each child was individually asked to read the words correctly and told that the task completion time was being recorded. The number of items read correctly and the total time to read all the words was noted down.

The NWS task was administered in children's classrooms. The number of items spelled correctly was taken as the final score for this test. The maximum score for each of the tests was 20.

4.2.1.6. The phonological awareness tasks

In order to assess phonological skills at the phoneme level, segmenting and blending tasks were employed. Both tasks, which were administered individually, consisted of 16 different word-items of increasing length, starting with three-letter words and ending with thirteen-letter words (See Appendix 3). In the segmenting task each child was asked to separate the individual sounds of each word they heard (e.g. *ata* 'them' segmented into /a/, /t/, /a/). In the blending task the children were required to do the opposite of the segmenting task; the sound segments were provided by the experimenter and children had to pronounce the correct word (e.g. /d/, /u/, /a/, blended into *dua* 'want'). For both tasks the children were given a few examples followed by one or two practice items until they showed understanding of what was required from them. The maximum score for each of the tasks was 16.

4.2.1.7 Orthographic Awareness Task (OAT).

In this task participants were given 17 pairs of pronounceable pseudowords. For each pair, one item contained a bigram that never occurs in Albanian in the initial or final position, and the other item contained a bigram at the same position, which does occur in the language in that position (See Appendix 4). The participants had to circle on the answer sheet the member of each pair that "looked like a word" or "could be a word". For example, for the pair *stal* and *mtal*, the first word should be circled as the *st* bigram is legal in an initial position in Albanian, whereas *mt* is not. The test was administered in a classroom setting and the score was the numbers of correct responses.

4.2.1.8 Serial naming speed.

Four measures of naming speed were adapted from Van den Bos et. al. (2002). The tasks involved serial naming of digits, letters, colours, and objects (Appendix 5). Each task contained 50 items and was presented in five columns and ten rows on A4 sheets. Each item occurred ten times in the set of 50 items, which were presented in a random order. The serial digit naming task contained the numbers 1, 2, 4, 7, and 9; the serial letter naming task contained the letters A, E, P, T, and S (all in capitals); the serial colour naming contained yellow, blue, red, green, and black squares; and the object naming task contained drawings of a ball *top*, tree *pemë*, bird *zog*, watch *orë*, and dog *qen* (all these words are short and easy to pronounce). To start with, the first four columns were covered, and participants practiced with the fifth column of each task. After the practice trial they were asked to name the items on each sheet as fast as they could without making errors. A stopwatch was used to record the overall time on each list. Errors were not recorded. For these tasks, all children were tested individually in a quiet room in their school.

4.2.1.9 Vocabulary knowledge

The second edition of The British Picture Vocabulary Scale (BPVS II, Dunn, Dunn, Whetton, & Burley, 1997) was translated into Albanian. The translated test uses only the first 144 items of the BPVS II. Each item consist of four pictures, one of which has to be chosen that best matches the given word, which was read by the experimenter. Each participant had a short practice session until they showed full understanding of the instructions given. The 144 items, which increase in difficulty, are divided into 12 sets containing 12 items each. The administration of the test was stopped when the child failed to identify eight items within a set. The maximum score was 144 (See Appendix 6). The children were tested individually in a quiet room.

Following the administration guidelines of the BPVS II, the starting set was dependent upon participant's age. The testing for 6-7 y.o. began at set 3, for 8-9 y.o. began at set 4, and for 10-11y.o. at set 5.

4.2.1.10 Non-verbal intelligence

All the items from sets A, AB, and B from the Coloured Progressive Matrices (CPM) (Raven, 1958) were presented on an overhead projector in participants' classrooms. For each item there are six possible answers, which were represented on the answer sheet with numbers 1 to 6. The participants were required to circle one of the numbers (Appendix 7). A new item was presented when all the pupils had made a choice. The maximum score was 36.

4.2.1.11 Generic Speed

On an A4 sheet, 25 additions and 25 subtractions of one-digit numbers were presented. The additions were in separate columns from the subtractions, and all the calculations resulted in one-digit numbers (Appendix 8). First, the participants were asked to write down as many calculations as possible on the addition column within a time interval of 20 seconds. Then, they were asked to do the same for the second column, which contained the subtractions. The maximum score was 50.

4.2.2 Data collection

The data were collected in four different sessions one month before the end of the school year. See Table 4.2 for a summary of the tests administered within each session and the number of items for each test.

Session 1 (Group testing)	**Number of items**
Orthographic Awareness	17
Generic Speed	50
Non-verbal IQ	36
NWS	20
Sessions 2 and 3 (Individual testing)	
Word Reading 100	100
Word Comprehension	100
NWR	20
Blending	16
Segmenting	16
Vocabulary Knowledge	144
Serial Naming of digits	50
Serial Naming of letters	50
Serial Naming of colours	50
Serial Naming of objects	50
Session 4 (Group Testing)	
Word Spelling 100	100

Table 4.2. Sessions and number of items for each task

4.2.3 Reliability analysis

Table 4.3 shows the Cronbach's alpha for the tests for which it was possible to calculate it. The alpha level was very low for the OAT, Blending and Segmenting tasks. This means that these tasks may not be very reliable; thus analyses which include the results from these tasks should be carefully interpreted.

One reason as to why Cronbach's alpha is low for the OAT is that during the time the test was administered some of the children seemed very confused as to what they were supposed to do. As a result most of them went on selecting an item at random. Also it was noticed that with the Blending and Segmenting tasks some of the final words were rather obscure, infrequent and proved to be rather long for younger age group. Given these problems it is not surprising that OAT, Blending and Segmenting tasks are not as reliable as the rest of the test used in the pilot study.

Tasks	Cronbach's a	Number of test items
Word reading	.86	100
NWR	.70	20
Word spelling	.93	100
NWS	.86	20
Non-verbal IQ	.90	36
OAT	.59	17
Segmenting	.58	16
Blending	.67	16

Table 4.3. Cronbach's alpha values for newly developed tests.

4.3 Main study materials: Albanian, English and Welsh

4.3.1 Measurement tools

4.3.1.1 Compilation of word-lists

Four lists[1] of 100 test-words for Albanian, English and Welsh were designed by taking the word types that composed million token word frequency counts for Albanian (ATC), English (CELEX, Baayen, Piepenbrock & Van Rijn, 1995) and Welsh (Ellis, O'Dochartaigh, Hicks, Morgan & Laporte, 2001), sorting them in decreasing frequency of occurrence, and randomly sampling one word from each of 100 successive strata of decreasing *log10* written word frequency. Next, starting from the first word every other word was selected: this method resulted in four word lists matched for frequency with 50 words each. The first word-list was used for the reading tasks (OMRT); the second was used for the spelling task (Spelling 50); the third was used to devise nonwords for the NWR tasks; and the fourth was used to devise nonwords for the NWS tasks.

All 12 word lists resulted in comparable log10 frequency and word length (Frequency, $F(11,39)=1.46$, *ns*; Length $F(11,39)=.90$, *ns*).

4.3.1.2 One Minute Reading Test (OMRT)

Within each language the first word list was used as a one minute reading test. All 50 words were presented on two columns on an A4 sheet (See Appendix 10). Children were asked to read the words presented in each column as quickly as possible. The number of words read in a minute and the number of errors made were recorded on a separate sheet. The final score consisted of the number of words read per second.

4.3.1.3 Word comprehension test

After the OMRT was completed, in order to assess the word comprehension level on the computerised reading tests, Welsh and English children were asked to explain the meaning of each word by giving a synonym, an explanation, or a correct usage in a sentence. The responses were noted on a separate sheet. Please note that the Albanian children were asked to give the meaning of the complete 100-word list. This is because prior to OMRT Albanian children received a 100-word reading test. Therefore, two scoring methods were used. The first scoring method consisted of responses for every other item, thus creating a score for Word Comprehension 50. The second scoring method is described in 4.3.1.11 and was used for additional analysis within Albanian language.

[1] In order to generate four similar word lists for each language, the first 20 most frequent words were

4.3.1.4 Spelling 50

Within each language[2] the second 50-item word list was used as a spelling test. The spelling test was administered in a classroom setting and each child had to write down each word that was read by the experimenter. All children worked at their own pace and the next word was read aloud only when all the children were ready. Each word was repeated twice in isolation, and once in a sentence. The maximum score was 50.

4.3.1.5 Nonword Reading (NWR) and Nonword Spelling (NWS)

Within each language, the two remaining 50-item word lists were used to devise a nonword reading and a nonword spelling task. In order to devise the non-words, for each word in the 50-item lists, one or two letters (usually the initial ones) were altered, resulting in orthographically legal pronounceable nonwords for all Albanian and Welsh items. However, experimenter errors occurred when creating the English nonwords. Many of the items contained illegal combinations of letters (e.g., sver, srice and sroop). As a result English children's scores will be negatively affected as they will be less accurate and will spend more time on each of the items that contain illegal combinations. These errors will have a severe impact on the interpretations of the results. The actual nonwords for both tasks are presented in Appendix 12.

The NWS task was administered in children's classrooms. Children were asked to write down the word they heard. Each non-word was read twice. The total

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not selected.

[2] Please note that the Albanian children spelled 100 word-items but afterwards two scoring methods were used. The first scoring method consisted of responses for every other item, thus creating a score for Spelling 50. The second scoring method is described in 4.3.1.11 and was used for additional analysis within Albanian language.

score consisted of the number of words correctly spelled and the maximum score is 50.

The NWR task was a time-limited test—children had to read as many nonwords as possible in a one-minute period. The 50 nonwords were presented in two columns on an A4 sheet. If the children read all fifty non-words within 1 minute, the completion time was noted. The total score consisted of non-words read per second.

4.3.1.6 Non-verbal intelligence

All the items from sets A, AB, and B from the Coloured Progressive Matrices (CPM) (Raven, 1958) were presented on A3 size sheets in children's classrooms. For each item there were six possible answers. The participants were required to write down the number that corresponded to the correct answer. A new item was presented when all the pupils had made a choice. The maximum score was 36 (see Appendix 13).

4.3.1.7 RAN

Seven measures of naming speed were adapted from Van den Bos et. al. (2002). The tasks involved serial naming of digits, numeral, letters, colours, colour names, objects and object names (Appendix 14). Each task included 50 items and was presented in five columns and ten rows on A4 sheets. Each item occurred ten times in the set of 50 and was presented in a random order.

In all three languages the serial digit naming task contained the numbers 1, 2, 3, 5, and 8; the serial numerals naming tasks contained numerals one, two, three, five and eight; the serial letter naming task contained the letters A, E, P, T, and S (all in capitals).

An effort was made to match for word length for items of picture naming, picture word naming, colours, and colour names tasks. As a result items differed across the three languages[3]. In Albanian the serial colour naming contained yellow, blue, red, grey, and black squares; the serial colour word naming contained the words *yellow, blue, red, grey,* and *black*; the object naming task contained drawings of a ball *top*, tree *pemë*, bird *zog*, watch *orë*, and a dog *qen* (all these words are short and easy to pronounce); and the object word naming task contained the words for ball *top*, tree *pemë*, bird *zog*, watch *orë*, and a dog *qen*.

In English the serial colour word naming task contained yellow, blue, red, orange, and black written words; the object naming task contained drawings of a ball, hat, man, boat, and cat (all these words are short and easy to pronounce); and the object word naming task contained the words for *ball* , *boat*, *hat*, *man* and *cat*.

The Welsh RAN tasks version used the same items for the, object and colour word naming as the English version, but translated into Welsh.

All words were presented in bold, 24pt font. Firstly, the first four columns were covered, and participants practiced with the fifth column of each task. After the practice trial they were asked to name the items on each sheet as fast as they could without making errors. A stopwatch was used to record the overall time on each list. Errors were recorded but were not taken into account during analysis. For the naming tasks, all children were tested individually in a quiet room in their school.

Time taken to name digits, numerals, colours, colour words, letters, pictures, and picture words was recorded. The final score for each sheet consisted of items named per second. The mean scores of the alphanumeric stimuli naming tasks (digits, letters, picture words, colour words and numerals) were combined into one single

[3] More specifically items in Albanian were different from those in Welsh and English whereas the

variable—RAN Alphanumeric. Mean scores of object and colour naming tasks were combined into a second single variable—RAN Objects and Colours.

4.3.1.8 Phoneme deletion

The phoneme deletion test consisted of 30 items. After a word has been orally presented, the participant is asked to delete an initial, medial or final phoneme pronounced by the experimenter. There were ten initial, ten medial and ten final phoneme deletions (Appendix 15). All participants were given a few practice trials to ensure that they understood the instructions. The final score consisted of the number of correct responses. The maximum score was 30.

4.3.1.9 Generic Speed

This is the same as in the pilot study materials (see section 4.2.1.11) with one change in the final score. The data was converted into number of correct calculations per second. This was done to match the final measurement used in Reading 50 and RAN tasks.

4.3.1.10 Wordchains

The Wordchains task was used to measure orthographic knowledge. This test consists of 120 word-chains (Miller-Guron, 1998). A word chain consists of a three or four words linked together (e.g. 'sandcoffeeblue') and participants are required to identify all words within a chain by separating them with a pencil slash (e.g. 'sand/coffee/blue'). This test was translated in Albanian and Welsh: the original words were replaced with words that had similar meaning and comparable word length (see Appendices 16, 17 and 18).

Welsh and English items were the same

All participants were given a few practice trials. This is a timed test and after a practice session, the participants have to divide as many chains as possible within 3 minutes. The total score consists of the number of correctly divided chains.

4.3.1.11 Additional reading and spelling tests for Albanian

No known studies have yet been conducted on the acquisition of reading in the Albanian language, therefore additional efforts were made to examine the development of literacy skills in Albanian in as much depth as possible. In addition to the tests described above, Albanian children received three more tests: Reading 100, Spelling 100 and Word Comprehension 100.

Reading 100: Reading 100 was a computerised reading test and consisted of 100 words of decreasing frequency presented on a portable Macintosh Power PC computer screen[4]. For this reading test, all 100 items of the first word list were used (see section 4.3.1.1.)

The items in the reading word-list ranged in frequency from 1973 *atë* 'that' down to 1 *goma* 'tyre' (see Appendix 9).

All children were tested individually in a large, quiet room. They were asked to read the words that appeared on the computer screen and to speak loudly and clearly because they would be recorded. If the child made no response after 15 seconds, the experimenter would ask them to try the next word. Each child was given four practice words. The reading test was discontinued if 5 consecutive errors were made. The maximum score for this test was 100 and the reading errors were recorded on a separate sheet by the experimenter. In order to avoid possible environmental noise effects, latency values below 300ms were excluded from the analysis. This resulted in only 126 latency values being excluded. Please note that the Albanian children also received a 50 word reading test (OMRT). For the OMRT every other word item of Reading 100 was used. However, the OMRT was administered several weeks later, thus minimising or even avoiding any possible carry over effects. Although, the OMRT was a time-limited test (1 minute), memory effects might have affected the Albanian children's scores. A solution to this problem would have to been to either used different word items matched for frequency and word length or to use counterbalancing techniques.

Comprehension 100: After Reading 100 and OMRT were completed, in order to assess the word comprehension level on the computerised reading tests, each child was asked to explain the meaning of each word by giving a synonym, an explanation, or a correct usage in a sentence. The responses were noted on a separate sheet. All items were presented to all children however, for scoring purposes a cut-off point of five consecutive errors was used.

Spelling 100: The second 100-word list generated for Albanian (see section 4.3.1.1) was used as a spelling test. The word items in the spelling word-list ranged in frequency from 1972 *ju* 'you' down to 1 *bujk* 'peasant'. This test was matched for *log10* frequency to Reading 100 word list and resulted in comparable word lengths.

All the items of the spelling test were administered in a classroom setting and each child had to write down each word that was read by the experimenter. All children worked at their own pace and the next word was read only when each child was ready. Each word was repeated twice individually, and once in a sentence (see Appendix 11). During the scoring process, a cut-off point of five consecutive errors was used. The maximum score was 100.

[4] The computer was programmed using *SuperLab*, Version 1.03 (Abboud & Sugar, 1997).

4.3.2 Data collection with the Albanian sample

Albanian data were collected in three different sessions one to two months before the end of the school year. See Table 4.4 for a summary of the tests administered within each session and the number of items in each test.

Session 1 (Group testing)	**Number of items**	**Time limit**
Word Spelling	100	
NWS	50	
Wordchains	120	3 mins
Non-verbal IQ	36	
Generic Speed	50	40 secs
Session 2 (individual testing)		
Word Reading 100	100	
Word Comprehension	100	
NWR	20	1 min
Phoneme Deletion	30	
Serial Naming of digits	50	
Serial Naming of numerals	50	
Serial Naming of letters	50	
Serial Naming of colours	50	
Serial Naming of colour names	50	
Serial Naming of objects	50	
Serial Naming of object names	50	
Session 3 (individual testing)		
OMRT	50	1 min

Table 4.4. Session and number of items for each task

4.3.3 Reliability analysis for the Albanian tasks

Table 4.5 shows Chronbach's alpha values for the tests[5] used in the main study. All variables presented below have a high alpha value.

Tests	**Chronbach's alpha**	**Number of test items**
Reading 100	.81	100
OMRT	.78	50
NWR	.93	50
Spelling 100	.89	100
Spelling 50	.93	50
NWS	.87	50
Word Comprehension 100	.85	100
Word Comprehension 50	.84	50
CPM	.87	36

Table 4.5. Reliability analysis for the main study's Albanian materials.

4.3.4 Data collection for the English and Welsh samples

Data for the English and Welsh parts of the main study come from a larger study—Welsh Dyslexia Project[6]—carried out by the Dyslexia Unit and the School of Psychology, U.W.Bangor. Only total scores for each test have been used for the following analysis; individual item data was not available for examination.

[5] Chronbach's alpha was calculated only where item data was available.
[6] The author of this thesis was actively involved with the design and the data collection of this project.

Chapter 5: Pilot study in Reading and Spelling Development in Albanian

5.1 Introduction

Recent research has begun to look at differences in the development of reading and writing skills across languages and at the different writing systems, that is, ways in which sounds represent letters in spelling and letters represent sounds in reading. It is thought that differences in writing systems may affect the rate of reading and spelling acquisition, the development of phonological and other language skills, the sort of reading strategy the children will acquire and the incidence and severity of reading disorders (Goswami et al., 1998).

No known studies have yet been conducted on the acquisition of reading in the Albanian language. It is important to examine learning to read in Albanian, because this language is a very special one in several respects. It forms a single branch of the Indo-European family, spoken by over 3 million people in Albania, and parts of the former republic of Yugoslavia, Greece and Italy. Because the writing system is relatively young, it is highly transparent. Indeed it has few competitors in this respect (e.g., Finnish, Serbo-Croatian and Hangul, the Korean script, match its transparency). Thus Albanian provides a perfect test-bed to further extend existing findings on the acquisition of literacy in a perfectly transparent writing system.

This thesis attempts to examine how much of their own language can English, Welsh and Albanian children read. Therefore, the methodology used here is based upon the one used by Ellis and Hooper (2001). The pilot study reported[1] here aims to

[1] Findings from this chapter are published in (1) Hoxhallari, van Daal and Ellis (2004) and (2) Ellis, Natsume, Stavropoulou,, Hoxhallari , Van Daal, Polyzoe, Tsipa, and Petalas (2004).

extend the Ellis and Hooper (2001) findings. Using word-lists matched for written frequency as reading tests they determined that: (i) Welsh children were able to read aloud accurately significantly more of their language (61% of tokens, 1821 types) than were English children (52% tokens, 716 types); (ii) the reading latencies for Welsh children were longer than for English children; (iii) the error patterns differed, with English children producing more visually similar real word substitutions, whereas Welsh children produced more non-word type mispronunciations; and (iv) reading latency was a clear function of word length in Welsh but not in English. These findings suggest that the transparency of the orthography has an effect on reading development and that Welsh children read by a GP synthetic strategy, whereas English children rely on lexical retrieval on the basis of partial visual analysis of the written words.

5.1.2 Balancing for frequency

The main method employed in the present study is the balancing of reading and spelling materials on frequency. Ellis and Hooper (2001) argued that once frequency is taken into account, the matching process should not control for other factors such as imageability, word length, utility, morphological complexity, orthographic complexity, etc., because 'everything to do with learning opportunity should be matched; everything to do with language should be freed to vary' (Ellis & Hooper, 2001, p. 577).

5.2 Aims and Hypothesis

The first aim of the pilot study was to extend the work done by Ellis and Hooper (2001) with same age Year 1 Albanian children. Thus data collected from Albanian children is compared with Ellis & Hooper's (2001) data.

In addition, the present research takes into account the development of spelling as well as the development of reading ability. The pilot study aimed at assessing reading and spelling abilities of Albanian primary school children from Years 1, 2 and 3; and carry out exploratory analysis in identifying skills involved in learning to read and to spell in Albanian.

5.2.1 Hypotheses concerning the Ellis and Hooper study

H.5.2.1.1. The first hypothesis is that Year 1 Albanian children will be reading more words than English children, because they are expected to use the grapheme-phoneme conversions which are very regular for the Albanian orthography.

H.5.2.1.2. Following the first hypothesis, it expected that word latencies for the Year 1 Albanian children will be longer than the latencies for the English children.

H.5.2.1.3. Ellis and Hooper (2001) found that Welsh children read significantly more words than the English children; however, they knew fewer word-meanings than the English children. They suggest that this may have resulted as a consequence of their bilingualism. If that is the case, then the monolingual Albanian children are expected to know more word meanings than the Welsh children.

H.5.2.1.4. The next hypothesis concerns the error types. Ellis and Hooper (2001) found that English children producing more visually similar real word substitutions, whereas Welsh children produced more non-word type mispronunciations. It is predicted that errors made by Albanian will be more non-word type errors, than word replacement.

5.2.2 Hypotheses related to Year 1, 2, and 3 Albanian children

H.5.2.2.1. Within the Albanian sample, due to the amount of literacy instruction received, it is expected that older children will perform better than younger ones in reading, spelling and all the sub skills tasks.

H.5.2.2.2. The Albanian orthography is highly transparent bi-directionally, therefore there should be no discrepancy between children's reading and spelling scores.

H.5.2.2.3. With regard to the RAN tasks, rapid naming of digits and letters should be more related to reading than rapid naming of objects and colours.

5.2.3 Age differences

The children participating in the present study are of the same chronological age as the English and Welsh children of Ellis and Hooper (2001). However, it should be noted that most English and Welsh children go to nursery school and play groups at the age of 3-4, where they are taught literacy skills such as letter knowledge and sound awareness. Thus, by the time English and Welsh children enter formal education at the age of 5, they already have some knowledge of the letters and the alphabet. In Albania, programs similar to the nursery schools of England and Wales do not exist, and only a minority of preschoolers go to kindergarten. Many, though not all, of these Albanian kindergartens are similar in ethos to the Austrian ones described by Wimmer and Hummer (1990), where activities such as word exposure and letter recognition are explicitly discouraged. The consequence is that most first graders in Albania enter school without letter or written word awareness (Hoxhallari, 2000). Thus the three language groups are matched for chronological age but the Albanian children have had less print exposure and less reading instruction. These aspects of the design thus bias *against* any literacy advantage in the Albanian group. Similarly, although SES was not assessed, Albania is a much less wealthy country than Britain with concomitantly less resources to invest in education and health. This is another factor which would bias against the hypothesis.

5.3 Method for comparing with Ellis and Hooper study (2001)

5.3.1 Participants

In order to compare reading accuracy of Albanian children with that of English and Welsh children from the Ellis and Hooper study, 20 monolingual Albanian children from a primary school located in a city in south-east Albania took part in the experiment. The participants were medium-achieving pupils on the most recent maths test administered by the classroom teacher, a method, employed by Bast and Reitsma (1997), to exclude the worst and best students from the study. Although this selection procedure differed from that of Ellis and Hooper who examined whole classes, the results are still comparable as average achievements are examined and not at the range of individual differences. It should be noted that the sizes Albanian classess were much larger (over 30 children per class) than those of Ellis and Hooper. Thus the process of selecting the middle 20 achieving children in a maths test serves as a random selection process.

Despite the fact that the Albanian orthography is extremely transparent and used to be taught with a phonics method, the Albanian government has recently prescribed a whole word method, known as the Global method (Xhumari, 2003) for all state schools in the country. Therefore many experienced teachers, including the teacher who taught the children who participated in the present research, use a mix of the global/whole word and phonics method. Thus, the teaching method used to teach literacy to the Albanian children who participated in this research is similar to teaching method employed in English and Welsh schools in that it is a mixture of techniques. Again, *contra* the hypothesis, any predominance of the Albanian national curriculum should bias towards a whole-word rather than an alphabetic reading strategy.

There were eight boys and twelve girls, with a group mean age of 7 years and 6 months (*SD* = 6 months). According to the classroom teacher, all the participants were normally developing children with no reading or spelling difficulties, and they came from a mix of social backgrounds. There is no reason to believe that the school attended by the children was either a very good or a very poor performing school. We believe therefore that the participants are a representative sample of Albanian school children. Prior to testing the Albanian children had received formal reading instruction for 8 months. The data collected from the Albanian children was compared to the existing data from Ellis and Hooper. In their study 20 Welsh children were selected from the Welsh primary schools and 20 English children from English schools. There were 17 girls and 23 boys. They were either 6 or 7 years old and attended Year 2. The two groups were matched with regard to their participants' exposure to reading, with the majority having only been introduced to reading at school. Testing was carried out during the second semester of the school year.

5.3.2 Materials

The Albanian 100-word reading test is described in detail in Chapter 4, sections 4.2.1.1 and 4.2.1.2.

5.3.3 Procedure

Each participant was tested by a pair of experimenters. Three pairs of experimenters worked in one large room, far from each other, so that the participants could not disturb each other. The word reading procedure was identical to the Ellis and Hooper study. The participants were asked to read the words and to speak loudly and clearly because they would be recorded on a tape. The tape was used as a backup in case the experimenter missed the timing of the response. A piece of plain card was used to cover the list, and the child was asked to move the card down when the first experimenter said 'next', and to read the following word immediately. A stopwatch was used to record latencies, from the onset of word presentation to the response onset. Using a stopwatch like this provides sufficient reliability to clearly discriminate individual differences between readers and between words—for example, the inter-observer correlation between the reaction times measured by two separate experimenters measuring the word-readings of the same child was highly significant (r=0.93, p<0.01). If the child made no response after 15 seconds, the experimenter would ask them to try the next word. Each child was given up to four practice trials to show that they understood the instructions. The reading test was discontinued if five consecutive errors were made. The reading errors were written down on a separate sheet by the second experimenter.

After the reading test was completed each child was asked to explain the meaning of each word by giving a synonym, an explanation, or a correct usage in a sentence. Each word was presented visually and was also read aloud by the experimenter. The responses were noted on a separate sheet. If more than 5 consecutive meaning errors were made the test was discontinued.

5.4 Results

Reading accuracy. The Albanian children read on average up to the 80th word from the reading list ($SD = 16.42$). In the Ellis and Hooper study the English children read on average up to the 52nd word ($SD = 11.7$), and the Welsh children read up to the 61st word ($SD = 16.2$). These group differences are significant (by item $F(2, 98) = 40.4, p < 0.001$; by subject $F(2, 38) = 20.71, p < 0.001$). Post-hoc Bonferroni test showed that the Albanian children were significantly better at reading accuracy than both the English and the Welsh children.

In order to verify these effects are not due to minor differences between the token frequency distributions of the parallel test items in the three languages, effects of language on accuracy using ANCOVAs with *log10* frequency as the covariate were assessed. The language group differences remained highly significant $F(2, 95) = 33.80, p < 0.001$. Post-hoc Bonferroni test showed that the Albanian children were significantly better at reading accuracy than both the English and the Welsh children.

For the Albanian sample gender ratio had no effect on reading accuracy $t(18)=-0.56$, n.s. (by subject analysis).

Reading latency. Albanian children read on average with a pace of 2.66 sec/word ($SD = 1.58$), with the short words being read at an average pace of 1.49 sec/word ($SD = 0.65$) and long words at 3.87 sec/word ($SD = 1.33$). The English children read on average at 1.41sec/word ($SD = 1.13$), and the Welsh children at 1.85sec/word ($SD = 1.11$). These group differences are significant (by item $F(2, 98)$

$= 16.8, p < 0.001$; by subject $F(2, 38) = 24.69, p < 0.001$). Post-hoc Bonferroni test showed that the Albanian children's reading latencies were significantly longer than both English and Welsh children's reading latencies. These effects of language group on latency remain significant when tested by ANCOVA with *log10* frequency as the covariate $F(2, 95) = 15.13, p < 0.001$. Again, post-hoc Bonferroni test showed that the Albanian children's reading latencies were significantly longer than both English and Welsh children's reading latencies.

Regression analysis for the Albanian group relating latency of correct responding to *log10* frequency shows that that reading latency increases by 0.89 units for each decreasing *log10* frequency step ($B = -0.89$, SE B $= 0.079, \beta = -0.75, F(1, 98) = 124, p < .01$).

Figure 5.1 depicts the reading latencies for correctly read items in Albanian, Welsh and English. It is clear that for the first 30 to 40 items the latencies for all groups are not very different. The main differences in word latencies appear to be for the last 50 items, especially between the English and Albanian children. A regression of reading latencies on test word number resulted in the following functions for the Albanian children y = 0.041x + 0.579, English children y = 0.013x + 0.863, and Welsh children y = 0.021x + 0839 (Albanian $B = 0.041$, SE B $= 0.004, \beta = 0.75, F(1, 98) = 128, p < .0001, R^2 = 0.56$; English $B = 0.013$, SE B $= 0.005, \beta = 0.30, F(1, 98) = 7.71, p < .01, R^2 = 0.087$; Welsh $B = 0.021$, SE B $= 0.03, \beta = 0.58, F(1, 98) = 48.61, p < .001, R^2 = 0.33$). Using the z-statistic (Sachs, 1982, p. 430) it was found that the R^2 s differ significantly from each other between all three language groups (all $z > 1.96$, $p < 0.05$).

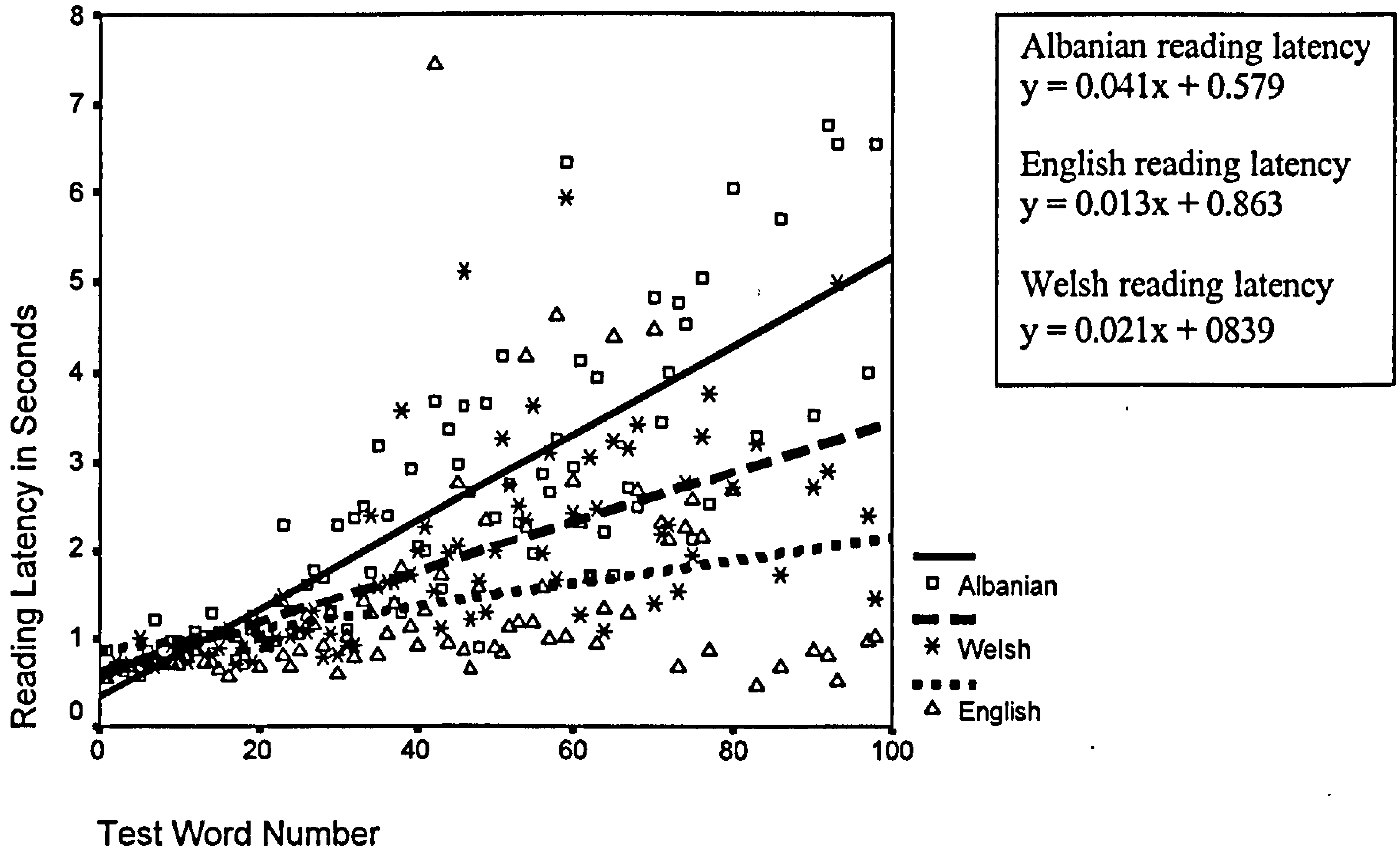

Figure 5.1. Reading latencies for correctly read words in Albanian, English and Welsh.

Reading latencies as a function of word length. Regression analysis reveals that for the Albanian children, reading latency is a function of word length $B = -0.50$, SE B $= 0.021, \beta = -0.93, F\,(1, 98) = 587, p < .001$. Figure 5.2 shows that reading latency for correct responses is more a linear increasing function of word length for the Albanian children ($R^2 = .86$) than for the English ($R^2 = .22$) and the Welsh children (R^2=.68). Using the z-statistic it was found that the R^2 s differ significantly from each other between all three language groups (all z > 1.96, p < 0.05).

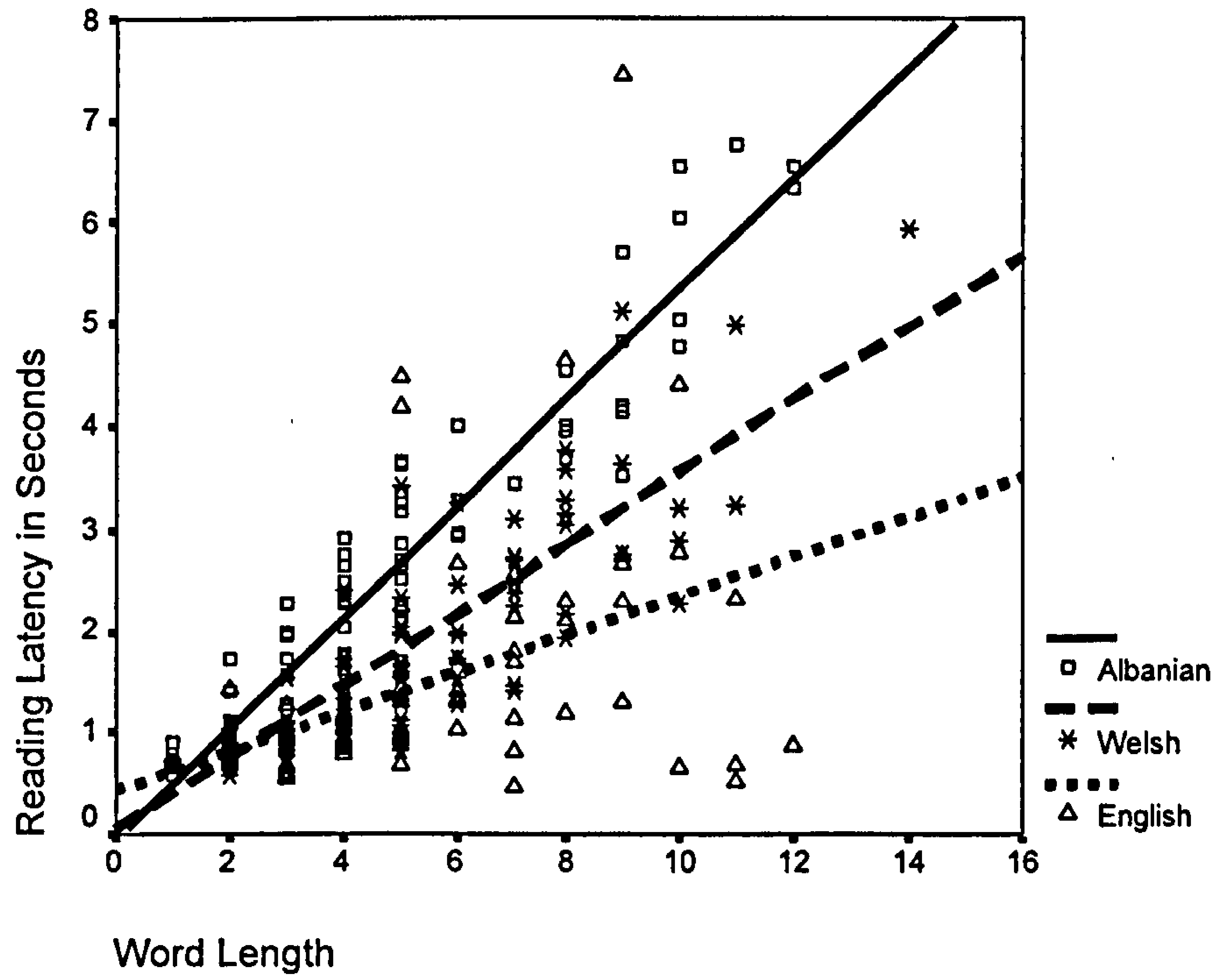

Figure 5.2. Latency as a function of word length for words correctly read aloud.

Word comprehension. On average, the Albanian children gave accurate definitions or appropriate usages for 50% ($SD = 11.09$) words of the reading list. Compared to Ellis and Hooper, where the word comprehension results for the English and Welsh children were 45% and 36 % respectively, the scores for the Albanian sample are higher ($F(2, 98) = 50.1, p < 0.001$). Post-hoc Bonferroni tests showed that Welsh children had significantly lower word comprehension scores than English and Albanian children; no significant differences were found between Albanian and English children. ANCOVAs with *log10* frequency as the covariate revealed similar results—the language group differences remained significant $F(2, 95) = 3.69, p < 0.05$. Post-hoc Bonferroni tests showed that for reading comprehension, there were significant differences between the Albanian and Welsh children but not between Albanian and English children.

In Figure 5. 3 reading and word comprehension scores for English, Welsh and Albanian are presented. It is clear that Albanian children read more words than English and Welsh children, and that word comprehension scores are much lower for the Welsh group. As already reported above these differences were found to be significantly different (Post-hoc Bonferroni tests). When the ratio of words comprehended and word read is considered, Year 1 Albanian children could read beyond their comprehension level. Their reading accuracy: word comprehension ratio was 1.61. This ratio is similar to the Welsh ratio 1.68, but not to the English ratio 1.16. This indicates that both Albanian and Welsh children could accurately read more words that they could comprehend, whereas English children could read only a little beyond their word comprehension level.

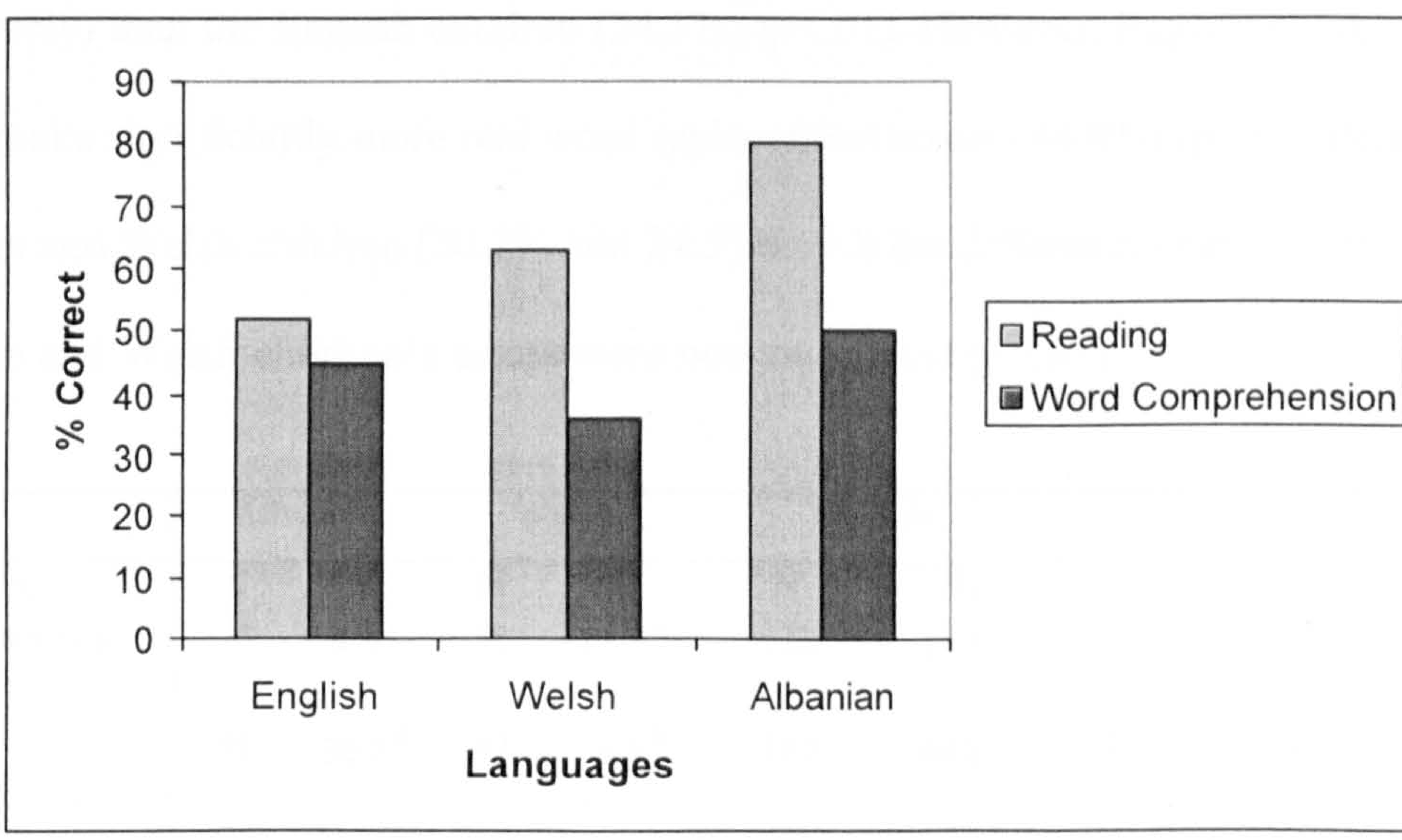

Figure 5. 3. Reading and Word comprehension scores for English, Welsh and Albanian.

Reading Errors. In total 296 errors were made by the Albanian children. The errors shown in Table 5.1 were classified as null responses (no response within 15 seconds), word replacements, or other attempts, which resulted in non-word responses. Examples of error types made by the participants in each language are presented in Table 5. 2. Most of the errors made by the Albanian children were non-word errors (64.9%), whereas null responses were very rare (only 4.4%). Whole word substitutions (30.7%) were not as frequent as nonword errors. Table 5.1 also shows the distributions of Welsh and English errors. Overall, the error rates suggest that Albanian and Welsh error patterns are very similar, whereas the English errors are quite differently distributed. Univariate ANOVA revealed significant differences between languages for each of the three error types. Post hoc Bonferroni tests revealed that Albanian and Welsh children had significantly fewer null responses (4.4% and 13.7% respectively) than English children (30.8%) ($p<.01$). Furthermore, Albanian and Welsh children commit more non-word errors (64.9% and 72.5% respectively) than the English children (24.5%) ($p<.01$). However, English children tend to make significantly more real word replacement errors (44.8%) ($p<.01$) than Albanian and Welsh children (30.7% and 24.3%). All the differences between the Albanian and Welsh children's errors were non-significant ($p>.01$).

	Albanian		Welsh		English			
Error Type	N	%	N	%	N	%	Total	ANOVA
Null responses	13	4.4 [a]	52	13.7 [a]	112	30.8 [b]	177	$F(2,57)=12.97$, $p<.001$
Word replacements	91	30.7 [a]	92	24.3 [a]	163	44.8 [b]	346	$F(2,57)=7.25$, $p<.01$
Non-word errors	192	64.9 [a]	235	62.0 [a]	89	24.5 [b]	516	$F(2,57)=27.27$, $p<.001$
Total	296		379		364		1039	

Table 5.1. Frequency of error types for Albanian, Welsh and English children.

Note. [a,b]: Different letters show significantly different proportions for each error type across the year-groups (using the Post-hoc Bonferroni test).

	Nonword errors		Whole word replacements	
	Target	**Error**	**Target**	**Error**
Albanian	lidhur	lidhrur	ndan	mban
	duke	bukre	nuk	ku
English	political	polluska	though	thought through
	cryptic	crypitic	quick	queen
Welsh	prydyddion	ptydyddio	dwy	dwi
	segurdod	segurdob	caeodd	creodd

Table 5. 2. Example of error types.

5.5 Cross-sectional data on literacy development (Albanian)

Next, the literacy development of Year 1, 2, and 3 monolingual Albanian children was examined.

5.5.1 Participants

Participants were 60 monolingual Albanian children from a primary school located in a city in south-east Albania. There was an equal number of children from year one, two, and three (n=20). The 20 middle students, based on the most recent maths test results, were selected by the teacher of each class as participants. Following this method, which was first used by Bast and Reitsma (1997), the worst and best students were excluded from the study. As presented in Figure 5. 3, there were selected 8 boys and 12 girls in Year 1 (M=7 years and 6 months, *SD* = 6 months), 13 boys and 7 girls in Year 2 (*M* = 8 years and 4 months), and 10 boys and 10 girls in Year 3 (*M* = 9 years and 4 months).

	Mean age	SD	Gender	
	Years : months	months	# Males	# Females
Year 1	7 : 6	6	8	12
Year 2	8 : 4	4.4	13	7
Year 3	9: 4	5.3	10	10

Table 5.3. Mean and standard deviations for age; and gender distributions for years 1, 2, and 3.

5.5.2 Test Materials and Procedure

All tests materials have been described in detail the Chapter 4, Section 4.2. However, a very short description of each task is presented below.

5.5.3 Reading, Word Comprehension and Spelling tests

100-word reading and spelling test. The same reading test that was used in the cross-language comparison for Albanian was administered to all children across the three Albanian year-groups.

After the reading test was completed, in order to assess the Reading Comprehension level, each child was asked to explain the meaning of each word by giving a synonym, an explanation, or a correct usage in a sentence. The responses were noted on a separate sheet. If more than 5 consecutive meaning errors were made the test was discontinued. Inter-observer reliability analysis showed no differences between the scores of two different rates on the same child (*Kappa*=.95, p<.001).

The word list for the reading test was also used as a spelling test administered to the same children approximately one week later. The spelling test was administered in a classroom setting and each child had to write down each word that was read by the experimenter. All children worked at their own pace and the next word was read only when each child was ready. Each word was repeated three times and the maximum score was 100.

Nonword reading and spelling tests (NWR and NWS). Both tests had 20 non-words each (Appendix 2). In the NWR tasks each child was individually asked to read the words and told that the task completion time was being recorded.

5.5.4 Phonological awareness tasks

Segmenting and blending tasks were employed. Both tasks, which were administered individually, had 16 different words of increasing length and difficulty, starting with three-letter words and ending with thirteen-letter words (Appendix 3).

Rapid naming. Four measures of naming speed were adapted from Van den Bos et. al. (2002). The tasks involved serial naming of digits, letters, colours, and objects. Each task had 50 items and was presented in 5 columns and 10 rows in A4 sheets. Each item occurred 10 times in the set of 50 and was presented in a random order (Appendix 5).

5.5.5 Orthographic awareness task

In this task participants were given 17 pairs of pronounceable pseudowords. For each pair, one item contained a bigram that never occurs in Albanian in the initial or final position, and the other item contained a bigram at the same position, which does occur in the language in that position (See Appendix 4). The participants had to circle on the answer sheet the member of each pair that "looked like a word" or "could be a word".

5.5.6 Vocabulary knowledge.

The second edition of The British Picture Vocabulary Scale (BPSV II, Dunn, Dunn, Whetton, & Burley, 1997) was translated and adapted into Albanian. The adapted test uses only the first 144 items of the BPSV II (Appendix 6).

5.5.7 General ability

Non-verbal intelligence (Coloured Progressive Matrices, Raven, 1958) and Generic Speed were used to assess general abilities of all children (Appendices 6 and 7).

5.6 Results

5.6.1 Descriptive Statistics.

The means and the standard deviations for the three year groups on all tests are presented in Table 5.1. As expected, for most of the tests, the mean performance increases as a function of age. For NWR, and Segmenting the mean performance is slightly higher for Year 1 than Year 2 but these differences are not significantly different. The mean performance for the blending task between the three year-groups in not significantly different $F(59) = 0.60$, $p>0.5$, although the mean scores are in the expected direction.

Test	Year 1 (n=20)		Year 2 (n=20)		Year 3 (n=20)		F (2, 57)
	Mean	SD	Mean	SD	Mean	SD	
Word Reading 100	79.55	16.42	86.20	10.81	93.70	4.73	7.35**
Reading Latency (in seconds)	2.95	1.12	1.23	.45	.89	.26	42.35**
Word Comprehension	49.60	18.91	71.95	7.76	84.35	9.11	103.56**
Word Spelling 100	74.55	12.74	84.20	5.23	94.30	3.54	56.66**
NWR	16.55	2.89	16.40	2.84	18.50	1.82	4.18*
NWS	12.15	3.47	18.55	1.00	19.05	.89	64.30**
OAT	9.90	2.75	12.40	2.46	12.90	2.17	8.45**
Generic Speed	12.15	4.11	19.55	4.85	26.40	4.63	49.31**
Non-verbal IQ	13.45	6.67	16.90	4.20	25.70	4.71	28.38**
Digit naming (in seconds)	35.00	6.42	27.70	4.46	24.80	2.93	23.76**
Letter naming (in seconds)	36.15	10.86	27.95	5.17	26.55	6.74	8.49**
Colour naming (in seconds)	67.33	12.24	54.10	10.36	45.55	10.77	19.41**
Object naming (in seconds)	58.05	14.81	48.30	10.47	45.40	8.10	6.68**
Segmenting	11.95	1.93	11.35	2.01	13.80	1.88	8.66**
Blending	11.80	2.46	11.95	2.14	12.55	2.24	0.60
Vocabulary Knowledge	76.45	26.26	93.95	22.96	107.85	19.52	9.29**

Table 5.4. Descriptive statistics for Year 1, 2, and 3 Albanian children.

Note: ** p<.01, * p<.05

Post-hoc tests indicate that older children (especially Year 3 children) are much better than younger children. Most of the significant differences are between years 1 and 3, except in Word comprehension and NWR (see Table 5.5). Year 1 and 2 differ significantly from each other in many of the tasks except in Reading, Word comprehension, NWR, Non-verbal IQ, Segmenting and Vocabulary knowledge. Significant differences between years 2 and 3, are only in Word Comprehension, Spelling, NWR, Generic speed, Non-verbal IQ, and Segmentation task.

	Year 1 v. 2	Year1 v. 3	Year 2 v. 3
Word Reading 100		x	
Reading Latency	x	x	
Word comprehension	x	x	x
Word Spelling 100	x	x	x
NWR			x
Non-words read/second	x	x	x
NWS	x	x	
OAT	x	x	
Generic Speed	x	x	x
Non-verbal IQ		x	x
Digit naming	x	x	
Letter naming	x	x	
Colour naming	x	x	
Object naming	x	x	
Segmenting		x	x
Vocabulary Knowledge		x	

Table 5.5. Crosses indicate significant pairwise comparisons.

5.6.2 Serial naming measures

Table 5.6 shows that the means for Serial Digit and Letter Naming are very close to each-other. The same applies to Serial Colour and Objects naming. Also, correlations are relatively high .75 and .70 (Table 5.7). Therefore, it would be reasonable to combine digit and letter naming into a new variable and Colour and Object naming into another variable. This would increase the reliability of these variables.

n=60	Mean	Std. Deviation
Digit naming	29.17	6.42
Letter naming	30.22	8.91
Colour naming	55.67	14.21
Object naming	50.58	12.52

Table 5.6. Means and st. deviation for serial naming tasks.

	Digits	Letters	Colours	Objects
Digits				
Letters	0.76**			
Colours	0.63**	0.32*		
Objects	0.55**	0.30*	0.70**	

Table 5.7. Pearson Correlations for serial naming tasks.
Note: ** $p < 0.01$ level (2-tailed), * $p < 0.05$ level (2-tailed).

5.7 Analysis for the Year 1, 2, and 3 Albanian data

5.7.1 Reading Aloud Accuracy

There is a significant difference between the groups in the reading task. The Bonferroni test in Table 5.4 reveals that there is a significant difference between Years 1 and 3, but not between Year 2 and 1, and 2 and 3. These differences can be seen as the approximately 80th word from the reading list for Year 1 children, 86th for Year 2, and 94th for Year 3. Only five Year 1 children, and one Year 2 child, reached the cut-off criterion of 5 consecutive errors.

5.7.2 Reading Aloud Latency

Naming latencies for the correct responses are shown in Figure 5.4. Overall, the latencies are greater for Year 1; these were significantly different from Year 2 and 3 latencies (Year 1 M=2.66s, SD=1.58; Year 2 M=1.18, SD=0.69s; Year 3 M=0.85s, SD=0.51; $F(297)=85, p<0.001$). The scatterplot presented in Figure 5.4 also indicates that there is an increase in reading latency as a function of word frequency for each year group, especially for Year 1.

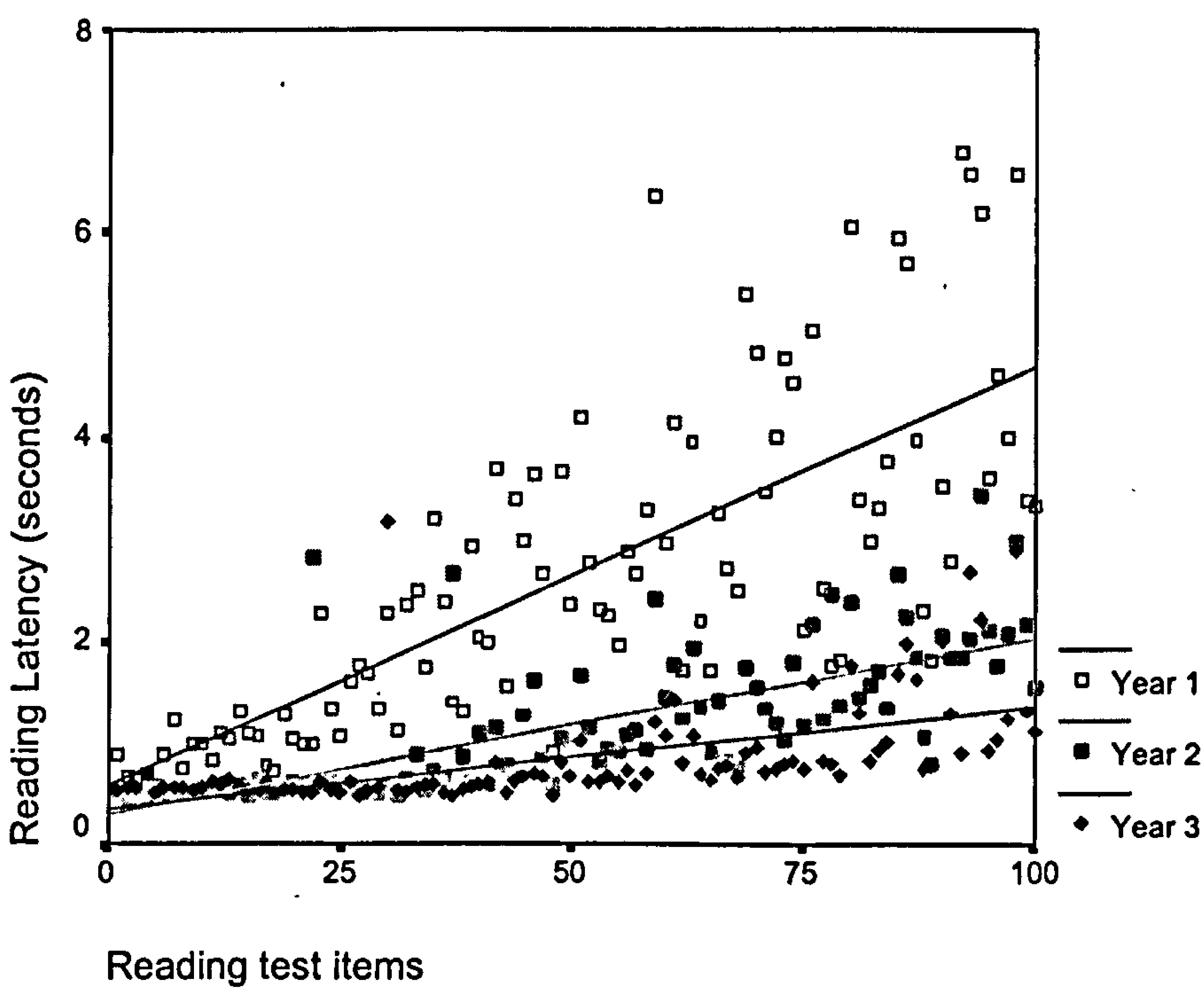

Figure 5.4. Reading latency for the test items correctly read aloud in Year 1, 2, and 3.

5.7.3 Reading Latencies as a function of word length

Regression analysis reveals that latency of correct responding is a function of word length especially for Year 1: Year 1 B=-0.02, $SE\ B$=.12, β=.94, $F(1. 98)=701.31$, $p<0.001$, $R^2 = 0.88$; Year 2 B=0.27, $SE\ B$=.10, β=.72, $F(1. 98)=105.77$, $p<0.001$, $R^2 =$

0.52; and Year 3 B=0.24, $SE\ B$=.08, β=.67, F(1. 98)=77.97, p<0.001, R^2 = .44.

Figure 5.5 shows the relationship between average reading latencies and word length. This function seems to be more linear for Year1 than Years 2 and 3.

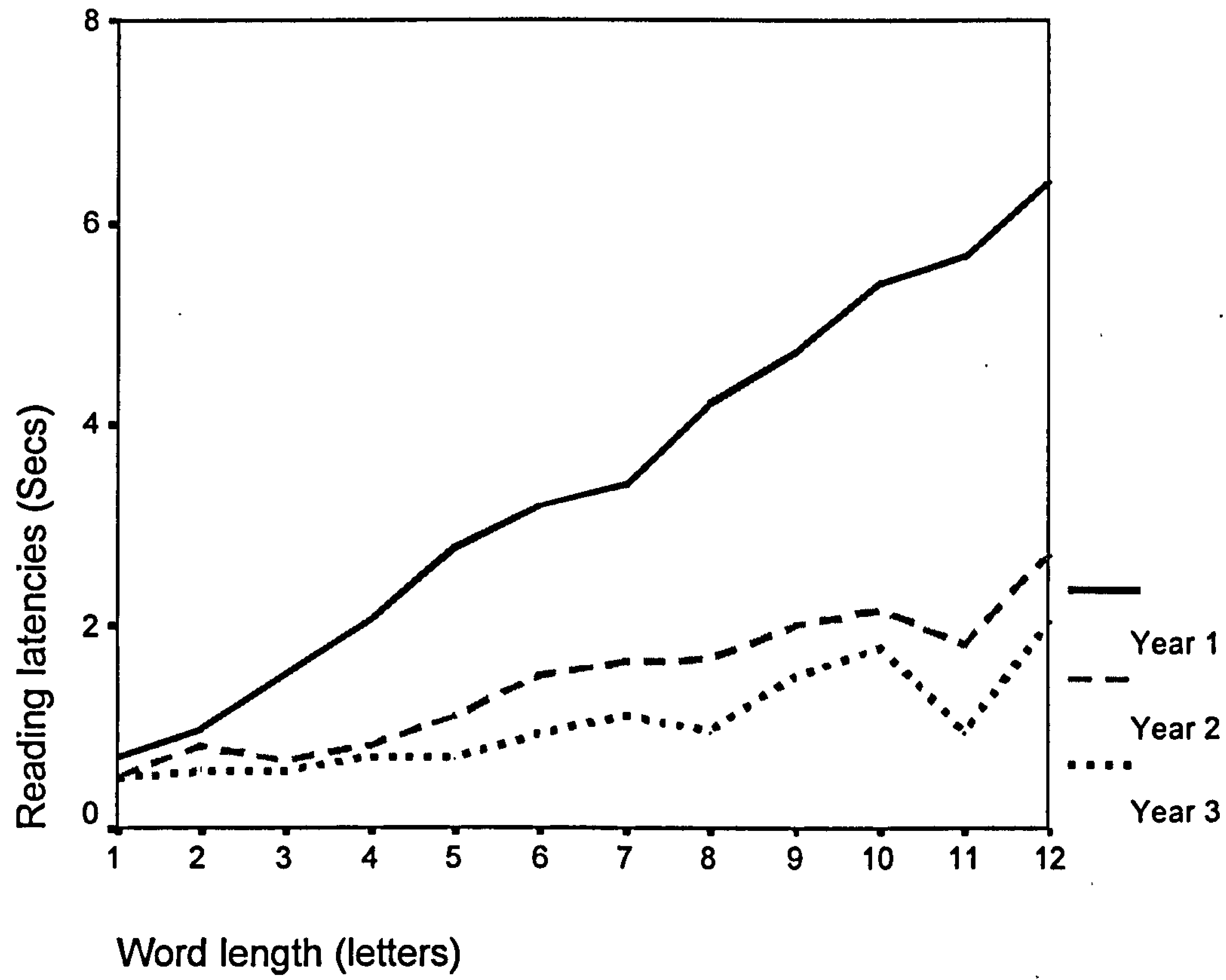

Figure 5.5. Latency as a function of word length for words correctly read aloud in Year 1. 2 and 3.

5.7.4 Word comprehension

Year 3 pupils show the highest performance in this test. There is a significant difference between the groups [F(57)=103.56, p<0.001], and the Bonferroni test reveals that there is a significant difference between all three years. Figure 5.6 indicates that Year 1 children read just a little beyond their comprehension level. On average, Year 1 children gave correct definitions approximately for 50% of the words, Year 2 children 72%, and Year 3 children 84%. The reading aloud and comprehension ratio for Year 1 is 1.61, whereas the ratio for Year 2 is 1.20, and Year 3 is1.11.

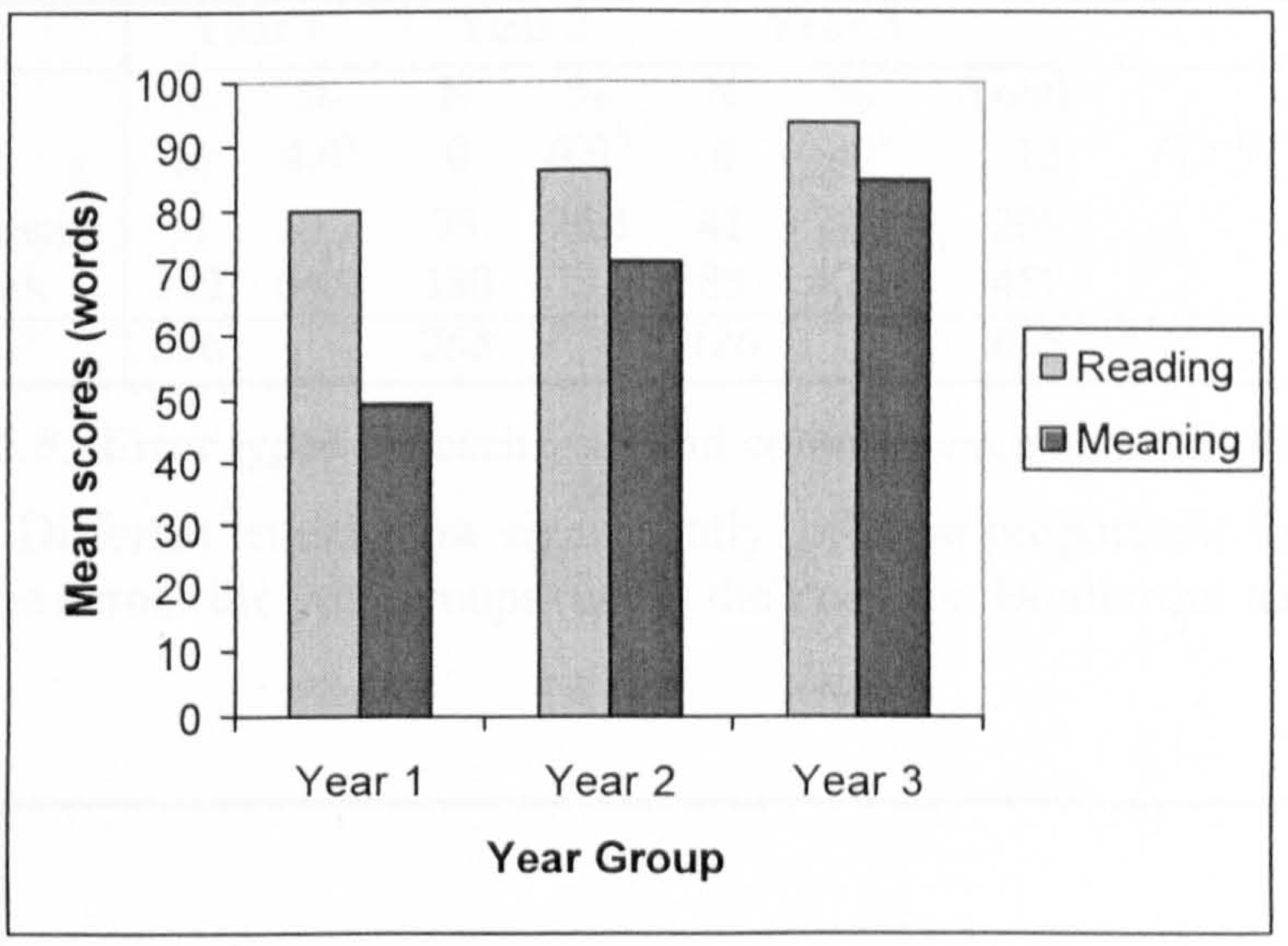

Figure 5.6. Reading and word comprehension mean scores for Year 1, 2, and 3.

5.7.5 Reading Errors

As in the Ellis and Hooper (2001) study, the reading test was discontinued if a child made 5 consecutive errors. This resulted in 296 errors for Year 1 children, 253 for Year 2, and 126 errors for Year 3. The errors shown in Table 5.8 were classified as null response (no response within 15 seconds), whole word substitutions, and other attempts which resulted in non-word responses. Year 1 children made most errors for all the types and Year 3 children make the least amount of errors. All three Albanian groups commit mostly non-word errors (Figure 5.7).

The proportion of nonword errors and whole word replacements made did not differ across the three year-groups ($F<1$, n.s.). The only difference was found with the null responses: Year 1 children made 13 of error type whereas Year 2 and 3 children made none (Bonferroni post-hoc test, $p<001$).

	Year 1		Year 2		Year 3			
Error Type	N	%	N	%	N	%	Total	ANOVA
Null responses	13	4.4[a]	0	0.0[b]	0	0.0[b]	13	$F(2,57)=8.80, p<.001$
Word replacements	91	30.7	73	26.1	41	22.2	205	$F<1$
Non-word errors	192	64.9	180	73.9	85	67.8	457	$F<1$
Total	296		253		126		675	

Table 5.8. Error types for each year and column percentages in Reading.

Note. [a,b,c]: Different letters show significantly different proportions for each error type across the year-groups (using the Post-hoc Bonferroni test).

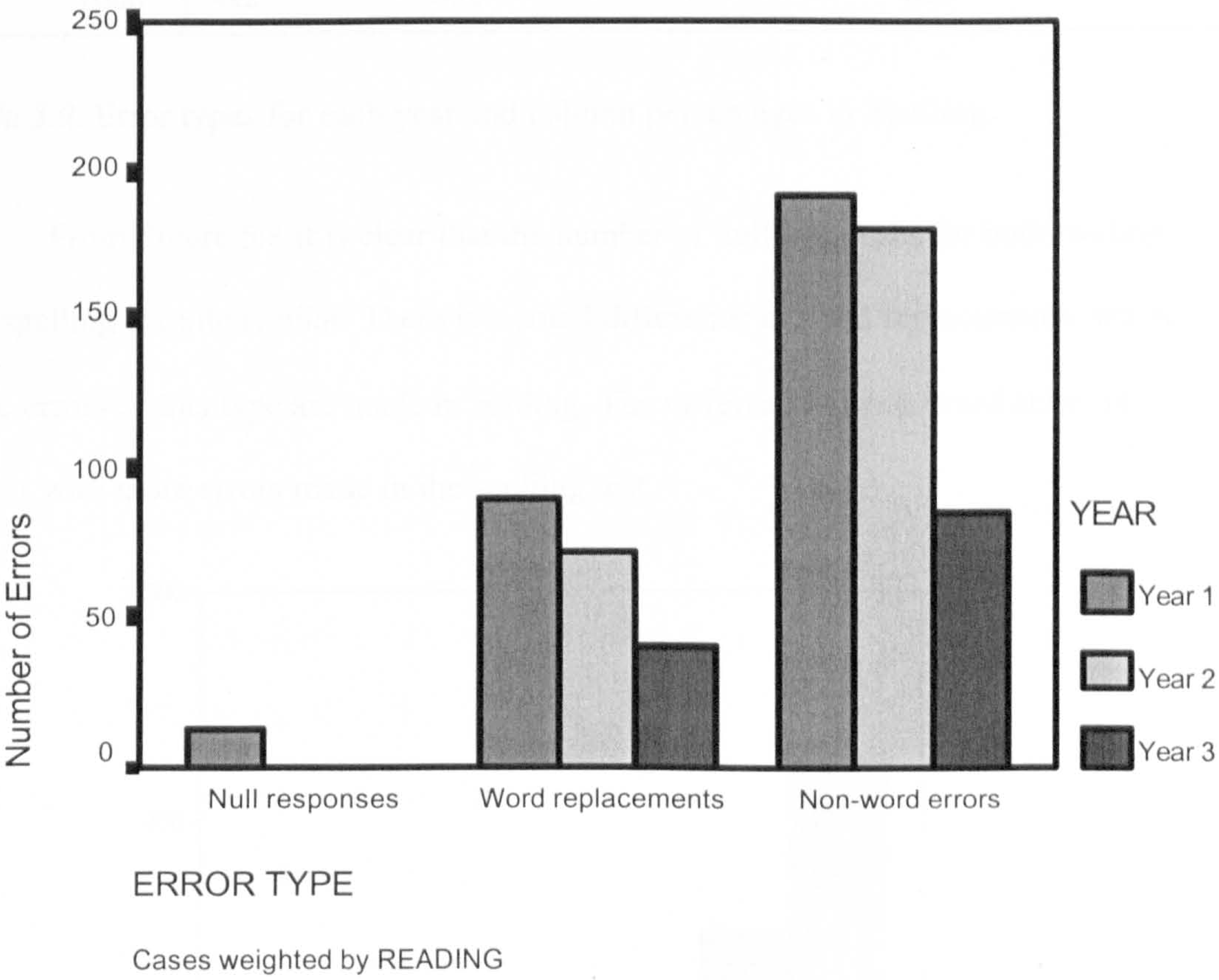

Figure 5.7. Frequencies for each error type committed by each group.

5.7.6 Spelling Errors

All children were asked to spell all words; however, marking was discontinued if five consecutive errors were made. Results for these tests were similar to the reading test in that most errors were committed by the younger children (Year 1, N= 509; Year 2, N= 316; and Year 3, N= 114) and that nonword errors were the most common type of error for all groups (see Table 5.9). However, none of the proportions across the year groups were significantly different.

	Year 1		Year 2		Year 3			
Error Type	N	%	N	%	N	%	Total	ANOVA
Null responses	11	2.60	5	1.70	-	-	16	$F(2,57)=2.26$, *n.s.*
Word replacements	65	15.40	57	18.90	22	19.30	144	$F(2,57)=.66$, *n.s.*
Non-word errors	346	82.00	240	79.50	92	80.70	678	$F(2,57)=1.28$, *n.s.*
Total	422		302		114		838	

Table 5.9. Error types for each year and column percentages in Spelling.

From Figure 5.8 it is clear that the number of null responses for both reading and spelling is quite similar. There is a small difference in word replacements, where more errors of this type are made in reading. The difference of non-word errors is higher with more errors made in the spelling test.

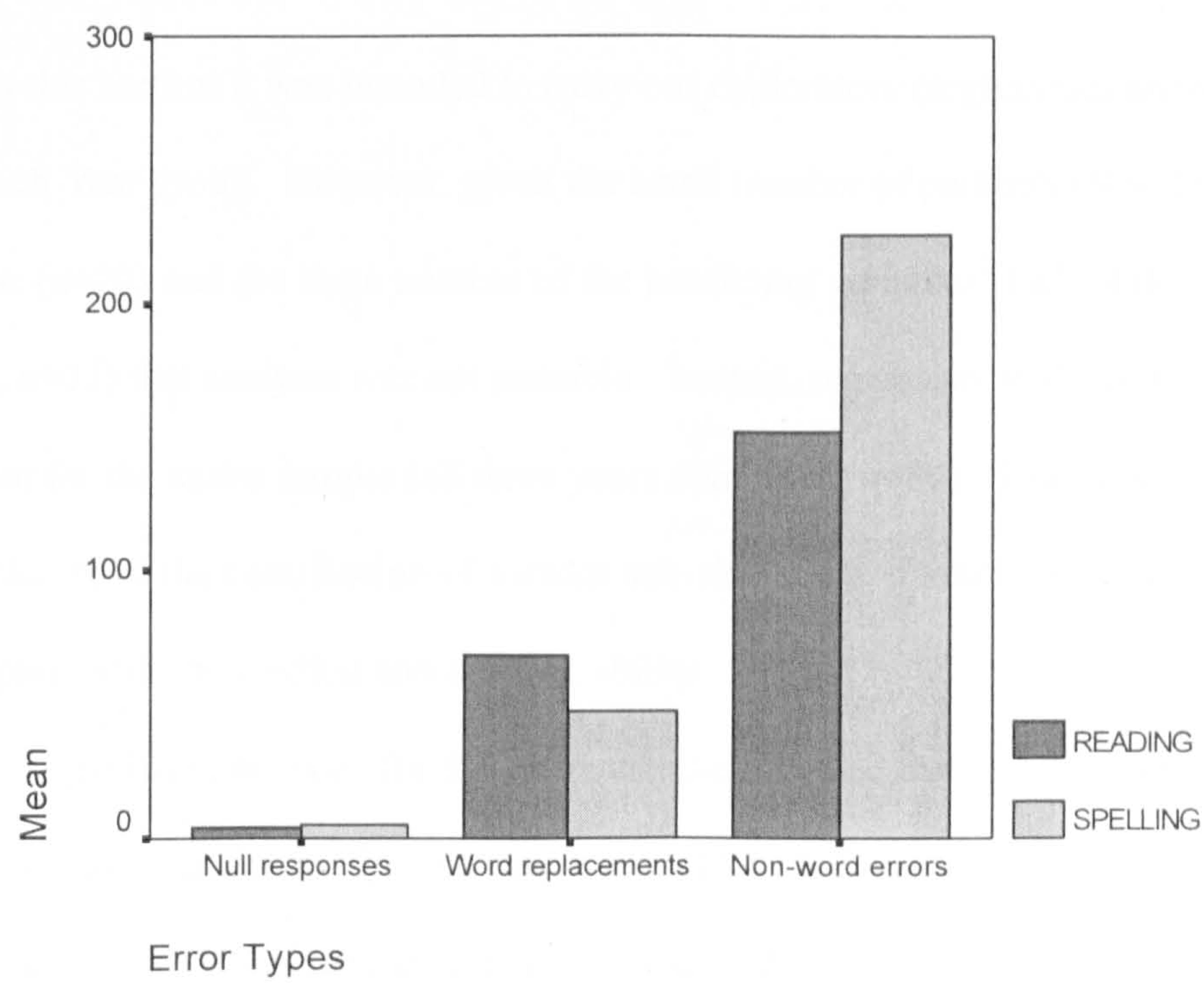

Figure 5. 8. The number of errors made in reading and spelling for each error type.

Overall, more errors were made in spelling than reading. Most word replacements were made in reading and most non-word errors were made in spelling.

5.7.7 Reading and spelling comparisons

It was predicted that in the highly transparent Albanian orthography there should be no discrepancy between children's reading and spelling scores. A 2x3 repeated measures ANOVA failed to find an interaction between Task (Reading and Spelling) and Year (3 year groups). A main effect for Age was present $F(2,18)=33.70$, $p<.001$, but not for type of task. This suggests that within each age-group Albanian children read and spelled at similar levels.

5. 8 Regression analyses for Reading and Spelling abilities.

In this section it was intended to carry out exploratory (regression) analysis within each Year group. However, given the small number of participants within each Year (n=20) and the large number of the predicting variables[2] (sub-skills assessed, n=11) this analysis was not possible. Instead, regression analysis was carried out for the entire sample (all three years combined, n=60). This gives only a general picture of the contribution of various sub-skills (e.g. phonological and orthographic skills) to reading and spelling ability.

Correlation analysis for the entire sample revealed that Reading was substantially correlated with all variables except OAT (See Table 5.10). Reading ability was most strongly correlated with Spelling, NWR, and RAN Alphanumeric.

[2] An attempt was made to reduce the number of the sub-skill variables by collapsing the scores of Blending and Segmenting tasks into a composite score variable—Phonological Tasks.

Spelling was significantly correlated with all the remaining variables. Spelling ability was most strongly correlated with CPM, NWS, and Reading, and least correlated with OAT. There are two reasons that might be responsible for these low correlations between OAT and reading and spelling ability: (i) orthographic knowledge does not contribute much to reading and spelling in the transparent Albanian orthography; (2) OAT might not be a very good measure of orthographic skills. Supporting evidence comes from the reliability analysis—Chronbach's alpha value was very low[3] (a = .59).

With regard to the rapid naming tasks, RAN Alphanumeric has higher correlation values with reading and spelling that RAN Objects and Colours. This supports the hypothesis that rapid naming of digits and letters should be more related to reading than rapid naming of objects and colours.

		1	2	3	4	5	6	7	8	9	10
1	Reading										
2	Meaning	.55**									
3	Spelling	.69**	.65**								
4	NWR	.59**	.46**	.61**							
5	NWS	.41**	.56**	.67**	.55**						
6	OAT	.21	.32*	.40**	.36**	.42**					
7	Generic Speed	.46**	.62**	.65**	.51**	.63**	.32*				
8	CPM	.53**	.65**	.76**	.52**	.60**	.40**	.57**			
9	RAN Alphanumeric	-.63**	-.52**	-.62**	-.68**	-.63**	-.31*	-.62**	-.48**		
10	RAN Colours & Objects	-.40**	-.31*	-.44**	-.42**	-.62**	-.26*	-.54**	-.48**	.49**	
11	Phonological tasks	.36**	.31*	.44**	.29*	.23	.14	.12	.38**	-.32*	-.04

Table 5.10. Correlation matrix for all the variables for Albanian children.

5.8.1 Reading

Two regression methods were used for each regression analysis: Enter and Stepwise method. Table 5.11 shows the variables entered in the regression analysis in which Reading ability was entered in the model as the dependent variable. The

[3] In order to have a reliable measure, Chronbach's alpha level needs to be closer to 1.

model explained 58 % of the variance (R^2=.58), and Spelling was the only significant predictor. Stepwise regression (Table 5.12) revealed that Spelling and RAN Alphanumeric were the only significant predictors of reading ability. This result indicates that in transparent orthographies rapid naming of alphanumeric stimuli is a better predictor of reading acquisition than phonological tasks

	B	Std. Error	Beta
NWR	6.91	5.31	0.18
RAN Alphanumeric	-0.46	0.26	-0.26
RAN Colours & Objects	-0.09	0.13	-0.08
Vocabulary	-0.03	0.06	-0.06
Phonological Tasks	0.29	0.80	0.04
CPM	-0.01	0.26	-0.01
Generic Speed	-0.18	0.25	-0.10
OCT	-0.54	0.48	-0.12
Spelling	0.51	0.17	0.51*

Table 5.11. B coefficient values, standard errors of B, beta values, and t-scores of the predicting variables where the dependent variable is Reading using Full Entry regression . *Note:* *p<.05.

	B	Std. Error	Beta
Step 1			
Spelling	0.70	0.10	0.695**
Step 2			
Spelling	0.50	0.12	0.498**
RAN Alphanumeric	-0.56	0.20	-0.316*

Table 5.12. Summary of Stepwise Regression Analysis for variables predicting Reading ability in Albanian.

Note: R^2= .38 for Step 1; ? R^2= .55, p<.001 for Step 2. *p<.05, ** p<.001.

5.8.2 Spelling

Table 5.13 shows the variables entered in the regression analysis in which Spelling was the dependent variable. This resulted in CPM, Reading and Generic Speed as the best predictors of Spelling. These model accounted for approximately 76% of the variance (R^2=.76). Stepwise regression revealed similar results with CPM being the best predictor followed by Reading and Generic Speed in steps 2 and 3. In step 4 the contribution of Phonological Tasks was also significant (Table 5.14).

	B	Std. Error	Beta
NWS	2.62	4.02	0.07
RAN Alphanumeric	-0.05	0.20	-0.03
RAN Colours & Objects	0.03	0.10	0.03
Vocabulary	-0.02	0.04	-0.05
Segmentation	1.04	0.58	0.15
CPM	0.62	0.18	0.36**
Generic Speed	0.44	0.18	0.25*
OCT	0.36	0.36	0.08
Reading	0.28	0.10	0.29**

Table 5.13. B coefficient values, standard errors of B, beta values, and t-scores of the predicting variables where the dependent variable is spelling. *Note:* *p<.05, ** p<.001.

	B	Std. Error	Beta
Step 1			
CPM	1.317	0.149	0.757**
Step 2			
CPM	0.942	0.15	0.542**
READING	0.407	0.086	0.409**
Step 3			
CPM	0.758	0.157	0.436**
READING	0.353	0.084	0.355**
Generic Speed	0.413	0.15	0.238**
Step 4			
CPM	0.661	0.16	0.38**
READING	0.313	0.084	0.315**
Generic Speed	0.468	0.149	0.269*
Phonological Tasks	1.063	0.522	0.154*

Table 5.14. Summary of Stepwise Regression Analysis for variables predicting Spelling ability in Albanian. *Note:* R^2= .57 for Step 1; ?R^2= .68, p<.001 for Step 2; ?R^2= .72, p<.001 for Step 3; ?R^2= .73, p<.001 for Step 4. *Note:* *p<.05, ** p<.001.

5.9. Discussion

5.9.1 Ellis and Hooper study comparisons

These data triangulate and confirm conclusions of Ellis and Hooper (2001) with respect to the effect of orthographic transparency on the rate of reading acquisition and the strategies children use in the beginning stages of learning to read.

The rate of reading acquisition is faster the shallower the orthography: Year 1 Albanian children were able to read correctly more words than the Welsh and far more words than the English children of Ellis and Hooper (2001), with Albanian children reading approximately 80% of the reading test items of their language after just one year of school education. This percentage covers the 8021 most frequent word types of Albanian (equvalent to approximately 87% of written Albanian tokens), whereas from the Ellis and Hooper study, English children could read only about 52% of the English test items, a coverage generated by the 716 most frequent word types (approximately 64% of written English tokens). Comparable Welsh children read approximately 61% of their test, a coverage generated by the 1821 most frequent word types of Welsh (approximately 81% of tokens). This finding is consistent with other studies of the effect of transparency on rate of acquisition including Wimmer and Goswami (1994), Öney and Durgunoglu (1997), Seymour et al., (2003) and Spencer and Hanley (2003).

Two strands of evidence show that beginning readers (Year 1 children) in the shallow orthography of Albanian rely on a GP conversion strategy: (i) the strong effect of word length on their reading latency, and (ii) their high proportion of non-word errors.

Albanian children's reading latencies were greatly affected by word length (R^2 = .89). This is consistent with their attempting to pronounce long, novel or infrequent words by phonological recoding using a left-to-right parse, thus, the more the letters in a row, the longer the production time. This finding is reaffirmed by the fact that Albanian children's latencies were longer than English children's, and also longer even than the Welsh children's. This suggests that the greater the orthographic transparency, the more likely a phonological reading strategy is to be consistently employed. One might have expected that Albanian and Welsh would be more or less similar in this respect, since both orthographies are highly transparent, yet the complete transparency of Albanian ties children's reading latencies even more tightly to word length. Latency differences across the groups cannot be attributed to word length. Word length differences are non-significant; the difference for the last 60 words is also non-significant. However, it should be remembered that there are fewer correct responses in the English group; indeed there were 17 words for which there were no correct responses for the English group. Thus, the Welsh and especially Albanian latencies are penalized by the presence of a greater number of low-frequency data points. Albanian children went further in the lists than did the other children; they were particularly slow on hard words. Higher latencies for Albanian children could also be due to comparably less practice as they were only in the first year of primary education.

The second strand of evidence that beginning readers in the shallow orthography of Albanian rely on a GP conversion strategy comes from error analyses. Unlike their English counterparts, Year 1 Albanian children made more non-word errors than any other kind of error. This high proportion of non-word errors suggests that their reading strategy relies heavily on alphabetic recoding, as demonstrated for reading of other transparent scripts by Wimmer and Hummer (1990), Spencer and Hanley (2003), Seymour et al., (2003), and Ellis and Hooper (2001). When phonological recoding goes wrong, the likely pronunciation error is a nonword; when whole-word lexical access on the basis of partial visual analysis goes wrong or when partial phonetic cueing is employed, the likely result is a word. A phonological reading strategy also means that children are prepared to 'have a go' at reading any word: despite the fact that the Albanian children have had less time on task of reading than the English children, they tended to make very few null responses. Regularity of orthography gives children greater confidence in trying to read new words. Following this strategy they will develop a 'self-teaching' mechanism, which allows them to enlarge their sight-word reading lexicon (Share, 1995).

Finally, the word comprehension level of the Year 1 Albanian children was superior to that of Welsh children. SES was not assessed therefore the comprehension results may be difficult to interpret. Nevertheless, Albanian children gave accurate definitions for 50% of the words, compared to the English children 45%, and Welsh children 36%. The finding that the Year 1 monolingual Albanian children performed better in word comprehension than did Year 2 bilingual Welsh children of the same age is consistent Ellis and Hooper's (2001) suggestion that their Welsh children's low comprehension scores was a consequence of bilingualism.

Orthographic depth also had an effect on reading comprehension. The reading comprehension level of the Year 1 Albanian children was superior to that of the English and Welsh children. Albanian children gave accurate definitions for 50% of the words, compared to the English children 45%, and Welsh children 36%. Of course the design used in the pilot study also tested whether children knew the meanings of words they could not read aloud correctly. However, a hypothesis worthy of further testing is that compared to their English counterparts, the ability to easily decode new words allowed the Albanian children to read more words and thus to further develop their vocabulary knowledge. It is generally argued that a reciprocal relationship exists between reading ability and vocabulary knowledge: well developed vocabulary knowledge, allows good reading comprehension (Beck, Perfetti, & McKeown, 1982; McKeown, Beck, Omason, & Perfetti, 1983; Stahl, 1983); reading experience allows children to infer the meanings of new words in context and so to expand their vocabulary (Stanovich, 2000). Stanovich has called such phenomenon whereby the rich get richer "Matthew effects" (Stanovich, 1986; Stanovich & West, 1989; Stanovich, 2000). The finding that the Year 1 monolingual Albanian children performed better in reading comprehension than did Year 2 bilingual Welsh children of the same age is also consistent Ellis and Hooper's speculation that their Welsh children's low comprehension scores was a consequence of bilingualism.

5.9.2 Reading and spelling ability for Albanian Year 1, 2 and 3.

Older Albanian children performed better than the 1st and 2nd year children at the reading, spelling and sub-skills tests. This age effect is not surprising and it is due to cognitive maturity and literacy. Research has shown that variation in print exposure is related to differences in reading comprehension and word recognition ability (West & Stanovich, 1989; Cunningham & Stanovich, 1990, 1993; Koolstra, Van der Voort & Vooijs, 1991; Cipielewski & Stanovich, 1992; Anderson, Wilson & Fielding, 1988).

5.9.2.1. Reading

Reading ability, for all three Albanian groups, is more developed than their comprehension level.

Naming latencies for correct responses for Year 1 were higher than the latencies of Year 2 and 3 (Year 1, R^2=.88; Year 2, R^2=.52; and Year 3, R^2=.44 Reading latencies for correct responses for Year 1 were higher than the latencies of Year 2 and 3 and the word length effect is slightly stronger in Year 1 than in Year 2 and Year 3. This suggests that the reading fluency in Year 1 children is not as well developed as the fluency of older children. However, this indicates that younger children rely more heavily on grapheme-phoneme conversion reading strategy, whereas older children rely on bigger units, such as onset, rime, whole word recognition. The developmental models of Frith (1980) and Ehri (1992)—which have been proposed for learning to lead in English—generalise here. Thus, young Albanian children start at the alphabetic stage and following print exposure, reach the final orthographic stage or use sight word reading. The sight word reading model (Ehri, 1999), predicts that the strength of the effect of word-length on reading latency in Year 1 should diminish as reading becomes skilled. Further exposure to print should allow Albanian children to soon move into the *consolidated alphabetic phase*, where written words become sight words, and where letter patterns recurring in different words become consolidated into larger pronunciation units. Such whole word reading strategies involve a shift from serial to parallel access, and thus the word length effect should become less evident in skilled readers with well-developed orthographic lexicons. More recent reading research with German speakers (Ziegler, Perry, Jacobs & Braun, 2001) suggests that the word length effect persists even in adulthood. Nevertheless, the German orthography is not as consistent as the Albanian orthography.

When the reliance on an alphabetic reading fails, the likely pronunciation is a nonword. Indeed, the highest proportion of nonword errors was made by Year 1 children, the least by Year 3. When reliance on lexical access by means of partial visual analysis or partial phonetic cueing fails, the likely result is a real word. In reverse pattern, Year 1 children made the smallest proportion of whole-word replacement errors, whereas Year 3 children had the highest proportion. Once again, these findings suggest that younger children rely more heavily on grapheme-phoneme conversion reading strategy, whereas older children rely on bigger units, such as onset, rime, or sight word recognition as suggested by the developmental models of Frith and Ehri. These findings are also supported by the self-teaching mechanism suggested by Share (1995), in which phonological recoding allows children to store the representation of a word in the orthographic lexicon and use these representations for fast and successful reading.

5.9.2.2 Spelling

In spelling similar error patterns to reading emerged for each year-group: very few null responses, a few real word replacements, and many nonword errors. The error pattern suggests that young Albanian children rely on a phonological recoding strategy from phoneme to grapheme level when spelling. Most of the nonword errors were made by Year 1 children and the least amount of these errors was made by Year 3 children. Year 1 children made the smallest proportion of whole-word replacement errors, whereas Year 3 children had the highest proportion. Even though in both cases ANOVA did not show significant differences, the emerging pattern points to the right direction. The Albanian children have the advantage of using the letter names to spell correctly. This advantage is mediated by the fact that the letter names in the alphabet correspond to the phonetic pronunciation (even though most people, when pronouncing the consonants from the alphabet, tend to add a schwa at the end of some letter names/sounds, this does not appear to be an obvious problem in spelling or reading). Older children might rely on larger units for spelling, however, given the extremely transparent orthography, relying on a phonological recoding strategy from phoneme to grapheme level when spelling seems a sensible strategy to use regardless of literacy experience.

The pattern that results from nonword errors across the ages for the reading and spelling tests is of theoretical importance. For spelling there is a steady decrease of nonword errors as a function of age. For reading, there is a small difference between Year 1 and Year 2, followed by a drastic drop from Year 2 to Year 3 (Figure 5.6). This could be due to print exposure; however, there must be something more to it. Older children's ability to use context information is another factor that could be responsible for this sudden change in nonword error rate. Stanovich's *interactive-compensatory model* (Stanovich, 1980) takes into account the context effect. The interactive part of the model assumes that word recognition is based on information provided from different knowledge sources, whereas the compensatory part assumes that a deficit in any knowledge source is compensated by greater use of information form other sources. Thus, a poor reader who has difficulties with word analysis skills might make a better use of the contextual effects. Although the test items in the present study were presented individually – therefore, making it impossible to use context information – previous word recognition experience, and especially a larger orthographic lexicon and better reading comprehension abilities serve as a compensatory tool for Year 3 children in individual word recognition tasks.

5.9.3 Reading and spelling comparisons

Research has shown that in English, at least, spelling is more difficult than reading: in the first years of formal education, spelling ability tends to develop at a slower rate than reading ability, dyslexic children have more problems with spelling than with reading tasks (Frith, 1985; Treiman, 1997), and spelling is more resistant to treatment than reading (Bruck, 1990). Yet perhaps this is the case only in deep orthographies. One issue raised in this pilot study is as follows: if the bi-directional relationship between letters and sounds is extremely transparent in the Albanian orthography and Albanian children rely on alphabetic decoding skills for both reading and spelling, then there should be no discrepancy between their reading and spelling accuracy scores. Indeed, in the present study reading and spelling scores were at similar levels within each of the three age groups examined, suggesting that in bi-directionally transparent orthographies, reliance on alphabetic skills for reading and spelling results in similar levels of success. However, the current findings do not suggest that reliance on alphabetic skills is the only strategy that used by children learning to read in transparent orthographies. A lexical decoding strategy can also be used for familiar words for which mental representations are already in the mental lexicon. Thus when reading the 100 items of the word list, Albanian children can use lexical decoding for familiar words and alphabetic decoding for unfamiliar words. In this pilot study small latencies for high frequency words and large latencies for low frequency words were found. This indicates that accuracy is affected by both strategies.

5.10. Skills involved in learning to read and spell

The second part of this pilot study was concerned with the skills that can contribute to the reading acquisition process in a transparent orthography such as Albanian. The main hypothesis concerning the skills involved in the reading acquisition process was that the combined variable for the serial naming of alpha-numeric items would be a better predictor of reading level than the phonological awareness tasks, and serial naming of colours and objects. The finding of this study clearly supports this hypothesis: in a transparent orthography digit and letter naming is a better predictor of reading acquisition. Object and colour rapid naming was not a good predictor, thus supporting findings from previous research (Van den Bos et al. (2002).

It was predicted that phonological and orthographic tasks would explain a good proportion of reading variance; but none of the phonological and orthographic awareness measures were significant predictors in the regression analyses. Nevertheless, correlation analysis revealed significant correlations between reading and NWR, and Reading and RAN Alphanumeric, whereas the correlation between Reading and OAT was not significant. This suggests that phonological skills may be more important to reading in the first three years of formal education than orthographic skills. Nevertheless, one should bear in mind that the reliability tests showed that these tasks were not highly reliable. Should these be used again, it would necessary to increase the number of items.

Spelling was also a significant predictor of Reading. The contribution of spelling to reading has also been identified in previous research (e.g., Ellis and Cataldo 1990).

Further, exploratory analysis using regression analysis was performed in order to see if which skills predicted spelling ability. When all the relevant variables were entered in the model, it was found that, CPM, Generic speed, Reading and Phonological tasks were significant predictors. One might have expected that NWS would have been a good predictor of the Spelling task. From the analysis, the NWS test was found to be highly reliable (Cronbach's a = .86) and the post-hoc tests revealed that Year 1 children had significantly lower scores than Year 2 and Year 3 children. Developmental models of spelling development (e.g., Frith, 1895) suggest that NWS should be a significant predictor. Correlation analysis revealed that NWS was significantly correlated with CPM, Generic Speed and Reading tasks, suggesting that the variability explained by NWS may have been already accounted for in the regression analysis by these three variables. However, the interpretation of the exploratory analysis on reading and spelling skills of Albanian children may be difficult. One major issue that needs to be taken into account is the way the children were selected. The samples in the present study consisted of the 20 middle achieving children, thus excluding the worst and the best pupils. This restriction of range could have consequences for the regression analyses, which are based on correlations: one might end up with no inflated correlation[4]. If the participants were selected at random then the results of the regression analyses might have shown a very different pattern.

5.11 Conclusions

First, from the comparison of the Albanian findings with those of the Ellis and Hooper it can be concluded that children learn to read an orthographically transparent script very quickly. Their reading accuracy is high. They quickly adopt a phonological reading strategy that ties reading latency to word length, that generates errors that tend to be nonword pronunciations, and that gives these children confidence in 'having a go' at new words. Word comprehension of Albanian children was better than that of Welsh children, thus supporting the Ellis and Hooper suggestion that word comprehension of Welsh children is a consequence of their bilingualism

Second, older Albanian children performed better than younger children: they received formal instruction longer. The highly transparent Albanian orthography

[4] To avoid this problem, in the main study (Chapters 6 and 7) this selection procedure is not employed.

allows Albanian children to rapidly master the alphabetic code, causing a fast reading acquisition process. Reading and spelling processes in bi-directionally transparent Albanian orthography are parallel: these processes seem to become parallel from the start of the literacy acquisition as a result of successful reliance on alphabetic decoding skills for both reading and spelling.

Third, in the transparent Albanian orthography RAN Alphanumeric and Spelling were best predictors of reading acquisition. In spelling CPM, Generic speed Reading, and Phonological tasks the best predictors. Whilst some indication on the relation between phonological awareness skills and literacy skills was evident, no such indication was found for the relation of the orthographic and literacy skills.

Finally, the findings of the pilot study on the development of literacy skills in Albanian should be carefully considered because several tests showed low reliability (e.g., OAT, Blending, and Segmenting and the translation of the BPVS II), sample size was small and the participant selection procedure was not suitable for the exploratory regression analysis.

Chapter 6: Reading and Spelling development in Albanian: Main Study

6.1 Introduction

The pilot study presented in the previous chapter extended the findings of Ellis and Hooper (2001) by examining monolingual children who were learning to read and write in the very transparent orthography of Albanian. Data from Year 1 Albanian was compared to the data from Ellis and Hooper. It was found that Albanian children could read more of their language than English and Welsh children. This suggests that that the rate of reading acquisition is faster the shallower the orthography.

The second part of the pilot study attempted to examine reading and spelling development of Year 1, 2, and 3 Albanian children. As expected, there was an age effect on reading and spelling tests, but no differences were found between reading and spelling accuracy scores within each year group. Overall, Spelling, and RAN Alphanumeric were the best predictors of reading ability. Nonverbal IQ, Generic speed, and Phonological tasks were the best predictors of spelling.

Following the pilot study, the next step was to increase sample size, and to manipulate and improve some of the tests that had a low reliability.

Two types of real word reading tests were used. The first type was similar to the 100-word reading test used in the pilot study. The second was a One Minute Reading Test (OMRT) consisting of 50 words. The second test was comparable[1] to the tests used in the English and Welsh research presented in the next chapter.

[1] They were matched for frequency.

The present study investigated reading and spelling development of Year 1, 3, and 5 Albanian children. It was thought that by examining the literacy skills of older children would be possible to get a fuller picture of the development of specific linguistic skills (e.g., phonological and orthographic awareness) and their contributions to the literacy development.

Based upon the literature review presented in Chapters 1, 2 and 3, and the findings from the pilot study (Chapter 5) the following hypotheses were generated.

H.1. General hypotheses.

H. 1.1. Older children should perform better than younger children in all the sub-skills tasks.

H.2. Reading hypotheses

H. 2.1. Reading accuracy. Year 1 children will be less accurate readers than Year 3 and 5 children.

H. 2.2. Reading strategy. Younger children will rely more heavily on a GP conversion reading strategy, whereas the older children will whereas older children rely more partial visual analysis, partial phonetic cueing or sight word recognition

H.2.2.1. Year 1 children will have longer word reading latencies than Year 3 and 5 children.

H.2.2.2. Log10 frequency effect on reading latency will be greater for younger children than older children.

H.2.2.3. The word length effect on reading latency will be greater for younger children than older children.

H.2.2.4. Both word length and log10 frequency will be significant predictors of reading latency.

H.2.2.5. It is expected that nonword errors will be the most frequent error type.

H.2.2.6. The types of errors and their proportions will change over the years: Year 1 children will make more nonword errors than Year 3 and 5 children (*Age x Type interaction*).

H.2.3. Reading rate. Year 1 children will have lower reading rates in the OMRT than their Year 3 and 5 counterparts.

H.2.3.1. During the OMRT younger children will make more reading errors than older children.

H.3. Spelling hypothesis

H.3.1. Spelling accuracy. Younger children will be less accurate than older children in the 100-word spelling task.

H.3.2. Spelling strategy. Younger children will rely more heavily on phoneme-grapheme conversion spelling strategy, whereas the older children will rely on bigger units, such as onset, rime, and whole word spelling from memory.

H.3.2.1. It is expected that nonword errors will be the most frequent error type. The types of errors and their proportions will change over the years: Year 1 children will make more nonword errors than Year 3 and 5 children (*Age x Type interaction*). If the spelling strategy changes as children become more experience with print then it should also be expected that the proportion of whole word replacements will be larger in Year 5 than in years 1 and 3.

H.4. Predictors of reading ability

H.4.1. Phonological awareness. NWR and Phoneme deletion will be the main predictors of reading ability in Year 1.

H.4.2. RAN. Like NWR and Phoneme deletion, the contribution of RAN to reading will be present only in Year 1.

H.4.3. Orthographic knowledge. Wordchains will become a good predictor of reading ability in later years.

H.5. Predictors of spelling ability

H.5.1. Phonological awareness. NWS and Phoneme deletion will be the main predictors of spelling ability in Year 1.

H.5.2. Orthographic knowledge. It is expected that Wordchains will become the main predictor of spelling ability in later years.

H.6. Reading and spelling comparisons

H.6.1. The Albanian orthography is highly transparent bi-directionally, therefore there should be no discrepancy between children's reading and spelling scores. This hypothesis was supported in the pilot study with Year 1, 2 and 3 children, however, it would be of interest to see of this hypothesis holds for a different[2] sample.

H.6.2. The frequency of the three error types should be the same for both reading and spelling.

H.6.3. Due to the similar orthographic complexity for reading and spelling, the relative contribution of phonological and orthographic skills should show similar patterns for both reading and spelling development.

6.2 Method

6.2.1 Participants

Sixty monolingual Albanian children for each year group were selected randomly from Year 1, Year 3 and Year 5 in a primary school in south-east Albania.

Mean and standard deviations for age are presented in Table 6.1. The number of male and female participants was fairly balanced.

	Mean age months	SD months	Gender	
			Males	Females
Year 1	86.77	4.34	29	31
Year 3	112.10	5.16	30	30
Year 5	135.65	4.80	29	31

Table 6.1. Mean and standard deviations for age; and gender distributions for years 1, 3, and 5.

6.2.2 Test Materials

The test materials and procedures used in the main Albanian study are briefly summarised below. They are described in detail in Chapter 4.

6.2.2.1 Reading, Word Compression and Spelling tasks

Reading 100 (Computerised Reading Test). Most of the tasks used in the pilot study were also used here. However, in order to increase the reliability of the latencies, the 100-word reading test was computerised. The 100-test items of decreasing frequency were presented on a portable Macintosh PowerPC computer screen. In

[2] Note that 'different' sample in this case does not refer only to the sample size but also to the

addition to reading accuracy, the computer's microphone was used to measure reading latencies.

OMRT. Albanian children were also given a one-minute 50-word reading tests. The words were selected from the 100 words used in the computerised reading test: every other word was selected. The 50-words were presented on an A4 sheet in two columns. The number of words read in a minute and the number of errors made were recorded on a separate sheet.

Word comprehension test. After the 100 reading test was completed, in order to assess the Word Comprehension level on the computerised reading tests, each child was asked to explain the meaning of each word by giving a synonym, an explanation, or a correct usage in a sentence. All the test words were administered and the responses were noted on a separate sheet.

Two methods of scoring were used. In the first scoring method for the 100-word comprehension tests a cut-off point of five consecutive errors was used.

For the second scoring method, the number of word items was reduced to 50. Every other word of the 100-word comprehension test was scored but the cut-off point of five consecutive errors was not applied. This was done in order to match the 50-word reading, 50-word spelling and 50-word comprehension tests administered in the Welsh and English schools.

Spelling 100. A 100-word spelling test was administered. This test was matched for log10 frequency to the reading test but uses different words. A t-test on word length differences resulted in a non-significant result $t(99)$=.65. All the items were administered. Two methods of scoring were used. In the first scoring method for the 100-word Spelling tests a cut-off point of five consecutive errors was used.

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participant selection method. In the pilot study only the middle achieving pupils were selected.

For the second scoring method, the number of word items was reduced to 50. This was done by scoring every other word of the 100-word spelling tests. Here, the cut off point of five consecutive errors was not applied.

Nonword reading (NWR) and nonword spelling (NWS). The nonwords for both NWR and NWS were selected from word lists matched for frequency and length to the real word reading and spelling test. For the nonword tests, first, every other word was selected. In order to derive the nonwords one or two letters (usually the initial ones) were altered, thus creating orthographically legal pronounceable nonwords.

6.2.2.2 Phonological awareness tasks

Phoneme deletion. The phoneme deletion test consists of 30 items. After a word had been orally presented, the participant was asked to delete an initial, medial or final phoneme pronounced by the experimenter. There were 10 initial phoneme deletions, 10 medial and 10 final and the maximum score was 30 (Appendix 15).

Rapid Automized Naming. Seven measures of naming speed were adapted from Van den Bos et. al. (2002). The tasks involved serial naming of digits, numeral, letters, colours, colour names, objects and object names (Appendix 9). Each task had 50 items and was presented in 5 columns and 10 rows on A4 sheets. Each item occurred 10 times in the set of 50 and was presented in a random order. Time taken to name all the items was measured using a stopwatch. The digit, letter, word, numeral and colour word naming scores were combined into a new variable called Alphanumeric naming. Colour and picture naming scores were combined into one variable (Appendix 14).

6.2.2.3 Orthographic skills

Wordchains. This test consists of 120 word-chains. This test is a translation of the English version of Wordchains Test (Miller-Guron, 1998). The original words were replaced with Albanian words: they had similar meaning and comparable word length. This is a timed test and after a practice session, the participants had to divide as many words as possible in a three minute period. The final score consisted of the correct number of Wordchains identified within 3 minutes.

6.2.2.4 General ability

Non-verbal intelligence. All the items from sets A, AB, and B from the Coloured Progressive Matrices (Raven, 1958) were presented on A3 size sheets in children's classrooms. For each item there were six possible answers. The participants were required to write down the number that corresponded to the correct answer. A new item was presented when all the pupils had made a choice. The maximum score was 36.

Generic Speed. On an A4 sheet, 25 additions and 25 subtractions of one-digit numbers were presented. The additions were in separate columns from the subtractions and all the calculations resulted in one-digit numbers. The total score was 50.

6.3 Results

6.3.1 Descriptive statistics.

Table 6.2 summarises the children's performance on the reading, spelling and sub-skills tests.

	Year 1		Year 3		Year 5	
	Mean	SD	Mean	SD	Mean	SD
Reading 100 (number of words read correctly out of 100)	79.88	15.60	87.10	10.16	91.18	10.90
Reading latency (reading latencies in seconds for the Reading 100 test)	2.87	0.96	1.51	0.62	1.17	0.39
OMRT (number of words correctly read per second)	0.48 (n=52)	0.14	0.71(n=59)	0.23	1.01 (n=55)	0.42
OMRT Errors (total number of errors made in the OMRT)	2.77 (n=52)	2.06	6.78 (n=59)	5.31	5.80 (n=55)	4.06
NWR (nonwords read per second)	0.27	0.11	0.46	0.17	0.59	0.23
Spelling 100 (number of words spelled correctly out of 100)	73.62	17.67	81.62	14.18	88.32	13.74
Spelling 50 (number of words spelled correctly out of 50)	39.35	7.39	42.53	5.36	45.23	6.42
NWS (number of nonwords spelled correctly out of 50)	35.38	7.18	37.77	7.28	39.38	7.66
Word Comprehension 100 (number of correct word meanings out of 100)	66.13	13.01	77.00	10.58	88.07	4.41
Word Comprehension 50 (number of correct word meaning out of 50)	34.39 (n=57)	3.95	38.61 (n=59)	4.00'	43.07 (n=59)	2.69
Alphanumeric naming (items named per second)	1.22	0.28	1.89	0.33	2.21	0.40
Digit naming	1.45	0.26	2.04	0.35	2.33	0.43
Numeral naming	1.13	0.37	1.89	0.41	2.31	0.47
Colour Word naming	0.91	0.31	1.69	0.33	2.02	0.40
Picture words naming	1.08	0.33	1.85	0.35	2.09	0.43
Letter naming	1.53	0.33	1.96	0.40	2.31	0.44
Colour and picture naming (items named per second)	0.87	0.18	1.06	0.17	1.29	0.22
Colour naming	0.79	0.21	1.02	0.21	1.28	0.22
Picture naming	0.95	0.20	1.10	0.18	1.30	0.28
Phoneme Deletion Total (number of correct deletions out of 30)	25.78	4.51	26.65	3.30	27.32	3.49
Phoneme Deletion Initial out of 10	8.48	1.42	8.78	1.11	9.02	1.24
Phoneme Deletion Final out of 10	9.07	1.59	9.43	1.16	9.65	1.01
Phoneme Deletion Medial out of 10	8.23	2.45	8.43	1.83	8.65	2.05
Wordchains (number of correct splits completed in 3 minutes)	17.63	8.22	36.15	22.27	57.92	20.03
Generic Speed (number of correct calculations per second)	0.31	0.09	0.61	0.17	0.90	0.24
Generic speed: Additions	0.40	0.11	0.69	0.23	1.03	0.25
Generic speed: Subtractions	0.22	0.11	0.52	0.18	0.76	0.30
CPM (out of 36)	16.95	5.75	22.95	5.27	28.05	4.51

Table 6.2. Descriptive statistics for all variables used in the analysis of the Albanian data. Note: For each group N=60 unless otherwise stated.

6.3.2 ANOVAS comparing Age Groups

As this chapter examines many questions, the rest of the results is hypothesis driven (Hypothesis presented first followed by the relevant analysis).

H.1.1. Older children should perform better than younger children in all the sub-skills tasks.

A series of one-way ANOVA's and Bonferroni post-hoc tests were conducted to investigate possible differences between the three Albanian year groups. Table 6.3 shows that overall, older children perform better than younger children in most of the sub-skills tasks. There are no differences for the Phoneme deletion task. Looking at Table 6.2 it is clear that the means and standard deviations for each year are very close to each other as well as very close to the maximum score. Thus, the lack of significant differences in the Phoneme deletion task may be due to possible ceiling effects. However, overall the findings presented in Tables 6.2 and 6.3 support hypothesis *H.1.1.*

	F(2, 57) by subject analysis	Year 1 vs. Year 3	Year 1 vs. Year 5	Year 3 vs. Year 5
Reading 100	12.66**	xx	xx	
Reading Latency	84.69**	xx	xx	xx
OMRT	45.49**	xx	xx	xx
OMRT errors	14.10**	xx	xx	
NWR	51.07**	xx	xx	xx
Word Comprehension 100	71.96**	xx	xx	xx
Word Comprehension 50	84.58**	xx	xx	xx
Spelling 100	13.89**	x	xx	
Spelling 50	12.53**	x	xx	
NWS	4.14*		x	
Alphanumeric naming	130.73**	xx	xx	xx
Digit naming	96.82**	xx	xx	xx
Numeral naming	120.65**	xx	xx	xx
Col. Word naming	158.13**	xx	xx	xx
Letter naming	57.82**	xx	xx	xx
Picture words naming	121.52**	xx	xx	x
Colour and picture naming	71.48**	xx	xx	xx
Picture naming	37.10**	xx	xx	xx
Colour naming	77.28**	xx	xx	xx
Phoneme deletion	2.45 n.s.			
Wordchains	122.82**	xx	xx	xx
Generic speed	161.80**	xx	xx	xx
CPM	68.43**	xx	xx	xx

Table 6. 3. ANOVAs and Bonferroni tests for the between year comparisons for all variables. *Note:* ** $p<.001$; xx$p<.001$; x$p<.05$.

6.3.3 Test of the Reading Hypotheses

H. 2.1. Reading accuracy. Year 1 children will be less accurate readers than Year 3 and 5 children.

Group differences for Reading 100 were assessed using ANOVAs. ANOVA testing shows significant differences between year groups [$F(2,297)=17.80, p<.001$, by item; $F(2,57)= 12.66, p<.001$, by subject]. Bonferroni tests show that Year 1 children are less accurate than Year 3 and 5 children ($p<.001$), but Year 3 and 5 children's accuracy scores do not differ significantly ($p>.05$).

H. 2.2. Reading strategy. Younger children will rely more heavily on grapheme-phoneme conversion reading strategy, whereas the older children will rely on bigger units, such as onset, rime, and whole word recognition.

H.2.2.1. Year 1 children will have longer word reading latencies than Year 3 and 5 children.

For the 100-word reading test, latencies smaller than 200 ms were excluded from the analysis because these latencies were probably due to environmental noises picked up by the computer microphone. This procedure resulted in 126 latencies being excluded from the total number of latencies (15,320). The average word latency for Year 1 children was 2.98 seconds (SD = 0.98), Year 3 children 1.57 seconds (SD = 0.62), and Year 5 children 1.17seconds (SD = 0.39). Group differences for reading latencies were assessed using by-item and by subject analyses of variance. ANOVA testing shows significant differences between groups [$F(2, 297)= 193.45, p<.001$, by items; $F(2,57)= 84.69, p<.001$, by subject]. Bonferroni post-hoc tests show Year 1 children are slower than Year 3 and 5 children ($p<.001$) and Year 3 children are significantly slower that Year 5 children ($p<.001$). These findings are inline with hypothesis ***H.2.2.1.***

H.2.2.2. Log10 frequency effect on reading latency will be greater for younger children than older children.

Regression analysis reveals that reading latency of correct responding is a function of log10 frequency for year all three years [Year 1, $B = -.673$, SE B = .07, $\beta = -.68$, $F(1, 98) = 84.51$, $p < 0.0001$, $R^2 = .46$; Year 3, $B = -.417$, SE B = .04, $\beta = -.70$, $F(1, 98) = 91.93$, $p < 0.0001$, $R^2 = .48$; Year 5, $B = -.214$, SE B = .022, $\beta = -.70$, $F(1, 98) = 94.80$, $p < 0.0001$, $R^2 = .49$]. These findings provide support for *H.2.2.2* (see Figure 6.1).

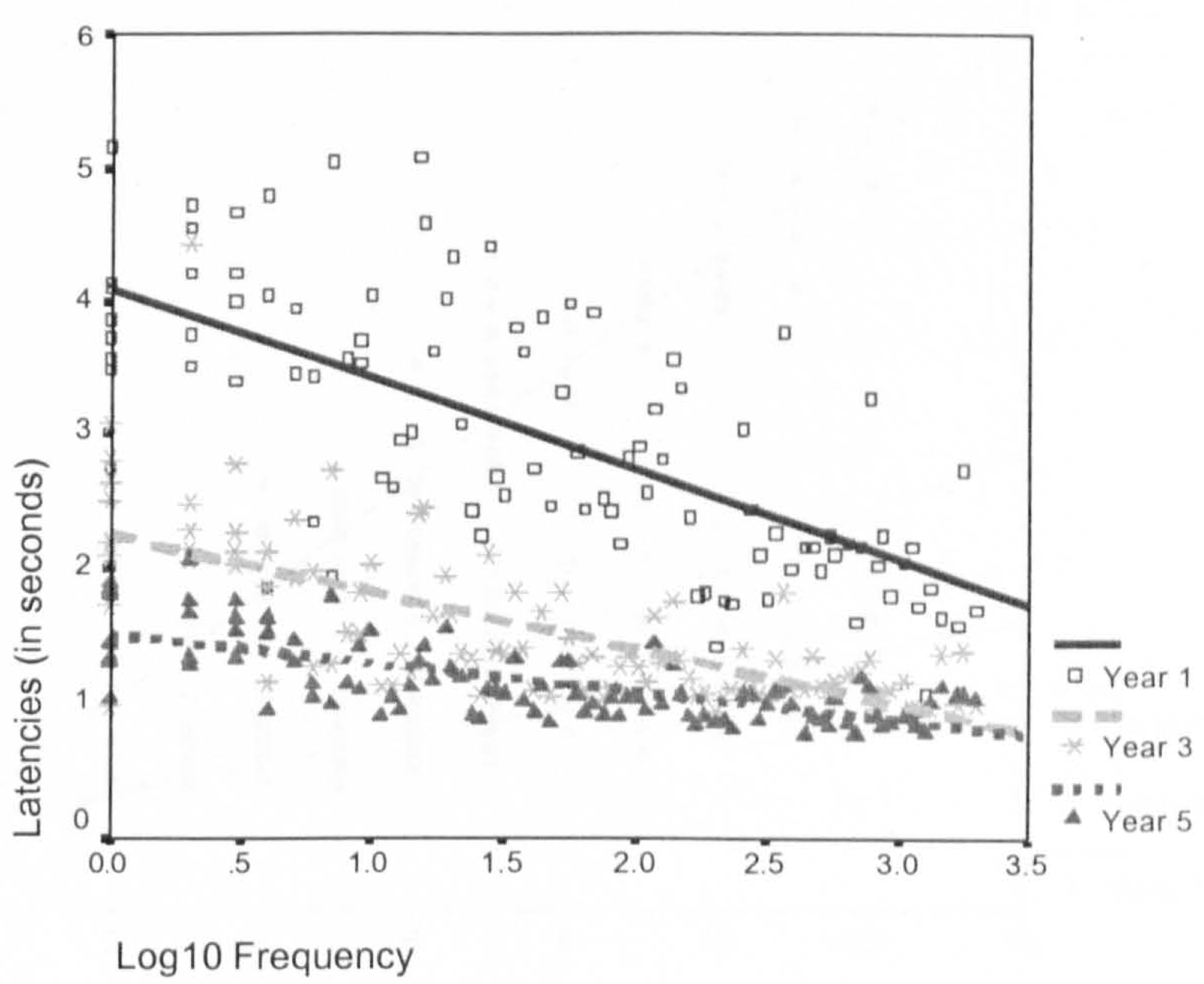

Figure 6. 1. Frequency effect on reading latencies for each Year.

H.2.2.3. The word length effect on reading latency will be greater for younger children than older children.

Regression analysis shows that for Year 1 children, reading latency is a function of word length [$B = .362$, SE B = .02, $\beta = .94$, $F(1, 98) = 715.66$, $p < 0.001$, $R^2 = .88$]. The same applies to Year 3 and 5 children [Year 3, $B = .182$, SE B = .02, $\beta = .77$, $F(1, 98) = 143.85$, $p < 0.001$, $R^2 = .60$; Year 5, $B = .092$, SE B = .01, $\beta = .77$,

$F(1, 98) = 145.82$, $p < 0.001$, $R^2 = .60$]. The regression coefficents suggest that reading latency for correct responses is more a linear increasing function of word length for Year 1 than for Year 3 and Year 5 (see Figure 6.2). This supports the hypothesis which states that word length effect on reading latency will be greater for younger children (*H.2.2.3.*).

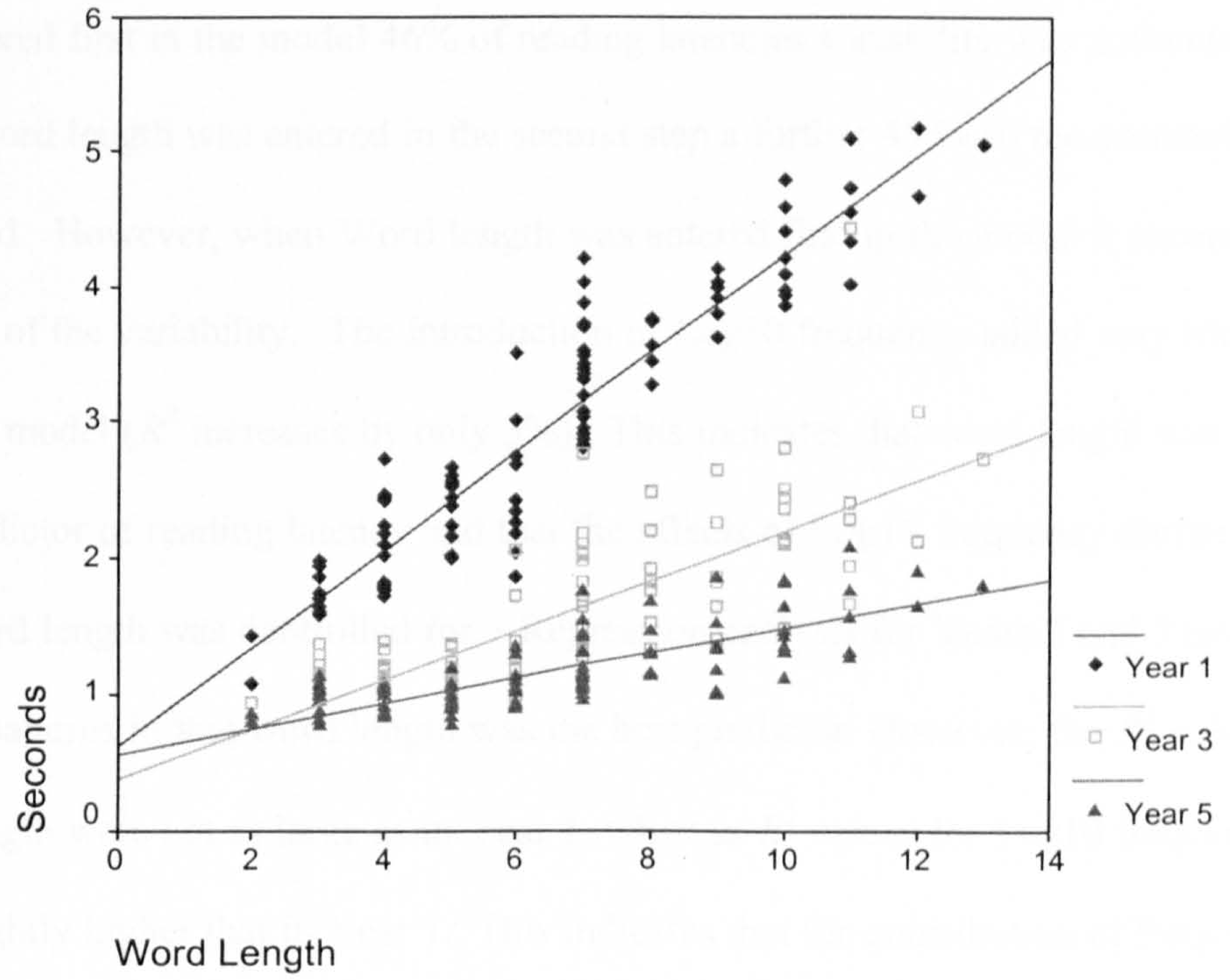

Figure 6.2. Reading latencies as a function of word length for each Year.

H.2.2.4. Word length and log10 frequency will be significant predictors of reading latency.

Multiple regressions, using full entry method, with word length and log10 frequency as independent variables, were carried out to assess the effect of both variables on reading latency. Tables 6.4, 6.5, and 6.6 show that both variables are significant predictors of reading latency; however, because Log10 frequency and word length are confounded in the Albanian words these results are difficult to interpret. Therefore, stepwise regressions were carried out where the order of variables entered in the regression analysis was controlled. In the initial regression analysis, Log10 frequency was entered first in the model and word length second. This was followed by a second set of regression analysis where the dependent variables were entered in opposite order. Both sets of regressions were run for each year. The R^2s for each model are presented in Table 6. 7. For Year 1, when Log10 was entered first in the model 46% of reading latencies variability was accounted for. When word length was entered in the second step a further 45 % of the variability was explained. However, when Word length was entered first in the model it accounted for 88% of the variability. The introduction of Log10 frequency added very little to the final model (R^2 increases by only 3%). This indicates that word length was the best predictor of reading latency and that the effects of Log10 frequency diminished after word length was controlled for. Regression analysis for Years 3 and 5 revealed similar patterns in that word length was the best predictor. However, the R^2 values for word length were not as large as in Year 1, whereas R^2 values for Log10 frequency were slightly higher that in Year 1. This indicates that the contribution of frequency increases with practice. To conclude, (1) word length is the best predictor within each year group, and (2) the word length effect seems to be especially large for Year 1. These findings support hypothesis *H. 2.2.*

	B	Std. Error	Beta
(Constant)	1.220	0.15	
Log10 Frequency	-0.194	0.04	-0.20**
Word Length	0.318	0.01	0.82**

Table 6.4. Reading latencies for Year 1 as a function of word length and Log10 Frequency [R^2=.95, F(2,97)=460.86, p<.001].

	B	Std. Error	Beta
(Constant)	1.077	0.16	
Log10 Frequency	-0.233	0.04	-0.37**
Word Length	0.130	0.02	0.55**

Table 6.5. Reading latencies for Year 3 as a function of word length and Log10 Frequency [R^2=.68, F(2,97)=105.08, p<.001].

	B	Std. Error	Beta
(Constant)	0.923	0.08	
Log10 Frequency	-0.115	0.02	-0.38**
Word Length	0.066	0.01	0.55**

Table 6.6. Reading latencies for Year 5 as a function of word length and Log10 Frequency (R^2=.69, F(2,97)=108.28, p<.001).

Order		*Year 1* R^2	*Year 1* R^2 change	*Year 3* R^2	*Year 3* R^2 change	*Year 5* R^2	*Year 5* R^2 change
1st	Log10 freq.	.46**		.48**		.49**	
2nd	Word length	.91**	.45**	.68**	.20**	.69**	.20**
1st	Word length	.88**		.60**		.59**	
2nd	Log10 freq.	.91**	.03**	.68**	.08**	.69**	.10**

Table 6. 7. R^2 values from stepwise regressions on reading latencies as a function of Log10 frequency and Word length. *Note:* ** p<.001.

H.2.2.5. It is expected that nonword errors will be the most frequent error type.

H.2.2.6. The types of errors and their proportions will change over the years: Year 1 children will make more nonword errors than Year 3 and 5 children (*Age x Type interaction*).

In total 1995 errors were made by the Albanian children. The errors shown in Table 6.8 are classified as null responses (no response within 15 seconds or when the children could not read the word), word replacements, or other attempts, which resulted in nonword responses. The error patterns are very similar for all three year groups, in the sense that most of the errors are nonword errors, followed by whole-word replacements, and null responses.

There is a significant interaction between error types and Year groups $F(4,352)=6.20, p<0.001$.

	Year 1		Year 3		Year 5		Total	
Error type	N	Column %	N	Column %	N	Column %	N	Anova
Null responses	16	1.81	6	0.90	1	0.23	23	$F<3$, n.s.
Word replacements	175	19.77[a]	175[a]	26.16	166	37.64[b]	516	$F(2,177)=10.78, p<.001$
Nonword errors	694	78.42[a]	488[a]	72.94	274	62.13[b]	1456	$F(2,177)=13.8, p<.001$
Total	885		669		441		1995	

Table 6.8. Classification of the reading errors made by Year 1, 3, and 5 Albanian children. *Note:* [a,b]: Different letters show significantly different porportions for each error type across the year-groups (using the Post-hoc Bonferroni test).

Most of the errors made by the Year 1 children were nonword errors (78.42%), whereas whole word substitutions (19.77%) were not as frequent as nonword errors. Null responses were very rare (only 1.81%). For Year 3 children 72.94% of errors were nonword errors, 26.15% were whole word replacements errors, 6% were null response error type, and for Year 5 children 62.13% of errors were nonword errors, 37.64% were whole word replacements errors, and 0.23% were null response error type.

The proportion of whole word replacements increases as children get older (Year 1 19.77%, Year 3 26.16%, and Year 5 37.64%) ($F(2,177)=10.78, p<.001$), whereas the proportion of nonword errors decreases (Year 1 78.42%, Year 3 72.94, and Year 5 62.13%) [$F(2,177)=13.8$, $p<.001$]. For both types of errors post-hoc Bonferroni test revealed a significant difference between years 1 and 3 ($p<.05$) but no difference between Year 3 and any of the other two age-groups. These findings confirm hypotheses *H.2.2.5.* and *H.2.2.6.*

The results from reading latencies and error analysis are supportive of *H.2.2.*

H.2.3. ***Reading rate.*** Year 1 children will have lower reading rates in the OMRT than their Year 3 and 5 counterparts.

Figure 6.3 suggests that reading rate improves with age [$F(2,177)=45.49$, $p<.001$]. Post-hoc Bonferroni tests revealed that differences between every group were significantly different from each other ($p<.001$). This supports hypothesis *H.2.3.1.*

H.2.3.1. During the OMRT young children will make more reading errors than older children.

Figure 6.4 shows that number of errors is different across the year-groups [$F(2, 57)=14.10$, $p<.001$]. Post-hoc Bonferroni tests revealed significant differences between Year 1 and 3, and between Year 1 and 5 ($p<00.1$). The number of errors was not different for Years 3 and 5 ($p<.001$). These findings go against hypothesis *H.2.3.1.*

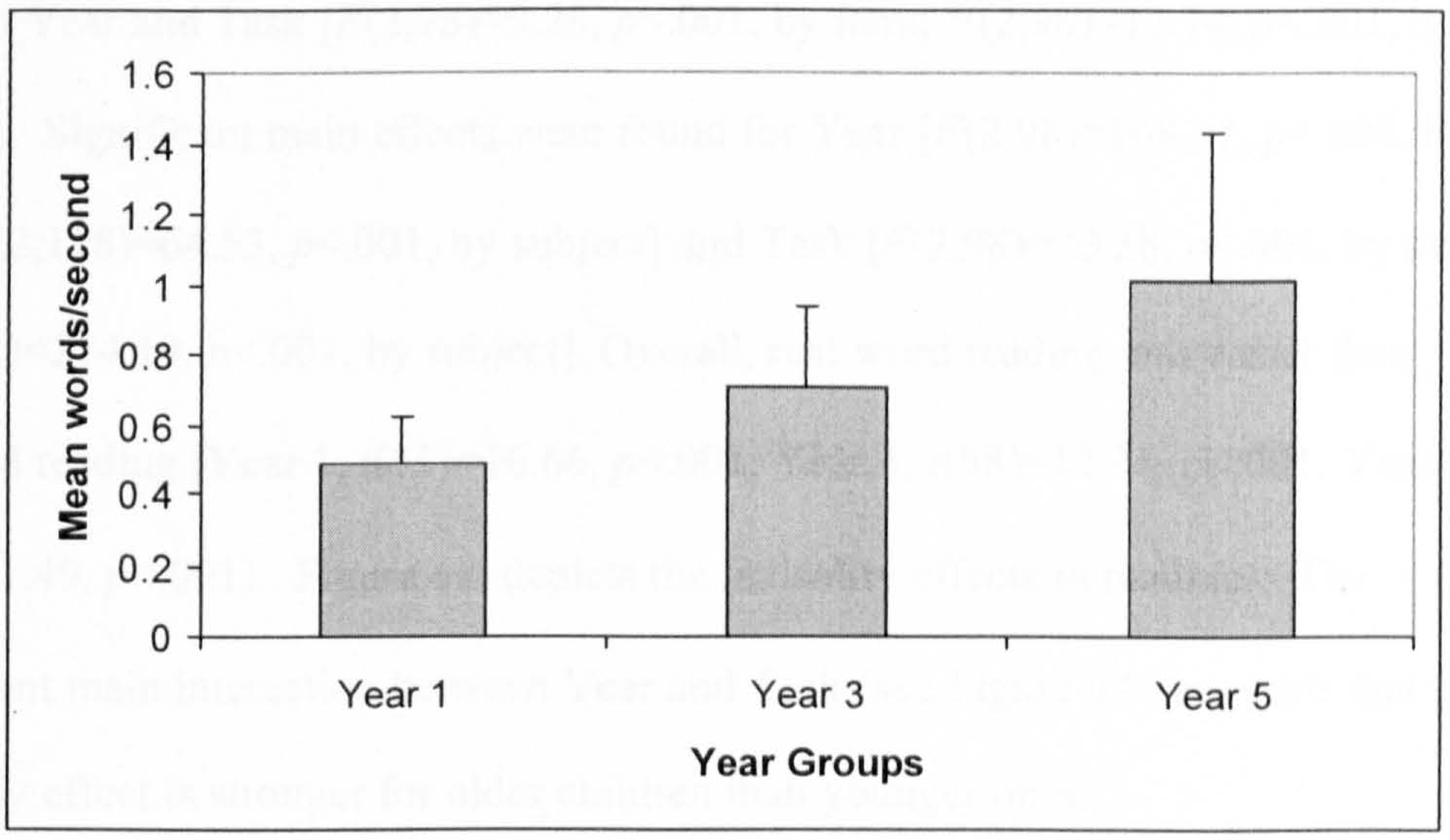

Figure 6.3. Mean number of words read per second and Standard Deviations (SDs) for each Year in the OMRT.

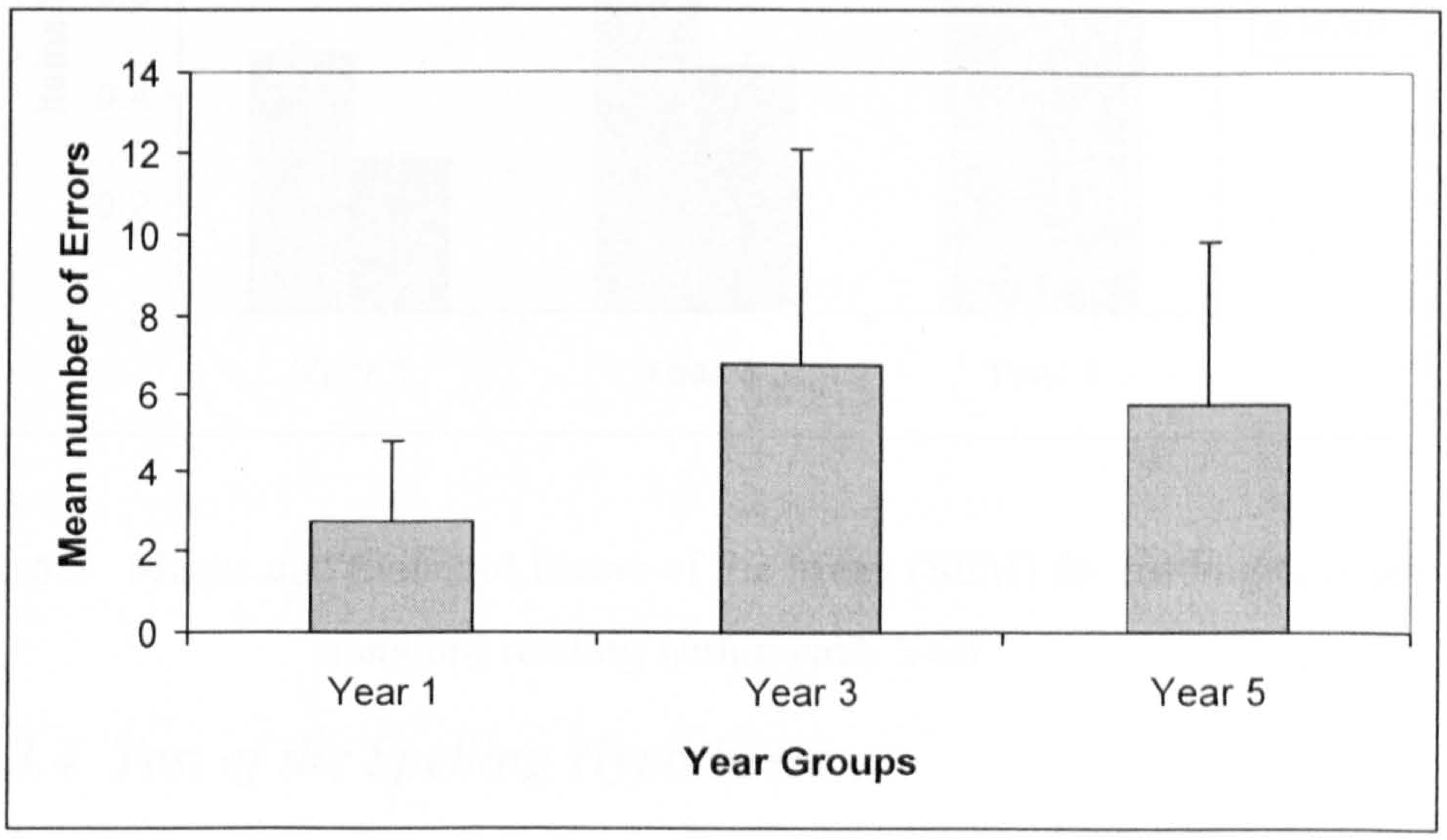

Figure 6.4. Mean number of errors made by each year group in the OMRT.

6.3.3.1. Lexicality effects in reading

Lexicality effect in reading was examined by comparing NWR and OMRT tasks. Repeated measures ANOVA revealed a significant two-way interaction between Year and Task [$F(2,98)=9.28$, $p<.001$, by item; $F(2,98)=12.74$, $p<.001$, by subject]. Significant main effects were found for Year [$F(2,98)=108.32$, $p<.001$, by item; $F(2,118)=64.53$, $p<.001$, by subject] and Task [$F(2,98)=73.28$, $p<.001$, by item; $F(2,118)=274.19$, $p<.001$, by subject]. Overall, real word reading was easier than nonword reading [Year 1, $t(51)=16.66$, $p<.001$; Year 3, $t(58)=12.31$, $p<.001$; Year 5, $t(54)=11.49$, $p<.001$). Figure 6.5 depicts the lexicality effects in reading. The significant main interaction between Year and Task (see Figure 6.5) suggests that the lexicality effect is stronger for older children than younger ones.

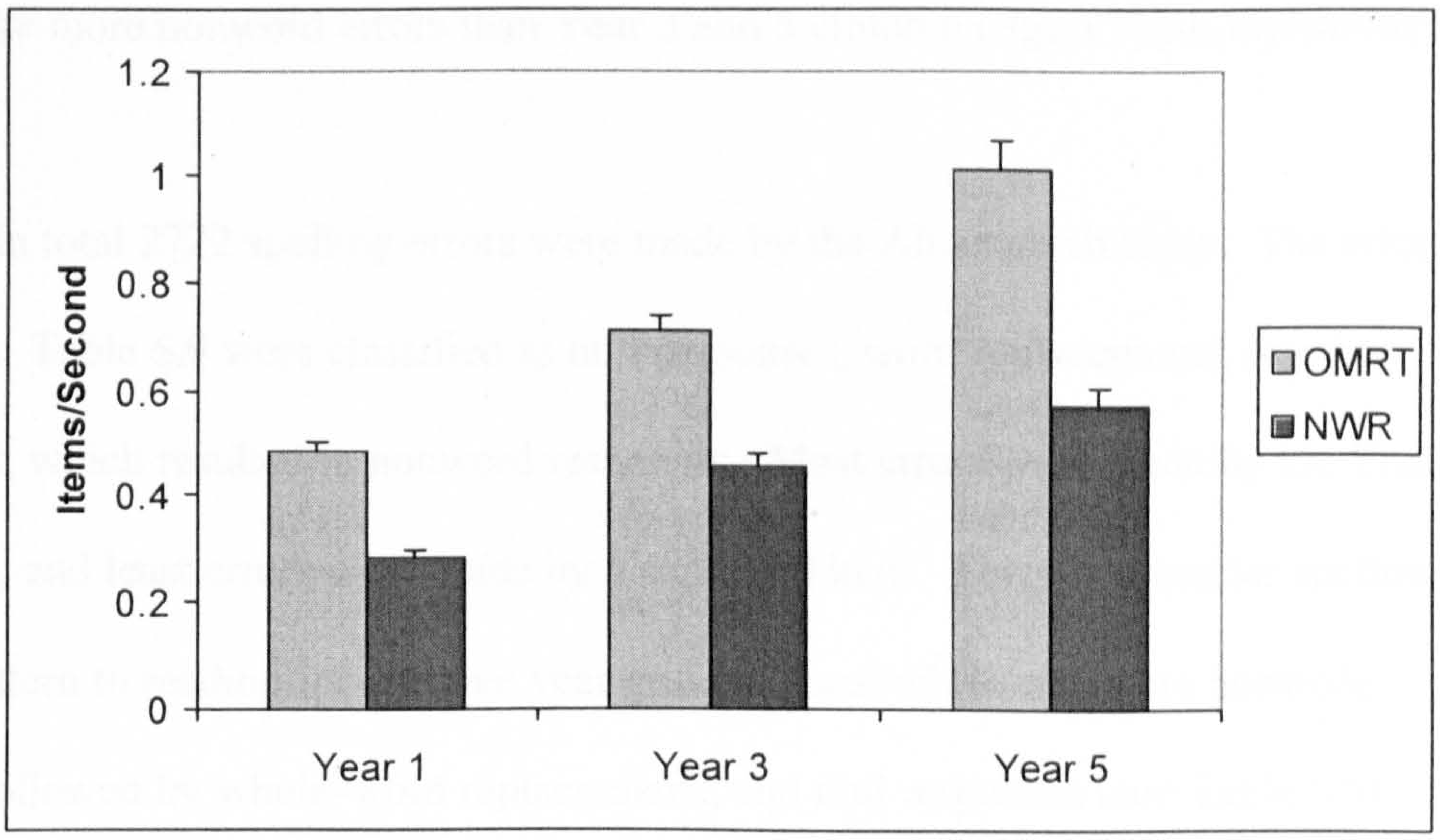

Figure 6.5. Means and Standard Errors of the Mean (SEM) for reading rate and nonword reading within each Year.

6.3.4 Test of the Spelling Hypotheses

H.3.1. Spelling accuracy. Younger children will be less accurate than older children in the 100-word spelling task.

Group differences for Spelling 100 were assessed using by-item and by subject ANOVAs. ANOVA testing shows significant differences between year groups [$F(2,297)=17.12$, $p<.001$, by item analysis; $F(2,57)= 13.89$, $p<.001$, by subject analysis]. Post-hoc Bonferroni tests show that Year 1 children are less accurate spellers than Year 3 and 5 children (Year 1 vs Year 3, $p<.05$; Year 1vs Year 5, $p<.001$). This supports hypothesis *H.3.1.* The spelling score of Year 3 children is not different from that of Year 5 children ($p>.05$).

H.3.2. Spelling strategy. Younger children will rely more heavily on phoneme-grapheme conversion spelling strategy, whereas older children will rely on bigger units, such as onset, rime, and whole word spelling from memory.

H.3.2.1. It is expected that nonword errors will be the most frequent error type. The types of errors and their proportions will change over the years: Year 1 children will make more nonword errors than Year 3 and 5 children (*Age x Type interaction*).

In total 2722 spelling errors were made by the Albanian children. The errors shown in Table 6.9 were classified as null responses, word replacements, or other attempts, which resulted in nonword responses. Most errors were made by the Year 1 children, and least errors were made by Year 5 children. There is a similar spelling error pattern to reading for all three year groups: most of the errors are nonword errors, followed by whole-word replacements, and null responses (see Table 6.9). The proportion of null responses did not differ across the year-groups. However, there were significant differences for the proportions of nonword errors and whole word replacements. Bonferroni post-hoc tests revealed Year 1 children made more nonword type errors and whole word replacements errors than Year 5 children ($p<.01$). Year 2 children proportions of error types did not differ significantly from the other age-groups ($p>.05$).

	Year 1		Year 3		Year 5		
Error type	N	Column %	N	Column %	N	Column %	ANOVA
Null responses	23	2.00	10	1.08	9	1.39	$F<3$, n.s.
Word replacements	158	13.70 [a]	174	18.87	120	18.55 [b]	$F(2, 177)=8.50, p<.001$
Nonword errors	972	84.30 [a]	738	80.04	518	80.06 [b]	$F(2, 177)=6.42, p<.001$
Total	1153		922		647		

Table 6.9. Classification of the spelling errors made by Year 1, 3, and 5 Albanian children. *Note*: [a,b,c] Different show significantly different proportions letters for each error type across the year-groups (using the Post-hoc Bonferroni test).

For all three year groups most of the errors are nonword errors, followed by whole-word replacements and null responses. As children grow older, the percentage of whole word replacements increases, and the percentage of nonword errors decreases. Overall, there is a significant interaction between spelling error types and year groups $F(4,354)=4.32, p<0.01$. These decreases are not as large as in reading. Therefore, for spelling, Albanian children rely heavily on phoneme-grapheme conversions even in later years. This is not entirely supportive of hypotheses *H.3.2.* and *H.3.2.1.*

6.3.4.1 Lexicality effects in spelling

Lexicality effect in spelling was examined by comparing NWS and Spelling 50. Figure 6. 6 shows that spelling scores are slightly higher than NWS scores. Furthermore, lexicality effects in spelling seem to be slightly smaller for Year 1 children than for older children. Repeated measures ANOVA revealed a non-significant two-way interaction between Year and Task [$F(2,98)<1$, by item; $F(2,98)<2$, by subject]. However, there were main effects of Year [$F(2,98)=12.75$,

$p<.001$, by item; $F(2,118)=8.44$, $p<.001$, by subject] and Task [$F(2,98)=13.96$, $p<.001$, by item; $F(2,118)=137.47$, $p<.001$, by subject]. Overall, real word spelling was easier than nonword spelling [Year 1, $t(59)=4.75$, $p<.001$; Year 3, $t(59)=6.08$, $p<.001$; Year 5, $t(59)=10.78$, $p<.001$].

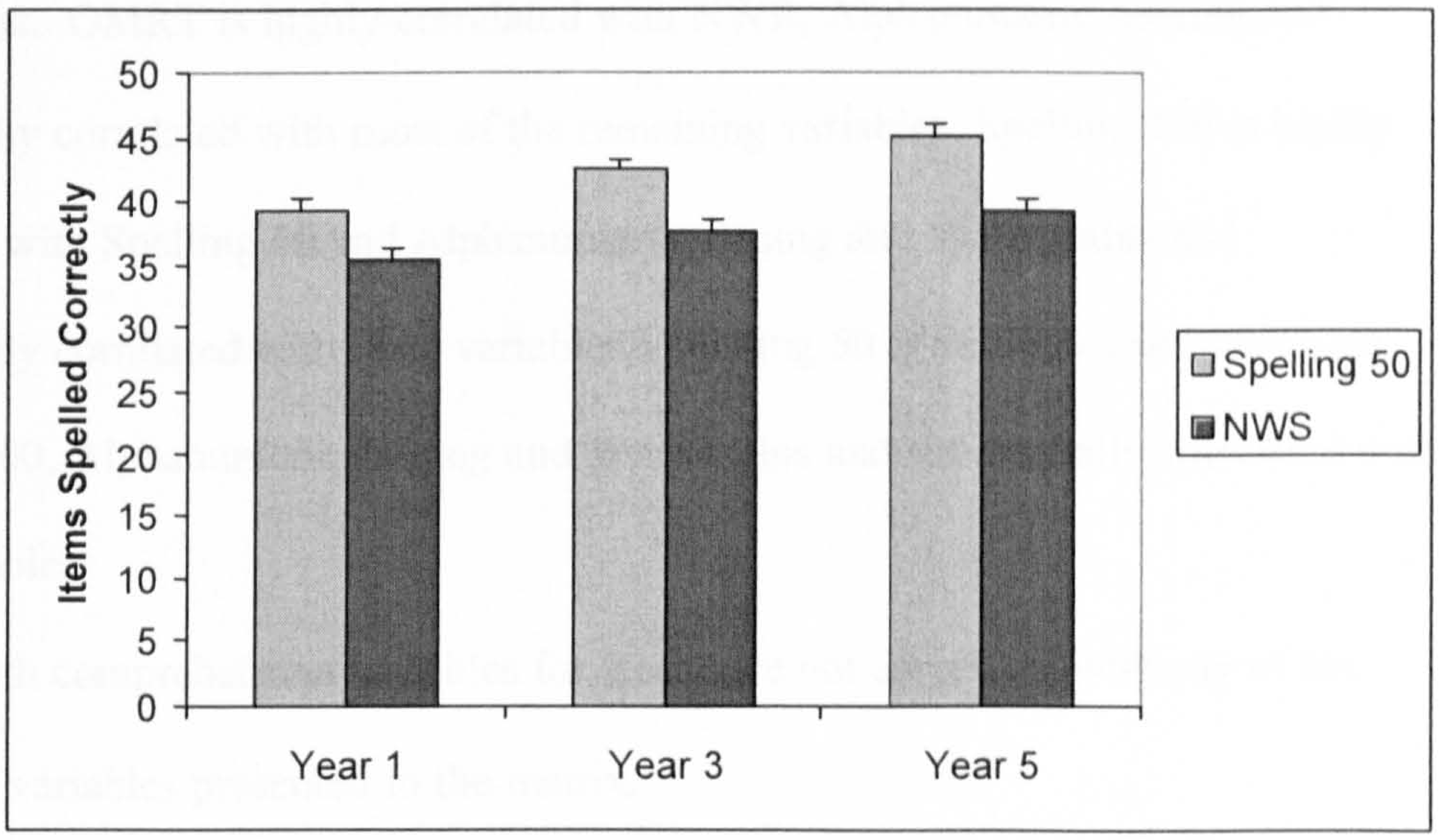

Figure 6. 6. Means and SEM for Spelling 50 and NWS.

6.3.5 Reading and Spelling predictors

6.3.5.1 Correlation matrices.

The correlation matrix (Table 6.10) shows the correlation values for the whole of the Albanian sample: almost all variables are substantially correlated. The 100-word Reading test is substantially correlated with OMRT, NWR, Spelling 100, Spelling 50, Alphanumeric naming and Phoneme deletion. OMRT is highly correlated with NWR, Alphanumeric naming, Generic Speed, and Wordchains. Spelling 100 is highly correlated with Spelling 50 and NWS and substantially with most variables. Spelling 50 is strongly correlated with Spelling 100, NWS, and substantially with most variables.

Both comprehension variables are correlated substantially with most variables presented in the matrix.

Table 6.11 shows the correlation coefficients for Year 1. The 100-word Reading test is substantially correlated with OMRT, NWR, Alphanumeric naming and Wordchains. OMRT is highly correlated with NWR, Alphanumeric naming and substantially correlated with most of the remaining variables. Spelling 100 is highly correlated with Spelling 50 and Alphanumeric naming and Wordchains and substantially correlated with most variables. Spelling 50 is strongly correlated with Spelling 100, Alphanumeric naming and Wordchains and substantially correlated with most variables

Both comprehension variables for Year 1are not correlated with any of the remaining variables presented in the matrix.

Table 6.12 shows the correlation coefficients for Year 3. The 100-word Reading test is substantially correlated with OMRT, NWR, Alphanumeric naming and Wordchains. OMRT is highly correlated with NWR, Alphanumeric na ming and substantially correlated with most of the remaining variables. Spelling 100 is highly correlated with Spelling 50 and substantially correlated with Reading 100, NWS and Phoneme deletion. Spelling 50 is strongly correlated with Spelling 100 and substantially correlated with Alphanumeric, Reading 100 and NWS.

Both comprehension variables for Year 5 hardly correlate with any of the variables presented in the matrix.

Table 6.13 shows the correlation coefficients for Year 5. The 100-word reading test is substantially correlated with most variables in the matrix, especially with NWR (r=.66). OMRT is highly correlated with Reading Latencies for the 100-word reading test, Spelling 100 and 50, Alphanumeric naming and Wordchains and substantially correlated with most of the remaining variables. Spelling 100 is highly correlated with Reading Latencies for the 100-word reading test, Spelling 50, NWS, and Alphanumeric naming and substantially correlated with most of the remaining variables. Spelling 50 is strongly correlated with Reading Latencies for the 100-word reading test and Spelling 100 and substantially correlated with most of the remaining variables.

For Year 5 there is little correlation between the comprehension variables and the rest of the variables.

Reading 100 and OMRT purport to measure reading skills. Overall, they substantially correlate with each other, but, OMRT is even more correlated with the reading latency of the 100-word reading tests. The correlations between these variables increase as children get older; however, by the end of Year 5 OMRT highly correlates with Reading 100 latency. Thus it is clear that performance on the OMRT strongly reflects a speed factor.

The two spelling tests on the other hand, are highly correlated across the years, suggesting that they do indeed measure similar skills.

Correlation coefficients for Years 1, 3, and 5 show that the two word comprehension measures hardly correlate with the rest of the variables. Previous studies have found high correlations between comprehension and IQ. This is not the case in this study. However, the IQ measure used here measures non-verbal IQ (Raven's Matrices), therefore the lack of correlations is understandable.

The overall pattern for the whole sample (Table 6.10) is that CPM correlation coefficients are relatively lower than rest of the coefficients. Across the years the predicting power of CPM scores decreases.

Finally, the correlation between NWS and the other variables increases as children get older indicating that ability to spell nonwords may be closely related to the general literacy skills in older children.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Reading 100														
2	Reading Latency	-.41**													
3	Word Comprehension 100	.30**	-.50**												
4	Word Comprehension 50	.32**	-.52**	.89**											
5	OMRT	.54**	-.66**	.48**	.51**										
6	NWR	.60**	-.72**	.47**	.48**	.83**									
7	Spelling 100	.52**	-.56**	.25**	.23**	.52**	.54**								
8	Spelling 50	.49**	-.55**	.24**	.21**	.51**	.55**	.95**							
9	NWS	.41**	-.37**	.13	.12	.41**	.45**	.68**	.67**						
10	CPM	.32**	-.58**	.48**	.55**	.48**	.48**	.39**	.35**	.23**					
11	Alphanumeric Naming	.55**	-.82**	.59**	.59**	.80**	.83**	.59**	.59**	.42**	.57**				
12	Colour and Object Naming	.48**	-.60**	.48**	.51**	.63**	.63**	.51**	.50**	.34**	.52**	.77**			
13	Phoneme Deletion	.54**	-.31**	.07	.08	.42**	.47**	.51**	.48**	.35**	.21**	.40**	.25**		
14	Generic Speed	.42**	-.66**	.61**	.63**	.69**	.66**	.40**	.44**	.32**	.63**	.79**	.68**	.19*	
15	Wordchains	.53**	-.73**	.60**	.62**	.80**	.82**	.58**	.59**	.43**	.65**	.85**	.66**	.39**	.80**

Table 6.10. Correlation matrix for all the variables for all the Albanian children (n=180). *Note:* ** $p<.001$; * $p<.05$.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Reading 100														
2	Reading Latency	-.15													
3	Word Comprehension 100	.03	-.04												
4	Word Comprehension 50	.14	-.07	.79**											
5	OMRT	.53**	-.60**	-.02	.08										
6	NWR	.54**	-.67**	.02	.17	.76**									
7	Spelling 100	.36**	-.59**	-.08	-.13	.63**	.45**								
8	Spelling 50	.32*	-.57**	-.09	-.16	.59**	.41**	.96**							
9	NWS	.25	-.40**	-.16	-.20	.38**	.34*	.58**	.56**						
10	CPM	.08	-.27*	.01	.19	.33*	.27	.36**	.28*	.23					
11	Alphanumeric Naming	.52**	-.65**	.11	.10	.74**	.74**	.69**	.65**	.27	.24				
12	Colour and Object Naming	.48**	-.45**	.10	.18	.56**	.55**	.55**	.46**	.23	.19	.73**			
13	Phoneme Deletion	.46**	-.16	.01	.02	.41**	.48**	.42**	.38**	.25	.42**	.46**	.23		
14	Generic Speed	.42**	-.30*	.11	.13	.56**	.51**	.44**	.42**	.13	.11	.50**	.44**	.28*	
15	Wordchains	.51**	-.57**	-.01	.01	.77**	.69**	.69**	.65**	.44**	.41**	.73**	.41**	.51**	.51**

Table 6.11. Correlation matrix for all the variables for Year 1 Albanian children (n=60). *Note:* ** $p<.001$; * $p<.05$.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Reading 100														
2	Reading Latency	-.32*													
3	Word Comprehension 100	.25	-.09												
4	Word Comprehension 50	.17	-.06	.82**											
5	OMRT	.50**	-.58**	.18	.13										
6	NWR	.56**	-.67**	.20	.09	.72**									
7	Spelling 100	.52**	-.31*	.18	.15	.30*	.39**								
8	Spelling 50	.54**	-.34**	.23	.16	.32*	.46**	.91**							
9	NWS	.38**	-.30*	.20	.17	.32*	.41**	.60**	.57**						
10	CPM	.15	-.12	-.04	.06	-.18	.02	.07	.03	.09					
11	Alphanumeric Naming	.45**	-.65**	.28*	.22	.67**	.77**	.34**	.40**	.35**	-.03				
12	Colour and Object Naming	.27*	-.22	.17	.14	.25	.40**	.18	.28*	.21	.15	.58**			
13	Phoneme Deletion	.57**	-.44**	-.05	.00	.50**	.49**	.53**	.48**	.34**	-.02	.48**	.28*		
14	Generic Speed	.13	-.30*	.22	.18	.27*	.35**	-.03	.18	.13	.09	.46**	.34**	.06	
15	Wordchains	.45**	-.54**	.40**	.31*	.62**	.68**	.36**	.42**	.35**	.20	.72**	.37**	.38**	.43**

Table 6.12. Correlation matrix for all the variables for Year 3 Albanian children (n=60). *Note:* ** $p<.001$; * $p<.05$.

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Reading 100														
2	Reading Latency	-.62**													
3	Word Comprehension 100	.30*	-.14												
4	Word Comprehension 50	.20	-.11	.90**											
5	OMRT	.59**	-.70**	.42**	.29*										
6	NWR	.66**	-.66**	.35**	.24	.78**									
7	Spelling 100	.59**	-.74**	.04	-.04	.53**	.58**								
8	Spelling 50	.54**	-.74**	.02	-.06	.50**	.58**	.98**							
9	NWS	.58**	-.64**	.06	.00	.49**	.52**	.86**	.83**						
10	CPM	.34*	-.23	.31*	.21	.34*	.26	.31*	.27*	.23					
11	Alphanumeric Naming	.62**	-.73**	.22	.15	.74**	.75**	.69**	.66**	.65**	.26				
12	Colour and Object Naming	.43**	-.35**	-.06	-.05	.46**	.44**	.50**	.48**	.45**	.10	.57**			
13	Phoneme Deletion	.60**	-.64**	.02	-.04	.50**	.57**	.59**	.55**	.44**	.09	.51**	.19		
14	Generic Speed	.45**	-.41**	.27*	.20	.51**	.44**	.43**	.45**	.55**	.35**	.55**	.40**	.21	
15	Wordchains	.61**	-.70**	.34*	.27*	.67**	.76**	.64**	.65**	.60**	.41**	.69**	.34*	.54**	.58**

Table 6.13. Correlation matrix for all the variables for Year 5 Albanian children (n=60). *Note:* ** $p<.001$; * $p<.05$.

6.3.6 *Regression analysis for Reading related tasks for all Albanian children*

For each regression analysis reported below, two methods were used: Stepwise and Full Entry. For each year, the full list of variables entered in these to methods is shown in the Full Entry table.

6.3.6.1 Reading accuracy

According to the stepwise regression analysis (Table 6.14), for the whole of the Albanian sample, NWR, Phoneme Deletion and Objects and Colours rapid naming are the best predictors of reading ability. The increase of R^2 in the Stepwise regression in the final step is very small (R^2 change = .03). As a result, Objects and Colours rapid naming is no longer a significant predictor in the Full Entry model. The best predictors of reading using the Full Entry regression analysis are NWR, Phoneme Deletion and Spelling 100 (Table 6.15).

	B	Std. Error	Beta	R^2	R^2 *change*
Step 1					
NWR	37.591	3.63	0.61**	.38	
Step 2					
NWR	27.095	3.83	0.44**	.47	.09
Phoneme Deletion	1.218	0.22	0.35**		
Step 3					
NWR	17.881	4.86	0.29**	.50	.03
Phoneme Deletion	1.271	0.21	0.37**		
RAN Objects and Colours	11.074	3.72	0.21**		

Table 6.14. Summary of Stepwise Regression Analysis for variables predicting reading ability in Albanian using Reading 100 as the dependent variable. *Note:* * $p<.05$, ** $p<.001$.

	B	Std. Error	Beta
(Constant)	23.991	7.96	
NWR	20.588	6.73	0.34**
Comprehension 100	0.094	0.07	0.10
RAN Alphanumeric	-1.464	3.56	-0.06
RAN Objects and Colours	8.860	4.67	0.17
Phoneme Deletion	1.145	0.24	0.33**
Wordchains	-0.105	0.08	-0.17
Generic Speed	4.345	4.68	0.10
CPM	-0.081	0.14	-0.04
Spelling 100	0.142	0.06	0.18*

Table 6.15. Summary of Full Entry Regression Analysis for variables predicting reading ability in Albanian using Reading 100 as the dependent variable [R^2= .52, F(9,170)=20.31**]. *Note:* * p<.05, ** p<.001.

6.3.5.2 Reading latency

Mann and Wimmer (2002) found that RAN was the only predictor of reading latencies for German speaking children. Stepwise regression (Table 6.16) shows that although Alphanumeric naming is the best predictor, Spelling 100 and CPM are also significant predictors. Full entry regression reveals similar results (Table 6.17).

In addition, R^2 values are larger for Reading latency for both regression methods, therefore, Reading latency explains more of the variability than Reading 100. Consequently, regression analysis on Latency 100 for each year group has been included in the following analysis.

	B	Std. Error	Beta	R^2	R^2 *change*
Step 1					
RAN Alphanumeric	-1.555	0.08	-0.82**	.67	
Step 2	5.068	0.22			
RAN Alphanumeric	-1.374	0.10	-0.73**	.69	.02
Spelling 100	-0.010	0.00	-0.16*		
Step 3	5.234	0.22			
RAN Alphanumeric	-1.241	0.11	-0.65**	.70	.01
Spelling 100	-0.009	0.00	-0.15*		
CPM	-0.020	0.01	-0.14*		

Table 6.16. Summary of Stepwise Regression Analysis for variables predicting reading ability in Albanian using reading Latencies as the dependent variable. *Note:* * $p<.05$, ** $p<.001$.

	B	Std. Error	Beta
(Constant)	4.885	0.47	
NWR	-0.421	0.40	-0.09
Comprehension 100	-0.001	0.00	-0.02
RAN Alphanumeric	-1.266	0.21	-0.67**
RAN Objects and Colours	0.517	0.28	0.13
Phoneme Deletion	0.008	0.01	0.03
Wordchains	0.000	0.00	-0.01
Generic Speed	0.005	0.28	0.00
CPM	-0.020	0.01	-0.14*
Spelling 100	-0.010	0.00	-0.16*

Table 6.17. Summary of Full Entry Regression Analysis for variables predicting reading ability in Albanian using reading Latencies as the dependent variable [R^2= .71, $F(9,170)$=46.24**]. *Note:* * $p<.05$, ** $p<.001$.

6.3.5.3 OMRT

Using the OMRT as the dependent variable, it was found that NWR was the best predictor of OMRT and Wordchains was the second best predictor, using both regression methods (Tables 6.18 and 6.19).

	B	Std. Error	Beta	R^2	R^2 *change*
Step 1					
NWR	1.398	0.07	0.83**	.69	
Step 2					
NWR	0.879	0.11	0.52**	.74	.05
Wordchains	0.007	0.00	0.39**		

Table 6.18. Summary of Stepwise Regression Analysis for variables predicting reading ability in Albanian using the OMRT as the dependent variable. *Note:* * p<.05, ** p<.001.

	B	Std. Error	Beta
(Constant)	-0.116	0.20	
NWR	0.732	0.13	0.43**
Comprehension 50	0.001	0.00	0.01
RAN Alphanumeric	0.066	0.07	0.10
RAN Colours and Objects	0.067	0.09	0.05
Phoneme Deletion	0.005	0.00	0.06
Wordchains	0.005	0.00	0.28*
Generic Speed	0.111	0.09	0.09
CPM	-0.002	0.00	-0.05
Spelling 50	0.000	0.00	-0.01

Table 6.19. Summary of Full Entry Regression Analysis for variables predicting reading ability in Albanian using the OMRT as the dependent variable [R^2=.75, F(9,156)=52.93]. *Note:* * p<.05, ** p<.001.

6.3.6 Factor analysis

Exploratory analysis was carried out to examine how the variables grouped together. Principal Component Analysis, using Varimax rotation, revealed two main components. A large number of variables load mostly on the first component; they seem to indicate a *general ability factor* (Table 6.20). Reading and spelling variables together with Phoneme Deletion load mostly on the second component, indicating a *literacy factor*. However, there are several variables, such as Latency 100, OMRT, and NWR, that have high loadings on both components. OMRT and NWR are very similar and are both speeded tests, whereas Latency 100 is a pure speed measure. Are the above regression results for the entire Albanian sample due to a generic speed effect or due to the content of the predictors? In order to assess this, two Hierarchical regressions were carried out where the effect of Generic Speed was controlled for.

Variables	Component	
	1	2
Reading 100	0.344	0.618
OMRT	0.683	0.504
NWR	0.655	0.568
Latency 100	-0.697	-0.445
Comprehension 100	0.850	
Comprehension 50	0.879	
Spelling 100		0.872
Spelling 50		0.862
NWS		0.766
RAN Alphanumeric	0.782	0.505
RAN Colours and Objects	0.679	0.401
Phoneme Deletion		0.700
Wordchains	0.798	0.432
Generic Speed	0.831	
CPM	0.692	

Table 6.20. PCA using Varimax rotaion for the Albanian variables. Note: Coefficients smaller than .300 are not presented.

In the first regression, with Latency 100 as the dependent variable, Generic Speed was entered first in the model. The best predictors of Latency 100 form the regression results presented in Table 6.16 (RAN Alphanumeric, Spelling 100, and CPM) were entered in the second step. The results, presented in Table 6.21, show that the R^2 for the Generic Speed variable was large (R^2=.44). In the following steps, the rest of the predictors explained a further 26% of the Latency 100 variance, indicating that for the initial Latency 100 regression analysis results were due to the content of the significant predictors.

	B	Std. Error	Beta	R^2	R^2 *change*
Step 1					
Generic Speed	-2.244	0.19	-0.66	.44	
Step 2					
Generic Speed	-0.120	0.24	-0.04	.67	.23
RAN Alphanumeric	-1.502	0.13	-0.79		
Step 3					
Generic Speed	-0.201	0.23	-0.06	.69	.02
RAN Alphanumeric	-1.279	0.15	-0.67		
Spelling 100	-0.010	0.00	-0.16		
Step 4					
Generic Speed	0.027	0.25	0.01	.70	.01
RAN Alphanumeric	-1.252	0.15	-0.66		
Spelling 100	-0.009	0.00	-0.14		
CPM	-0.020	0.01	-0.14		

Table 6.21. Regression analysis for Latency 100, controlling for Generic Speed.

Note: * p<.05, ** p<.001.

In the second regression, with OMRT as the dependent variable, once again Generic Speed was entered first in the model. The best predictors of OMRT form the regression results presented in Table 6.18 (NWR and Wordchains) were entered in the second step. The results, presented in Table 6.22, show that the R^2 for the Generic Speed variable was quite large (R^2=.48). However, in the following steps, the rest of the predictors explained a further 27% of the OMRT variance, indicating that for the initial OMRT regression analysis results were due to the content of the significant predictors. Hence, dependent variables that have a speed aspect, such as Latency 100 and OMRT, are not purely affected by a generic speed factor, but by the real contents of the predictors.

	B	Std. Error	Beta	R^2	R^2 *change*
Step 1					
Generic Speed	0.830	0.07	0.69	.48	
Step 2					
Generic Speed	0.313	0.07	0.26	.72	.24
NWR items/sec	1.110	0.09	0.66		
Step 3					
Generic Speed	0.130	0.08	0.11	.75	.03
NWR	0.866	0.11	0.51		
Wordchains	0.005	0.00	0.31		

Table 6.22. Regression analysis for OMRT, controlling for Generic Speed. *Note:* * $p<.05$, ** $p<.001$.

6.3.7 Regression analysis for Reading related tasks for Year 1 Albanian children

6.3.7.1 Reading accuracy

The final step of stepwise regression (Table 6.23) reveals Phoneme Deletion and RAN Colours and Objects as the best predictors of Reading 100 for Year 1. Surprisingly, NWR was the best predictor in Steps 1 and 2 but was not significant in Step 3, hence, was removed in Step 4. The finding of the final step is supported by the results of the Full Entry regression analysis (Table 6.24), in which only Phoneme Deletion and RAN Colours and Objects were significant predictors. NWR and RAN Colour and Objects are substantially correlated (r=.55), and this might explain why

NWR is removed in the stepwise regression and does not appear in the Full Entry method.

	B	Std. Error	Beta	R^2	R^2 *change*
Step 1					
NWR	81.805	16.01	0.56**	.31	
Step 2					
NWR	57.474	18.19	0.39**	.38	.05
Phoneme Deletion	1.066	0.43	0.31*		
Step 3					
NWR	29.900	19.99	0.20 n.s.	.45	.07
Phoneme Deletion	1.178	0.41	0.34*		
RAN Colours and Objects	27.323	10.02	0.32*		
Step 4					
Phoneme Deletion	1.491	0.35	0.43**	.43	-.02
RAN Colours and Objects	34.900	8.73	0.41**		

Table 6.23. Summary of Stepwise Regression Analysis for variables predicting reading ability in Year 1 Albanian children using Reading 100 as the dependent variable. *Note:* * p<.05, ** p<.001.

	B	Std. Error	Beta
(Constant)	16.273	14.60	
NWR	40.213	24.96	0.27
Comprehension 100	0.022	0.13	0.02
RAN Alphanumeric	-6.793	13.38	-0.12
RAN Colour and Object	29.900	13.17	0.35*
Phoneme deletion	1.427	0.47	0.41*
Wordchains	-0.179	0.28	-0.09
Generic Speed	17.707	21.62	0.10
CPM	-0.469	0.30	-0.17
Spelling 100	0.033	0.14	0.04

Table 6.24. Summary of Full Entry Regression Analysis for variables predicting reading ability in Year 1 Albanian children using Reading 100 as the dependent variable [R^2=.49, F(9,50)=5.43**]. *Note:* * p<.05, ** p<.001.

6.3.7.2 Reading Latency

NWR and Spelling 100 were the best predictors of reading latencies for Year 1 using the Stepwise method (Table 6.25). RAN Alphanumeric was the best predictor in Steps 1 and 2 but removed in the final step. Full Entry regression (Table 6.26) shows that in addition to NWR and Spelling 100, Phoneme Deletion is also a significant predictor. According to the correlation matrix for Year 1, RAN Alphanumeric has large correlation coefficients with NWR (*r*=.74), Spelling 100 (*r*=.69) and Phoneme Deletion (*r*=.46): this may explain why this variable is removed from the stepwise analysis and why it does not appear in the Full Entry regression analysis. One or more of these variables may be accounting for the variance explained by RAN Alphanumeric.

	B	Std. Error	Beta	R^2	R^2 *change*
Step 1					
RAN Alphanumeric	-2.374	0.32	-0.70**	.48	
Step 2					
RAN Alphanumeric	-1.355	0.46	-0.40*	.55	.07
NWR	-3.565	1.22	-0.39*		
Step 3					
RAN Alphanumeric	-0.700	0.55	-0.20 n.s.	.58	.03
NWR	-3.628	1.19	-0.40*		
Spelling 100	-0.014	0.01	-0.26*		
Step 4					
NWR	-4.594	0.92	-0.51**	.57	-.01
Spelling 100	-0.019	0.01	-0.35*		

Table 6.25. Summary of Stepwise Regression Analysis for variables predicting reading ability in Year 1 Albanian children using Reading Latency as the dependent variable. *Note:* * p<.05, ** p<.001.

	B	Std. Error	Beta
(Constant)	4.716	0.75	
NWR	-4.388	1.28	-0.49*
Comprehension 100	-0.004	0.01	-0.06
RAN Alphanumeric	-1.187	0.69	-0.35
RAN Colour and Object	1.172	0.68	0.22
Phoneme deletion	0.058	0.02	0.27*
Wordchains	-0.010	0.01	-0.08
Generic Speed	0.955	1.11	0.09
CPM	-0.009	0.02	-0.05
Spelling 100	-0.019	0.01	-0.36*

Table 6.26. Summary of Full Entry Regression Analysis for variables predicting reading ability in Year 1 Albanian children using Reading Latency as the dependent variable [R^2=.65, $F(9,50)$=10.14**]. *Note:* * p<.05, ** p<.001.

6.3.7.3 OMRT

When the OMRT was used as the dependent variable, NWR and Spelling 50 were found to be significant in the stepwise regression, and NWR alone in the Full Entry method (Tables 6.27 and 6.28).

	B	Std. Error	Beta	R^2	R^2 *change*
Step 1					
NWR	0.981	0.12	0.76**	.58	
Step 2					
NWR	0.801	0.12	0.62**	.67	.09
Spelling 50	0.007	0.00	0.34**		

Table 6.27. Summary of Stepwise Regression Analysis for variables predicting reading ability in Year 1 Albanian children using OMRT as the dependent variable. *Note:* * p<.05, ** p<.001.

	B	Std. Error	Beta
(Constant)	-0.005	0.15	
NWR	0.554	0.18	0.43*
Comprehension 50	-0.001	0.00	-0.02
RAN Alphanumeric	0.090	0.10	0.18
RAN Colour and Object	0.004	0.09	0.01
Phoneme deletion	-0.002	0.00	-0.07
Wordchains	0.001	0.00	0.06
Generic Speed	0.242	0.16	0.15
CPM	0.003	0.00	0.12
Spelling 50	0.004	0.00	0.20

Table 6.28. Summary of Full Entry Regression Analysis for variables predicting reading ability in Year 1 Albanian children using OMRT as the dependent variable [R^2=.71, $F(9,42)$=11.59**]. *Note:* * p<.05, ** p<.001.

6.3.8 Regression analysis for Reading related tasks for Year 3 Albanian children

6.3.8.1 Reading Accuracy

Stepwise regression analysis for Year 3 children reveals that Phoneme Deletion, NWR and Comprehension 100 are the best predictors of reading ability using the 100-word reading test (Table 6.29). Phoneme Deletion is the best predictor. Full Entry regression reveals similar results (Table 6.30); again Phoneme Deletion is the best predictor.

	B	Std. Error	Beta	R^2	R^2 *change*
Step 1					
Phoneme Deletion	1.762	0.33	0.57**	.33	
Step 2					
Phoneme Deletion	1.232	0.35	0.40*	.43	.10
NWR	21.915	6.98	0.36*		
Step 3					
Phoneme Deletion	1.339	0.34	0.44**	.47	.04
NWR	18.430	6.96	0.30*		
Comprehension 100	0.207	0.10	0.22*		

Table 6.29. Summary of Stepwise Regression Analysis for variables predicting reading ability in Year 3 Albanian children using Reading 100 as the dependent variable. *Note:* * p<.05, ** p<.001.

	B	Std. Error	Beta
(Constant)	15.002	13.75	
NWR	22.468	9.58	0.37*
Comprehension 100	0.254	0.11	0.26*
RAN Alphanumeric	0.458	6.44	0.01
RAN Colour and Object	-1.977	7.34	-0.03
Phoneme deletion	1.234	0.40	0.40*
Wordchains	-0.177	0.14	-0.20
Generic Speed	-0.866	6.79	-0.01
CPM	0.335	0.20	0.17
Spelling 100	0.120	0.09	0.17

Table 6.30. Summary of Full Entry Regression Analysis for variables predicting reading ability in Year 3 Albanian children using Reading 100 as the dependent variable [R^2=.54, F(9,50)=6.51**]. *Note:* * p<.05, ** p<.001.

6.3.8.2 Reading Latency

When regression analysis was carried out with reading latency as the dependent variable NWR reading was a predictor in Stepwise and Full Entry regression, whereas Wordchains variable was a predictor in Stepwise regression (Table 6.31) but was replaced by RAN Alphanumeric in Full entry method (Table 6.32). From the correlation matrix for Year 3, RAN Alphanumeric and Wordchains are highly correlated (R^2=.73); this may explain why Wordchains are replaced by RAN Alphanumeric.

	B	Std. Error	Beta	R^2	R^2 *change*
Step 1					
NWR	-2.501	0.36	-0.67**	.45	
Step 2					
NWR	-1.869	0.44	-0.50**	.50	.05
Wordchains	-0.015	0.01	-0.28*		

Table 6.31. Summary of Stepwise Regression Analysis for variables predicting reading ability in Year 3 Albanian children using Reading Latency as the dependent variable. *Note:* * p<.05, ** p<.001.

	B	Std. Error	Beta
(Constant)	3.183	0.81	
NWR	-1.197	0.57	-0.32*
Comprehension 100	0.008	0.01	0.14
RAN Alphanumeric	-0.778	0.38	-0.41*
RAN Colour and Object	0.691	0.43	0.19
Phoneme deletion	-0.009	0.02	-0.05
Wordchains	-0.009	0.01	-0.17
Generic Speed	-0.031	0.40	-0.01
CPM	-0.015	0.01	-0.13
Spelling 100	-0.001	0.01	-0.02

Table 6.32. Summary of Full Entry Regression Analysis for variables predicting reading ability in Year 3 Albanian children using Reading Latency as the dependent variable [R^2=.57, F(9,50)=7.35**]. *Note:* * p<.05, ** p<.001.

6.3.8.3 OMRT

Stepwise regression presented in Table 6.33 reveals that NWR, Wordchains and CPM are the best predictors of OMRT for Year 3 children. NWR and CPM are best predictors of OMRT when Full Entry regression was carried out (Table 6.34), with Wordchains almost significant (p=.05).

	B	Std. Error	Beta	R^2	R^2 *change*
Step 1					
NWR	0.983	0.12	0.72**	.52	
Step 2					
NWR	0.730	0.15	0.54**	.58	.06
Wordchains	0.006	0.00	0.31*		
Step 3					
NWR	0.713	0.14	0.52**	.61	.03
Wordchains	0.007	0.00	0.33*		
CPM	-0.009	0.00	-0.22*		

Table 6.33. Summary of Stepwise Regression Analysis for variables predicting reading ability in Year 3 Albanian children using OMRT as the dependent variable. *Note:* * $p<.05$, ** $p<.001$.

	B	Std. Error	Beta
(Constant)	0.247	0.30	
NWR	0.615	0.19	0.45*
Comprehension 50	-0.001	0.01	-0.01
RAN Alphanumeric	0.088	0.13	0.13
RAN Colour and Object	-0.102	0.15	-0.08
Phoneme deletion	0.010	0.01	0.15
Wordchains	0.006	0.00	0.28 (p=.05)
Generic Speed	-0.004	0.13	0.00
CPM	-0.008	0.00	-0.19*
Spelling 50	-0.003	0.00	-0.08

Table 6.34. Summary of Full Entry Regression Analysis for variables predicting reading ability in Year 3 Albanian children using OMRT as the dependent variable [R^2=.65, F(9,49)=10.22**). *Note:* * $p<.05$, ** $p<.001$.

6.3.9 Regression analysis for Reading related tasks for Year 5 Albanian children

6.3.9.1 Reading accuracy

According to the Stepwise regression (Table 6.35) for Year 5, only NWR and Phoneme Deletion are the best predictors of Reading 100. Both predictors are substantially correlated (*r*=.57) and Full Entry regression (Table 6.36) reveals that only Phoneme Deletion variable is the best predictor.

	B	Std. Error	Beta	R^2	R^2 *change*
Step 1					
NWR	31.730	4.80	0.66**	.43	
Step 2					
NWR	22.532	5.49	0.47**	.51	.08
Phoneme Deletion	1.040	0.35	0.33*		

Table 6.35. Summary of Stepwise Regression Analysis for variables predicting reading ability in Year 5 Albanian children using Reading 100 as the dependent variable. *Note:* * $p<.05$, ** $p<.001$.

	B	Std. Error	Beta
(Constant)	-13.055	27.32	
NWR	10.808	8.24	0.22
Comprehension 100	0.440	0.26	0.18
RAN Alphanumeric	0.845	4.42	0.03
RAN Colour and Object	8.162	6.08	0.16
Phoneme deletion	1.139	0.40	0.37*
Wordchains	-0.064	0.09	-0.12
Generic Speed	5.053	5.45	0.11
CPM	0.188	0.25	0.08
Spelling 100	0.108	0.12	0.14

Table 6.36. Summary of Full Entry Regression Analysis for variables predicting reading ability in Year 5 Albanian children using Reading 100 as the dependent variable [R^2=.59, F(9,50)=8.09**]. *Note:* * $p<.05$, ** $p<.001$.

6.3.9.2 Reading latency

Using reading latencies as the dependent variable, Stepwise regression (Table 6.37) showed that Spelling 100, Wordchains and Phoneme Deletion were the best predictors. Regression analysis using Full Entry method (Table 6.38) revealed that only Spelling 100 and Wordchains were significant predictors. Stepwise regression shows that Phoneme Deletion add only .03 to the R^2, and this might be the reason why Phoneme Deletion does not have a significant impact in predicting reading latencies using the Full Entry regression Method.

	B	Std. Error	Beta	R^2	R^2 *change*
Step 1					
Spelling 100	-0.021	0.00	-0.74**	.55	
Step 2					
Spelling 100	-0.014	0.00	-0.48**	.66	.11
Wordchains	-0.008	0.00	-0.42**		
Step 3					
Spelling 100	-0.011	0.00	-0.38**	.69	.03
Wordchains	-0.007	0.00	-0.37**		
Phoneme deletion	-0.026	0.01	-0.23*		

Table 6.37. Summary of Stepwise Regression Analysis for variables predicting reading ability in Year 5 Albanian children using Reading Latency as the dependent variable. *Note:* * $p<.05$, ** $p<.001$.

	B	Std. Error	Beta
(Constant)	3.377	0.83	
NWR	0.014	0.25	0.01
Comprehension 100	-0.002	0.01	-0.02
RAN Alphanumeric	-0.237	0.13	-0.24
RAN Colour and Object	0.142	0.18	0.08
Phoneme deletion	-0.021	0.01	-0.18
Wordchains	-0.006	0.00	-0.29*
Generic Speed	0.048	0.16	0.03
CPM	0.002	0.01	0.02
Spelling 100	-0.010	0.00	-0.35*

Table 6.38. Summary of Full Entry Regression Analysis for variables predicting reading ability in Year 5 Albanian children using Reading Latency as the dependent variable [R^2=.71, $F(9,50)$=13.84**]. *Note:* * $p<.05$, ** $p<.001$.

6.3.9.3 OMRT

Stepwise regression for Year 5 (Table 6.39) shows that NWR and RAN Alphanumeric are significant predictors of OMRT. Full Entry regression (Table 6.40) reveals that only NWR was the significant predictor.

	B	Std. Error	Beta	R^2	R^2 *change*
Step 1					
NWR	1.433	0.16	0.78**	.60	
Step 2					
NWR	0.943	0.23	0.51**	.66	.06
RAN Alphanumeric	0.365	0.13	0.35*		

Table 6.39. Summary of Stepwise Regression Analysis for variables predicting reading ability in Year 5 Albanian children using OMRT as the dependent variable. *Note:* * p<.05, ** p<.001.

	B	Std. Error	Beta
(Constant)	-1.528	0.82	
NWR	0.693	0.27	0.37*
Comprehension 100	0.016	0.01	0.10
RAN Alphanumeric	0.255	0.16	0.25
RAN Colour and Object	0.247	0.20	0.13
Phoneme deletion	0.016	0.01	0.14
Wordchains	0.002	0.00	0.10
Generic Speed	0.135	0.19	0.08
CPM	0.010	0.01	0.10
Spelling 100	-0.009	0.01	-0.14

Table 6.40. Summary of Full Entry Regression Analysis for variables predicting reading ability in Year 5 Albanian children using OMRT as the dependent variable [R^2=.71, F(9,45)=11.93**). *Note:* * p<.05, ** p<.001.

6.3.10 Conclusion on Predictors of Reading

Table 6.41 represents a summary of all significant predictors for each dependent variable examined in this regression analysis.

Reading 100 accuracy. Overall, Phoneme Deletion and NWR tasks are the best predictors of Reading 100 accuracy. Phoneme Deletion is a significant predictor for the entire sample and individual years regardless of the regression method used. NWR does not appear to be significant in Year 1.

RAN Colours and Objects appears to be a significant predictor for all of the Albanian sample during the Stepwise regression, whereas in the Full entry regression it is replaced by Spelling 100. RAN Colours and Objects is also significant in Year 1, regardless of regression methods used.

Finally, the word comprehension variable explains a significant amount of the variance for Year 3, a result supported by both regression methods.

To summarise, Phoneme Deletion and NWR are the best predictors of Reading 100 in Albanian children.

Reading Latency. Regression analysis for reading latencies is less clear compared to the Reading 100 analysis. RAN Alphanumeric, Spelling 100, and CPM are the best predictors for the entire Albanian sample. Across the years, RAN Alphanumeric is only significant in Year 3 (Full Entry method), whereas CPM does not appear to be significant for any of the years. Unlike CPM, Spelling 100 is a significant predictor of reading latencies in Year 1 and the best predictor in Year 5 regardless of the regression method used. For Year 1 and 3, NWR is the best predictor but does not appear to be significant in Year 5. The Wordchains variable is the second best significant for Year 3 (Full Entry method) and Year 5 (both methods).

Finally, the best predictor of Reading 100 does not appear to be a very good predictor for reading latencies as it significant only in Year 1 (Full Entry method) and Year 5 (Stepwise regression).

To summarise, NWR is the best predictor for Years 1 and 3. Spelling 100 is the best predictor for Year 5. This variable together with the Wordchains variable explain most of the variance of Latency 100 in Year 5.

OMRT. For the OMRT, NWR is the best predictor of the entire Albanian sample and throughout the 3 year-groups. The Wordchains variable, which is the second best predictor for the entire Albanian sample, appears to be significant only in Year 3. CMP is also a significant predictor of OMRT in Year 3.

Finally, Spelling 50 is a significant predictor in Year 1 (Full Entry method), and RAN Alphanumeric is significant only in Year 5 (Stepwise regression).

To conclude, NWR is the best predictor of OMRT regardless of the regression method used.

6.3.11 Comparison of patterns for the three reading relating variables

Overall, the regression analysis pattern is not entirely similar between Reading 100, Latency 100 and OMRT. They seem to tap different skills. The only predictor that these variables have in common is NWR.

H.4.1. Phonological awareness. NWR and Phoneme deletion will be the main predictors of reading ability in Year 1.

From the regression analysis on reading related variables (Reading 100, Latency 100, and OMRT), it is clear that NWR and Phoneme Deletion are the main predictors. This supports hypothesis H.4.1. However, there are other significant variables that predict reading ability. RAN Colours and Objects and Spelling tasks are significant predictors, but predict less of the variance than NWR and Phoneme Deletion. In addition, phonological skills tasks are best the predictors in later years as well as early years of literacy development.

The main conclusion here is that phonological awareness related tasks are the main predictors of reading ability in Year 1.

H.4.2. RAN. Like NWR and Phoneme deletion, the contribution of RAN to reading will be present only in Year 1.

The findings of the regression analysis do support this hypothesis only when reading accuracy is taken into account (Reading 100). For time-limited/related reading measures like OMRT and Latency 100 the RAN tasks show somewhat unexpected results. Rapid naming tasks (RAN Alphanumeric) are a significant predictor in Year3 for Latency 100 (Full Entry regression only), and in Year 5 for OMRT (Stepwise regression only).

H.4.3. Orthographic knowledge. Wordchains will become a good predictor of reading ability in later years.

Regression analysis revealed that Hypothesis *H.4.3.* was supported: Wordchains task was found to be a significant predictor for Latency 100 and OMRT for Year 3, and Latency 100 for Year 5.

	All years		Year 1		Year 3		Year 5	
	Stepwise	Full entry	Stepwise	Full entry	Stepwise	Full entry	Stepwise	Full entry
Reading 100	NWR Phoneme Del. RAN C & O R^2=.50	NWR Phoneme Del. Spelling 100 R^2=.52	Phoneme Del. RAN C & O R^2=.43	Phoneme Del. RAN C & O R^2=.49	Phoneme Del. NWR Comp. 100 R^2=.47	Phoneme Del. NWR Comp. 100 R^2=.54	NWR Phoneme Del. R^2=.51	Phoneme Del. R^2=.59
Latency 100	RAN Alphan. Spelling 100 CPM R^2=.70	RAN Alphan. Spelling 100 CPM R^2=.71	NWR Spelling 100 R^2=.57	NWR Phoneme Del. Spelling 100 R^2=.65	NWR Wordchains R^2=.50	NWR RAN Alphan R^2=.57	Spelling 100 Wordchains Phoneme Del. R^2=.69	Spelling 100 Wordchains R^2=.71
OMRT	NWR Wordchains R^2=.74	NWR Wordchains R^2=.75	NWR Spell 50 R^2=.67	NWR R^2=.71	NWR Wordchains CPM R^2=.61	NWR Wordchains* CPM R^2=.65	NWR RAN Alphan. R^2=.66	NWR R^2=.71
Spelling 100	NWS RAN Alphan. Phoneme Del. RAN C & O R^2=.66	NWS Phoneme Del. R^2=.67	RAN Alphan. NWS R^2=.65	RAN Alphan. NWS R^2=.69	NWS Phoneme Del. R^2=.48	NWS Phoneme Del. R^2=.54	NWS Phoneme Del. RAN C & O CPM R^2=.82	NWS Phoneme Del. RAN C & O CPM R^2=.84
Spelling 50	NWS RAN Alphan. Phoneme Del. R^2=.59	NWS Phoneme Del. R^2=.61	RAN Alphan. NWS R^2=.58	RAN Alphan. NWS R^2=.64	NWS Phoneme Del. R^2=.42	NWS Phoneme Del. R^2=.44	NWS Phoneme Del. R^2=.74	NWS R^2=.78

Table 6.41. Summary of significant predictors for reading and spelling variables for Albanian children. *Note:* * p=.05.

6.3.12 Regression analysis for Spelling related tasks for all Albanian children.

6.3.12.1 Spelling 100 Accuracy

The final step of Stepwise regression analysis (Table 6.42) for the entire Albanian sample revealed that NWS, RAN Alphanumeric, Phoneme Deletion and RAN Objects and Colours were the best predictors of spelling ability using Spelling 100 as the dependent variable. In the Full Entry regression none of the RAN variables appeared significant; only NWS and Phoneme Deletion were best predictors (Table 6.43). From the final step of the Stepwise regression, it is evident that RAN Colours and Objects explains only a small percentage of the variance (1%), and this could be the reason why the effect of this variable is not strong enough to be significant in the Full Entry Model.

	B	Std. Error	Beta	R^2	R^2 *change*
Step 1					
NWS	1.524	0.12	0.70**	.49	
Step 2					
NWS	1.154	0.12	0.53**	.60	.11
RAN Alphanumeric	11.222	1.65	0.37**		
Step 3					
NWS	1.011	0.11	0.46**	.65	.05
RAN Alphanumeric	8.769	1.63	0.29**		
Phoneme Deletion	1.094	0.22	0.26**		
Step 4					
NWS	0.999	0.11	0.46**	.66	.01
RAN Alphanumeric	4.949	2.43	0.16*		
Phoneme Deletion	1.158	0.22	0.27**		
RAN Objects and Colours	9.772	4.67	0.15*		

Table 6.42. Summary of Stepwise Regression Analysis for variables predicting spelling ability in Albanian using Spelling 100 as the dependent variable. *Note:* * p<.05, ** p<.001.

	B	Std. Error	Beta
(Constant)	-7.286	8.52	
NWS	0.974	0.12	0.45**
Comprehension 100	-0.038	0.07	-0.03
RAN Alphanumeric	5.746	3.30	0.19
RAN Objects and Colours	9.406	4.80	0.15
Phoneme Deletion	0.928	0.25	0.22**
Wordchains	0.039	0.07	0.05
Generic Speed	-8.363	4.77	-0.15
CPM	0.255	0.14	0.11
Reading 100	0.090	0.08	0.07

Table 6.43. Summary of Full Entry Regression Analysis for variables predicting spelling ability in Albanian using Spelling 100 as the dependent variable [R^2= .67, $F(9,170)$=37.96**]. *Note:* * p<.05, ** p<.001.

6.3.12.2 Spelling 50 accuracy

When Spelling 50 was used as dependent variable for the entire Albanian sample, an almost similar pattern as in Spelling 100 regression analysis emerged. In the Stepwise regression (Table 6.44), NWS, RAN Alphanumeric and Phoneme Deletion were best predictors, whereas in Full Entry regression, the rapid naming variable failed to reach a significant level (Table 6.45).

	B	Std. Error	Beta	R^2	R^2 *change*
Step 1					
NWS	0.599	0.05	0.67**	.45	
Step 2					
NWS	0.461	0.05	0.52**	.57	.12
RAN Alphanumeric	4.835	0.74	0.37**		
Step 3					
NWS	0.424	0.05	0.48**	.59	.02
RAN Alphanumeric	4.118	0.75	0.32**		
Phoneme Deletion	0.326	0.10	0.18*		

Table 6.44. Summary of Stepwise Regression Analysis for variables predicting spelling ability in Albanian using the SPELLING 50 as the dependent variable. *Note:* * p<.05, ** p<.001.

	B	Std. Error	Beta
(Constant)	14.113	4.55	
NWS	0.404	0.05	0.45**
Comprehension 50	-0.154	0.09	-0.12
RAN Alphanumeric	3.065	1.59	0.24
RAN Colours and Objects	3.870	2.17	0.15
Phoneme Deletion	0.318	0.11	0.18*
Wordchains	0.029	0.04	0.09
Generic Speed	-0.266	2.19	-0.01
CPM	0.034	0.07	0.04
OMRT	-0.884	1.73	-0.05

Table 6.45. Summary of Full Entry Regression Analysis for variables predicting spelling ability in Albanian using the SPELLING 50 as the dependent variable [R^2=.61, $F(9,156)$=26.85**]. *Note:* * p<.05, ** p<.001.

6.3.13 Regression analysis for Spelling related tasks for Year 1 Albanian children.

6.3.13.1 Spelling 100 accuracy

In Year 1, both regression methods revealed that RAN Alphanumeric and NWS were the best predictors of Spelling 100 (Tables 6.46 and 6.47). According to the stepwise regression values, RAN Alphanumeric was the best predictor.

6.3.13.2 Spelling 50 accuracy

Using both regression methods, the same predictors as in Spelling 100 were significant when Spelling 50 was used as the dependent variable (Table 6.48 and 6.49). According to the stepwise regression values, RAN Alphanumeric was the best predictor.

	B	Std. Error	Beta	R^2	R^2 *change*
Step 1					
RAN Alphanumeric	45.125	5.76	0.72**	.51	
Step 2					
RAN Alphanumeric	35.119	5.42	0.56**	.65	.14
NWS	0.973	0.21	0.40**		

Table 6.46. Summary of Stepwise Regression Analysis for variables predicting spelling ability in Year 1 Albanian children using Spelling 100 as the dependent variable. *Note:* * p<.05, ** p<.001.

	B	Std. Error	Beta
(Constant)	-4.492	13.88	
NWS	0.834	0.22	0.34**
Comprehension 100	-0.168	0.11	-0.12
RAN Alphanumeric	28.096	10.27	0.45*
RAN Colour and Object	6.413	12.33	0.07
Phoneme deletion	0.572	0.45	0.15
Wordchains	-0.007	0.25	0.00
Generic Speed	12.483	19.04	0.06
CPM	0.289	0.26	0.09
Reading 100	-0.044	0.12	-0.04

Table 6.47. Summary of Full Entry Regression Analysis for variables predicting spelling ability in Year 1 Albanian children using Spelling 100 as the dependent variable [R^2=.69, F(9,50)=12.50**]. *Note:* * p<.05, ** p<.001.

	B	Std. Error	Beta	R^2	R^2 *change*
Step 1					
RAN Alphanumeric	16.457	2.73	0.65**	.42	
Step 2					
RAN Alphanumeric	13.573	2.44	0.54**	.58	.16
NWS	0.426	0.10	0.42**		

Table 6.48. Summary of Stepwise Regression Analysis for variables predicting spelling ability in Year 1 Albanian children using SPELLING 50 as the dependent variable. *Note:* * p<.05, ** p<.001.

	B	Std. Error	Beta
(Constant)	15.843	8.07	
NWS	0.375	0.11	0.37*
Comprehension 100	-0.299	0.17	-0.17
RAN Alphanumeric	15.803	4.94	0.62*
RAN Colour and Object	-3.429	5.33	-0.09
Phoneme deletion	-0.009	0.20	-0.01
Wordchains	-0.157	0.11	-0.18
Generic Speed	11.826	9.30	0.15
CPM	0.138	0.13	0.11
OMRT	2.247	8.00	0.04

Table 6.49. Summary of Full Entry Regression Analysis for variables predicting spelling ability in Year 1 Albanian children using SPELLING 50 as the dependent variable [R^2=.64, $F(9,42)$=8.44**]. *Note:* * p<.05, ** p<.001.

6.3.14 Regression analysis for Spelling related tasks for Year 3 Albanian children.

6.3.14.1 Spelling 100 accuracy

In Year 3, both regression methods revealed that NWS and Phoneme Deletion were the best predictors of Spelling 100 (Tables 6.50 and 6.51). NSW was the best predictor in both methods.

6.3.14.2 Spelling 50 accuracy

The same predictors, using both regression methods, were significant when Spelling 50 was used as the dependent variable (Table 6.52 and 6.53), with NWS once again being the best predictor.

	B	Std. Error	Beta	R^2	R^2 *change*
Step 1					
NWS	1.177	0.20	0.60**	.37	
Step 2					
NWS	0.937	0.20	0.48**	.48	.11
Phoneme Deletion	1.550	0.44	0.36**		

Table 6.50. Summary of Stepwise Regression Analysis for variables predicting spelling ability in Year 3 Albanian children using Spelling 100 as the dependent variable. *Note:* * p<.05, ** p<.001.

	B	Std. Error	Beta
(Constant)	-12.948	18.67	
NWS	0.855	0.21	0.44**
Comprehension 100	0.157	0.16	0.12
RAN Alphanumeric	3.449	8.04	0.08
RAN Colour and Object	-1.900	10.27	-0.02
Phoneme deletion	1.271	0.58	0.30*
Wordchains	-0.116	0.20	-0.09
Generic Speed	-12.816	9.34	-0.15
CPM	0.127	0.28	0.05
Reading 100	0.240	0.18	0.17

Table 6.51. Summary of Full Entry Regression Analysis for variables predicting spelling ability in Year 3 Albanian children using Spelling 100 as the dependent variable [R^2=.54, F(9,50)=6.44**]. *Note:* * p<.05, ** p<.001.

	B	Std. Error	Beta	R^2	R^2 *change*
Step 1					
NWS	0.423	0.08	0.57**	.33	
Step 2					
NWS	0.342	0.08	0.46**	.42	.09
Phoneme deletion	0.522	0.18	0.32*		

Table 6.52. Summary of Stepwise Regression Analysis for variables predicting spelling ability in Year 3 Albanian children using SPELLING 50 as the dependent variable. *Note:* * p<.05, ** p<.001.

	B	Std. Error	Beta
(Constant)	11.022	8.60	
NWS	0.322	0.09	0.44**
Comprehension 100	0.070	0.16	0.05
RAN Alphanumeric	0.637	3.50	0.04
RAN Colour and Object	2.039	4.54	0.06
Phoneme deletion	0.501	0.22	0.31*
Wordchains	0.012	0.09	0.02
Generic Speed	2.043	3.94	0.06
CPM	-0.033	0.12	-0.03
OMRT	-1.352	3.93	-0.06

Table 6.53. Summary of Full Entry Regression Analysis for variables predicting spelling ability in Year 3 Albanian children using SPELLING 50 as the dependent variable [R^2=.44, $F(9,49)$=4.30**]. *Note:* * p<.05, ** p<.001.

6.3.15 Regression analysis for Spelling related tasks for Year 5 Albanian children.

6.3.15.1 Spelling 100 accuracy

From the final step of Stepwise regression (Table 6.54), it was found that NWS, Phoneme Deletion, RAN Objects and Colours and CPM were significant predictors of Spelling 100 in Year 5. The same variables appeared to be significant when Full Entry regression was used (Table 6.55). Both models explained a large amount of the variability in, 82% and 84% respectively.

	B	Std. Error	Beta	R^2	R^2 *change*
Step 1					
NWS	1.538	0.12	0.86**	.74	
Step 2					
NWS	1.333	0.12	0.74**	.79	.05
Phoneme Deletion	1.028	0.27	0.26**		
Step 3					
NWS	1.214	0.13	0.68**	.81	.02
Phoneme Deletion	1.027	0.26	0.26**		
RAN Colour and Object	9.229	4.21	0.14*		
Step 4					
NWS	1.170	0.13	0.65**	.82	.01
Phoneme Deletion	1.021	0.25	0.26**		
RAN Colour and Object	9.043	4.08	0.14*		
CPM	0.386	0.18	0.13*		

Table 6.54. Summary of Stepwise Regression Analysis for variables predicting spelling ability in Year 5 Albanian children using Spelling 100 as the dependent variable. *Note:* * $p<.05$, ** $p<.001$.

	B	Std. Error	Beta
(Constant)	6.555	20.43	
NWS	1.223	0.15	0.68**
Comprehension 100	-0.130	0.21	-0.04
RAN Alphanumeric	1.306	3.26	0.04
RAN Colour and Object	9.727	4.78	0.15*
Phoneme deletion	0.991	0.32	0.25*
Wordchains	0.059	0.07	0.09
Generic Speed	-7.036	4.47	-0.12
CPM	0.509	0.20	0.17*
Reading 100	-0.097	0.11	-0.08

Table 6.55. Summary of Full Entry Regression Analysis for variables predicting spelling ability in Year 5 Albanian children using Spelling 100 as the dependent variable [R^2=.84, F(9,50)=28.44**]. *Note:* * $p<.05$, ** $p<.001$.

6.3.15.2 Spelling 50 accuracy

Stepwise regression for Year 5, using Spelling 50 as the dependent variable showed that NWS and Phoneme Deletion were the best predictors (Table 6.56). However, the Full Entry regression identified NWS as the only significant predictor (Table 6.57).

	B	Std. Error	Beta	R^2	R^2 *change*
Step 1					
NWS	0.699	0.06	0.83**	.70	
Step 2					
NWS	0.616	0.07	0.74**	.74	.04
Phoneme deletion	0.414	0.15	0.23*		

Table 6.56. Summary of Stepwise Regression Analysis for variables predicting spelling ability in Year 5 Albanian children using SPELLING 50 as the dependent variable. *Note:* * p<.05, ** p<.001.

	B	Std. Error	Beta
(Constant)	12.725	11.19	
NWS	0.513	0.08	0.61**
Comprehension 100	-0.198	0.20	-0.08
RAN Alphanumeric	1.311	2.16	0.08
RAN Colour and Object	4.061	2.75	0.13
Phoneme deletion	0.319	0.17	0.17
Wordchains	0.067	0.04	0.19
Generic Speed	-2.799	2.66	-0.10
CPM	0.154	0.13	0.10
OMRT	-1.595	1.89	-0.10

Table 6.57. Summary of Full Entry Regression Analysis for variables predicting spelling ability in Year 5 Albanian children using SPELLING 50 as the dependent variable [R^2=.78, F(9,45)=18.13**]. *Note:* * p<.05, ** p<.001.

6.3.16 Conclusion on Predictors of Spelling.

Spelling 100 accuracy. Regression analysis reveals that NWS and Phoneme Deletion are the best predictors of Spelling 100 accuracy for the entire sample as well as across the year-groups (Table 6.41). The two rapid naming variables are significant predictors for the entire sample only in the Stepwise regression. RAN Alphanumeric is the best predictor of spelling ability in Year 1, whereas RAN Colours and Object is one of the predictors for Year 5 for both regression methods. CPM is also a significant predictor in Year 5.

To sum up, NWS and Phoneme Deletion are the best predictors of Spelling 100, apart form Year 1. In Year 1, RAN Alphanumeric is the best predictor followed by NWS.

Spelling 50. Regression analysis shows a very similar pattern to Spelling 100 when Spelling 50 is used as the dependent variable. NWS and Phoneme Deletion are the best predictors for the entire sample as well as for Years 3 and 5 regardless of the regression method used. RAN Alphanumeric is the best predictor for Year 1, followed by NWS. RAN Alphanumeric is also one of the significant predictors for the entire Albanian sample, but only when Stepwise regression was used.

It was found that NWS was the only significant predictor of Spelling 50 in the Full Entry regression for Year 5.

Unlike reading related variables (Reading 100, Latency 100, and OMRT), the two spelling variables show extremely similar patters of predicting variables across the year-groups.

H.5.1. Phonological awareness. NWS and Phoneme deletion will be the main predictors of spelling ability in Year 1.

The surprising result was that RAN Alphanumeric was the best predictor of both spelling tests. Regression analysis revealed that, after RAN Alphanumeric, NWS was a significant predictor of spelling ability in Year 1, whereas Phoneme Deletion did not reveal any significance (See Table 6.41). Therefore, hypothesis *H.5.1.* does not hold.

H.5.2. Orthographic knowledge. It is expected that Wordchains will become the main predictor of spelling ability in later years.

Regression analysis shows that the Wordchains variable does not appear to be significant for Years 3 and 5. Instead, the phonological awareness tasks NWS and Phoneme Deletion are always the best predictors, regardless of the regression method or spelling tests. In addition, RAN Colours and Object and CPM are significant predictors of Spelling 100 in Year 5. As a result, the current evidence for the regression analysis does not support hypothesis *H.4.2.*

6.3.17 Reading and spelling comparisons

In the Albanian study, reading and spelling differences were assessed in comparing the (1) accuracy scores, (2) error types and their frequency and (3) patterns of relative contributions of different predicting variables.

6.3.17.1 Reading and Spelling accuracy

The figure below represents the distributions of Reading 100 and Spelling 100 scores for each year group. Both reading and spelling scores are very high, with Year 5 almost reaching ceiling. For every year reading scores are higher than spelling scores. A small number of outliers are present.

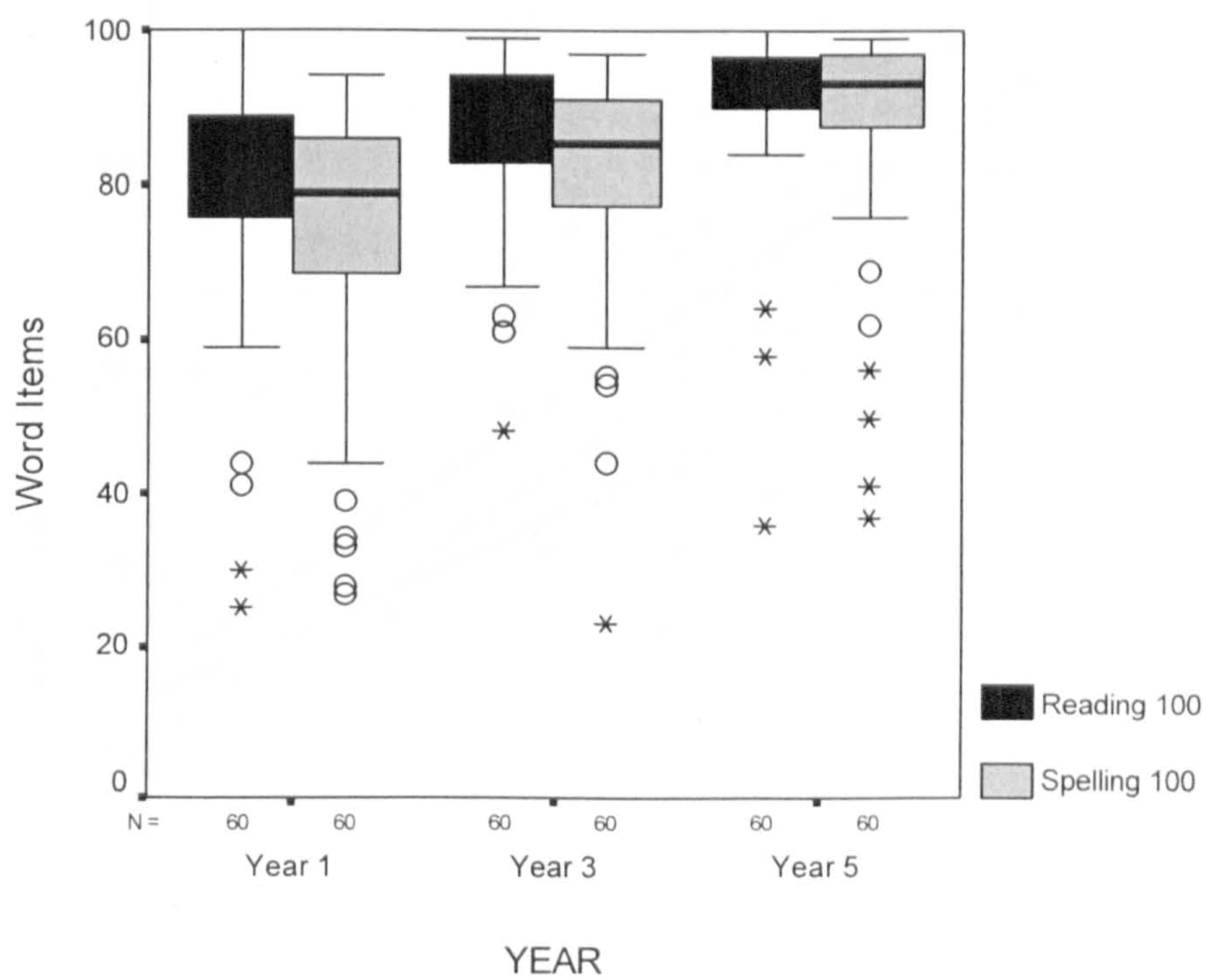

Figure 6.7. Boxplots to show the distributions of scores for the 100-word reading and spelling tests. (The middle line indicates the median and the higher and lower hinges represent the extreme scores)

Reading and spelling scores are significantly correlated. Table 6.58 shows that the correlation between these variables gets stronger as children get older. Figure 6.8 shows that the strongest correlation is between reading and spelling scores of Year 5.

	Reading		
Spelling	Year 1	Year 3	Year 5
Year 1	0.44**		
Year 3		0.52**	
Year 5			0.59**

Table 6.58. Correlation values between Reading and Spelling scores for the 100-word tests. *Note:* ** $p<.001$.

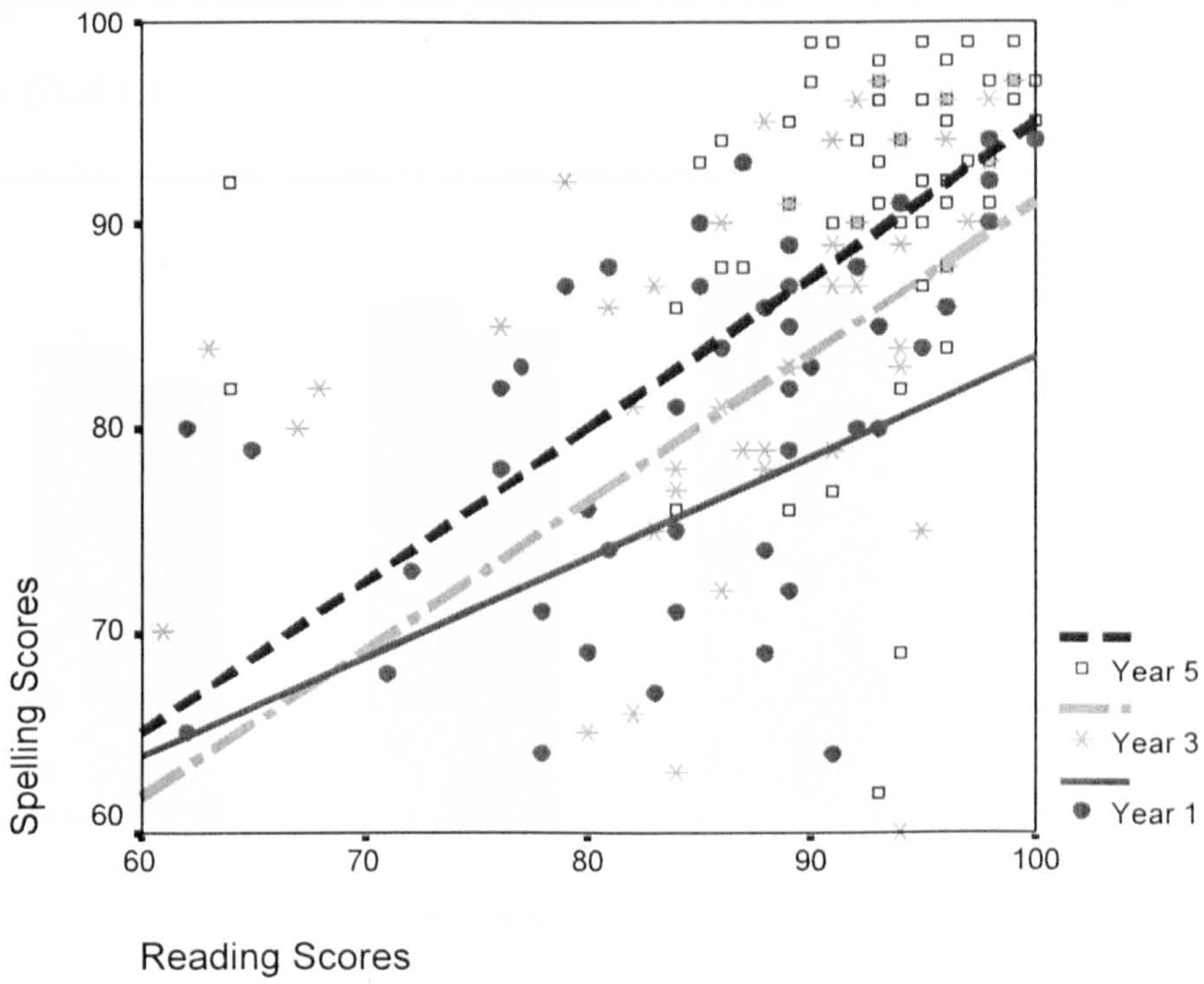

Figure 6.8. Reading and spelling scores for the 100-word tests.

H.6.1. The Albanian orthography is highly transparent bi-directionally, therefore there should be no discrepancy between children's reading and spelling scores.

A 2x3 repeated measures ANOVA Reading 100 with Spelling 100 by Year group was conducted. No interaction was found for type of test (Reading 100 and Spelling 100) and Year group (Years 1, 3, and 5). However, main effects of Test $F(1, 59)=27.48$, $p<.001$ and Year $F(2,59)=16.32$, $p<.001$ were present.

Figure 6.9 indicates that Albanian children perform better in reading than spelling. T-test analysis shows that there are significant differences between reading and spelling tests of Year 1 and Year 3 children. This difference is not significant in Year 5 [Year 1 $t(59)=2.74$, $p<.01$; Year 3 $t(59)=3.43$, $p<.01$; Year 1 $t(59)=1.95$, n.s.].

The hypothesis that there should be no discrepancy between children's reading and spelling scores in Albanian is not supported for Year 1 and 3, despite significant correlations (*H.6.1.).*

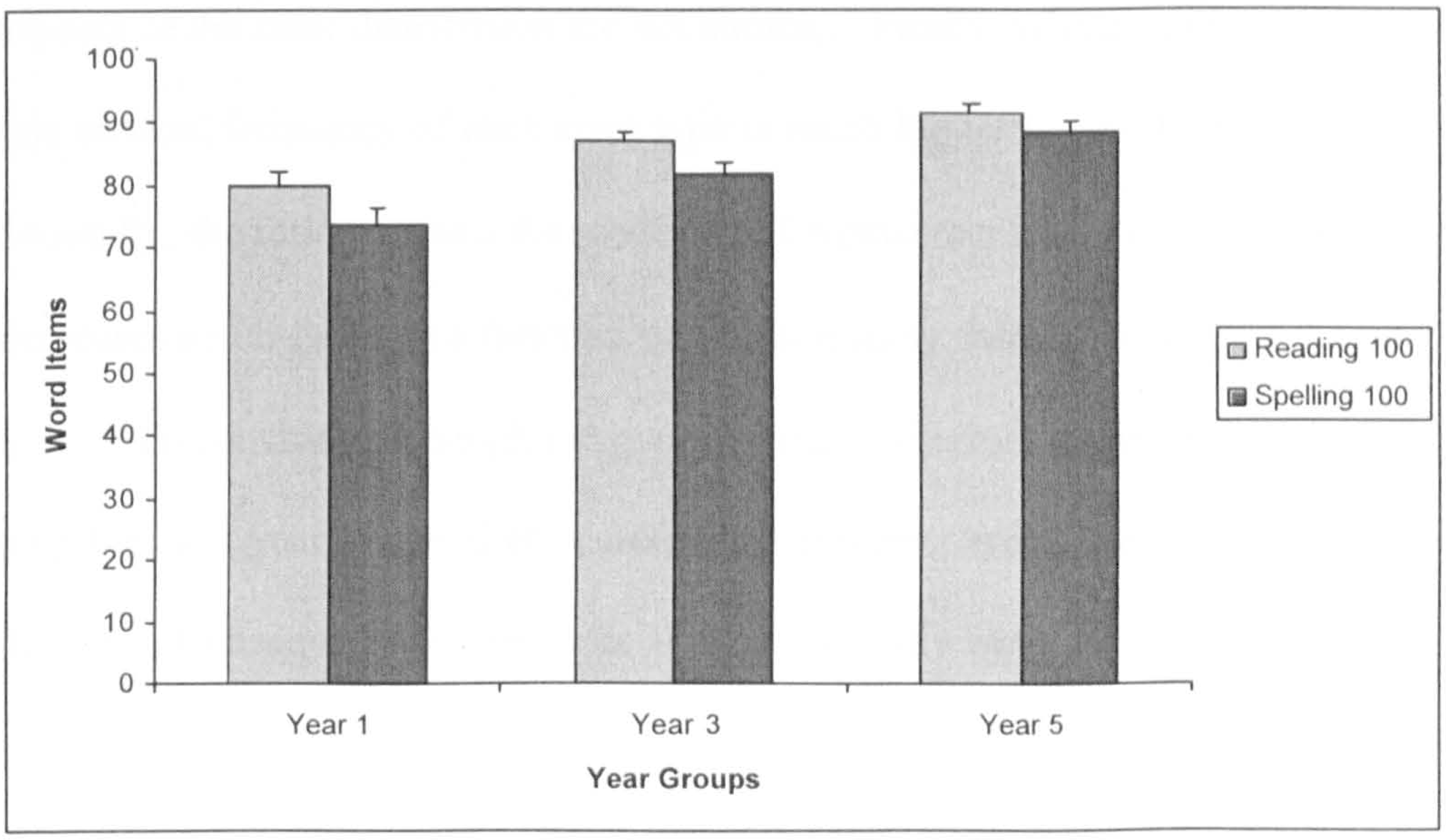

Figure 6.9. Means and S.E. Mean for Reading 100 and Spelling100 for each year group.

6.3.17.2 Reading and Spelling errors

H.6.2. The frequency of the three error types should be the same for both reading and spelling.

Figure 6.10 shows the frequency distributions of errors and error types for Years 1, 3, and 5 for Reading 100 and Spelling 100. Within each year-group and for the entire Albanian sample, the total frequency of errors is much higher for spelling than for reading scores.

Albanian children make more nonword errors than any other type of error. However, nonword error frequency decreases as a function of age for both reading and spelling, whereas the frequency for the whole word replacements remains almost unchanged across the years.

From Tables 6.8, 6.9, and Figure 6.10, it is evident that the overall error patterns for reading and spelling are similar: within each year most of the errors are nonword errors, followed by whole-word replacements, and null responses. Two aspects of the error distribution are not similar. Firstly, as mentioned at the start of this section, frequency of each error type is much higher for spelling than for reading. Secondly, the ratio between the whole-word replacements and nonword errors decreases much faster as a function of age in reading than in spelling.

To conclude, although the overall pattern of errors is similar between the two tests for each year, the total error frequency and error type frequency are distinctively different. Consequently, hypothesis *H.6.2.* is not fully supported.

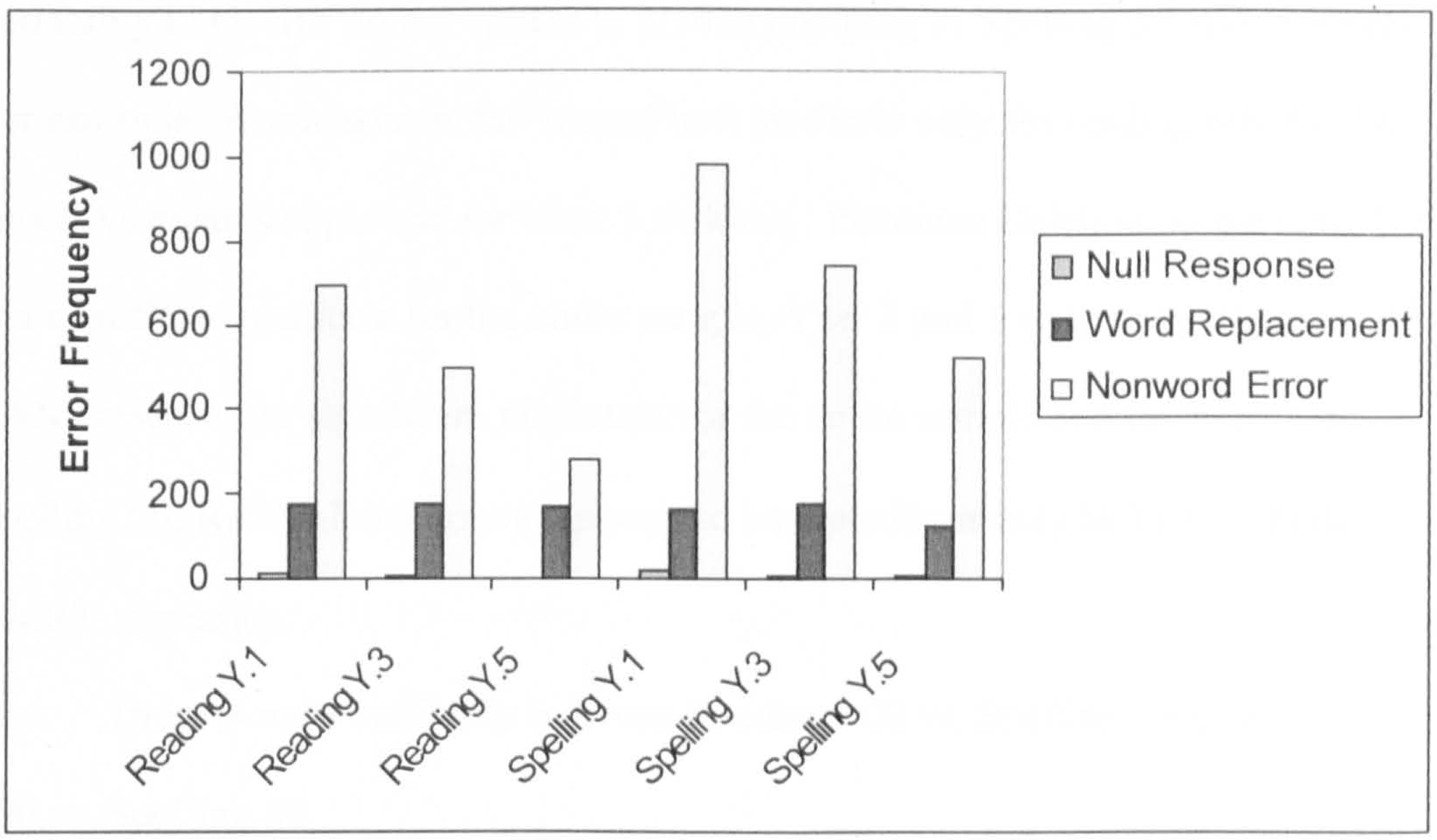

Figure 6. 10. Error types and frequencies made during the reading and spelling tests for each year group.

6.3.17.3 Reading and Spelling predictor comparisons

H.6.3. Due to the similar orthographic complexity for reading and spelling, the relative contribution of phonological and orthographic skills should show similar patterns for both reading and spelling development.

In order to match consequent analysis with English and Welsh speaking children, the comparisons between OMRT and Spelling 50 will be the main interest.

From Table 6.41, NWR is the best predictor for the entire sample and in each year, regardless of the regression method used for the OMRT; whereas in Spelling 50, NWS is the best predicting variable in every regression model, apart form Year 1, where it is the second best predictor. These two predicting variables, which relate to decoding and encoding skills, provide the only common pattern that occurs in the regression analysis for OMRT and Spelling 50. The rest of the variables that predict variability in OMRT do not appear to predict anything in Spelling 50 and vice versa. For example, Wordchains is the second best predictor only for reading rate for the entire Albanian sample and for Year 3 children. Phoneme Deletion on the other hand, is a significant predictor for the entire sample, Year 3 and 5 only in Spelling 50. The RAN variables are significant predictors for the entire sample and for Year 1 in Spelling 50; RAN Alphanumeric appears to be a predictor only in Year 5, in the OMRT regression.

There is more similarity between Reading 100 vs. Spelling 100, and Reading 100 vs. Spelling 50.

To conclude, from the emerging pattern of predictors for OMRT and Spelling 50, hypothesis *H.6.3.* is not fully supported.

6.4. Discussion

The data confirm most of the hypotheses set for examination at the start of the chapter. With regard to the General Hypothesis, the findings confirmed and age effect for all the tasks: older children performed better than younger ones.

6.4.1. Reading

Older children did better than younger children in reading accuracy and reading rate. Experience on task, increasing amounts of learning instruction, print exposure, and cognitive maturation are the logical reasons for this improvement. With regard to the Reading 100 and reading strategy hypothesis, the findings related to Year 1 of the pilot study were supported from the main study results: Year 1 children tend to read most of the words form the 100-word list (M =79.88), and they tend to rely on a slow grapheme phoneme conversion strategy. Long reading latencies, together with the high proportion of nonword errors, indicate that Year 1 children rely on an alphabetic decoding strategy as demonstrated for reading of other transparent orthographies by Wimmer and Hummer (1990), Ellis and Hooper (2001), Spencer and Hanley (2003), and Seymour et al. (2003).

Considering the development of reading strategy as children get older, the developmental models of Frith (1980) and Ehri (1992), which were proposed for learning to lead in English, generalise here and suggest that young Albanian children start at the alphabetic stage and by at least Year 5, reach the final orthographic stage or use sight word reading. Indeed, there seems to be some evidence for this change of strategy by children learning to read even in the very transparent orthography of Albanian.

Firstly, it was found that younger children had longer latencies than older children in Reading 100. In addition, the effects of log10 frequency and word length were larger for Year 1 children than Year 3 and Year 5. The effect of word length was larger than that of log10 frequency [Word length Year 1 R^2=.88; Year 3 R^2=.60; Year 5 R^2=.60; log10 Frequency Year 1 R^2=.46, Year 3 R^2=.48, Year 5 R^2=.49].

However, because log10 frequency and word length covary in the Albanian words these results are difficult to interpret. A log 10 frequency effect suggests a lexical reading strategy whereas a word length effect suggests a non-lexical reading strategy. Because of the theoretical implications involved throughout this thesis, being able to distinguish between these two effects and understanding how these contribute to reading latencies is crucial. Stepwise regression analysis was carried out where the order the predicting variables can be controlled. In Year 1 when Log10 was entered first in the model 46% of reading latencies variability was accounted for.

When word length was entered in the second step a further 45 % of the variability was explained. When these two variables were entered in the model in the opposite order it was found that word length alone accounted for 88% of the variability. The introduction of Log10 frequency added very little to the final model (R^2 increases by only 3%). These results provide evidence that word length and log10 frequency contribute to reading latencies. However, because most of the variance in the model was explained by the word length effect it is suggested that the main reading strategy used by Year 1 Albanian children is non-lexical. Word length continued to explain most of the variance even for Years 3 and 5, however, its contribution was not as large as in Year 1, whereas the contribution of log10 frequency increased to 8 and 10 % respectively. This suggests that there is a shift strategy used by older children who have been exposed to print for a longer period of time. The regression findings for Year 1, do not necessarily suggest that non-lexical reading is the only strategy employed by these children (and older children). To argument this would be illogical. Regularity of the orthography gives children confidence in trying to read new words. Following this strategy they will develop a 'self-teaching' mechanism, which allows them to enlarge their sight-word reading lexicon (Share, 1995). Thus, the self-teaching mechanism allows children to store the representation of a word in the orthographic lexicon and use these representations for fast and successful reading. The strong word length effect and the used of a non-lexical strategy is not surprising when the reading test used is taken into account. The word list contained 100 items many of which had not seen or heard before. Therefore, for low frequency unfamiliar words the non-lexical strategy seem to be the best option in attempting to read these items. However, for high frequency words a lexical strategy would be faster.

The use of Stepwise regression analysis, where the order of the predicting variables can be controlled, helps in distinguishing between the size log10 frequency effect and word length effect. One way to check that the regression analysis is producing a clear picture of the reading strategies used is to select test items where log10 frequency is varied but word length is kept constant and vice versa. This would ensure a more direct interpretation of any effect of log10 frequency and word length on reading latencies.

Secondly, when the reliance on an alphabetic reading fails, the likely pronunciation is a nonword. Indeed, the highest proportion of nonword errors was made by Year 1 children, the least by Year 5 children. When reliance on lexical access by means of partial visual analysis or partial phonetic cueing fails, the likely result is a real word. In reverse pattern, Year 1 children made the smallest proportion of whole-word replacement errors, whereas Year 5 children had the highest proportion. These findings suggest that younger children rely more heavily on a GP conversion reading strategy, whereas older children rely more partial visual analysis, partial phonetic cueing or sight word recognition as suggested by the developmental models of Frith and Ehri. These findings are also supported by the self-teaching mechanism suggested by Share (1995), in which phonological recoding allows children to store the representation of a word in the orthographic lexicon and use these representations for fast and successful reading.

Thirdly, if older children rely more heavily on partial visual recognition, then the discrepancy between real word reading and nonword reading (the "lexicality effect") should be larger for Year 5 children than Year 3 and Year 1 children. This was exactly what was found. Although overall, children had better word reading rates at the OMRT than in NWR across the years, the discrepancy was larger for Year 5 children.

To conclude, word length effects, changes in error types and their proportions, and discrepancies between rates of real word and nonword reading are consistent with the hypothesis on reading strategy which suggests that younger children rely more heavily on grapheme-phoneme conversion reading strategy, whereas older children rely more partial visual analysis, partial phonetic cueing or sight word recognition (*H.2.2*).

6.4.2 Predictors of reading development

From the above findings on the change of reading strategy, the other hypotheses set at the start of the chapter on reading predictors should also follow: Phonologically related skills tasks such as Phoneme deletion and NWR should predict reading skill in early children only, whereas orthographic awareness tasks should predict more skilled reading.

Regression analysis was used in order to identify the predictors of Reading 100, Latency 100 and OMRT. For the entire sample, and within each year, Spelling 100 (or Spelling 50), Word Comprehension 100 (or Word Comprehension 50), NWR, RAN Alphanumeric, RAN Objects and Colours, Phoneme Deletion, Wordchains, CPM and Generic Speed were independent variables. To get a better picture of the predicting patterns, two regression methods were used: Stepwise and Full Entry method. In most of the analyses, both regression methods gave similar results.

Regression analysis for the entire Albanian sample was first carried out. Overall, phonological skills tasks are the most frequent predictors of reading, followed by orthographic skills tasks. For Reading 100, NWR and Phoneme

Deletions were the best predictors. RAN Objects and Colours was also a predictor of reading accuracy in Stepwise regression, whereas in full Entry regression, it was replaced by Spelling 100. Latency 100 was best predicted by RAN Alphanumeric, Spelling 100, and CPM. When OMRT was used as the dependent variable, for the entire Albanian sample, NWR, and Wordchains were the only predictors of reading rate.

The pattern of predictors varies when each year group is to taken into account. Reading development models, based on English language research, suggest that in the early years of literacy children rely on phonological skills; in later years the contribution of orthographic skill becomes of primary importance. Are these findings replicated in the current study, where the literacy skills of Albanian children were examined? They are and they are not. Phonological skills predicted reading ability of Albanian children across the age groups. The predicting power of orthographic skills tasks was higher for older children, but this was secondary to the predicting power of phonological related tasks.

When Reading 100 was used as the dependent variable in the regression analysis phonological skills related tasks, Phoneme Deletion and NWR were the best predictors of reading accuracy across the age groups. Orthographic skills hardly contributed: Wordchains predicted no significant amount of variance. With regards to reading accuracy, this suggests that phonological awareness tasks are the best predictors of reading accuracy in young as well as skilled readers. It should be noted here that ANOVA tests revealed no significant differences between the three age-groups for the Phoneme Deletion tasks and yet this task was found to be the best predictor of reading accuracy for every single year. At first this may seem an odd result. However, the ANOVA finding indicates that in transparent orthographies phonological skills develop very quickly. Thus Phoneme Deletion may prove an easy task even for normally developing Year 1 readers. The lack of significant differences across the years, however, does not suggest that within a year group Phoneme Deletion cannot contribute to reading accuracy. The Phoneme Deletion task requires participants to manipulate sound of words they hear. Regression analysis suggests that this ability is important in all stages of word reading.

When Reading Latencies were used as the dependent variable, the contribution of phonological skills was most important in Years 1 and 3, but it is weak in Year 5. The contribution of orthographic skills to reading latencies increases with age. In Year 3 Wordchains is a better predictor of latency than phonological tasks.

An unexpected finding was the high degree to which spelling skill predicted reading: Spelling 100 was the best predictor in Year 5 and second best in Year 1. The contribution of spelling in reading skills has been evident in previous studies (Ellis & Cataldo, 1990). However, when OMRT was used as the dependent variable, phonological tasks were the best predictors of reading rate across the three age groups. The importance of orthographic skills was secondary to reading ability skills in Years 3 and 5.

In the current study, with regard to children learning to read in highly transparent Albanian, phonological skills are the best predictors of reading development. The contribution of orthographic skills increases as children become more experienced in reading; however, these remain secondary to the phonological skills.

The findings on these predicting patterns are similar in nature to that of Sprenger-Charrolles. Siegel, and Béchennec (1997) who found that during literacy development even in highly opaque French, the role of the orthographic skills was secondary to the role of phonological skills, which increased as a function of age.

The nature of the orthography encourages a reliance on alphabetical skills for successful word decoding even in skilled readers. Alphabetic decoding for new words is highly successful and this, in turn, makes Albanian children more confident to attempt words they have never seen before.

6.4.3 Two reading tests: different predictors.

From the above patterns of best predictors it emerges that the Reading 100 test is quite different from the Latency 100 and OMRT. The very nature of these variables varies in the sense that Reading 100 relates to the accuracy regardless of speed; Latency 100 and OMRT have the speed factor in common. Does this mean that these two reading tests do not measure the same content?

Correlation analysis revealed that OMRT correlated more strongly with Latency 100 than Reading 100. In order to further examine how these variables related to each other, PCA with Varimax rotation was performed. Two components were identified: the first reflected a general ability factor, whereas the second, a literacy factor. Another interesting finding from the PCA was that the speeded tests, except Generic Speed, loaded on both components. Hence, it appears that a speed factor may be a confounding variable. Two Hierarchical regression analyses of Latency 100 and OMRT were used, where Generic Speed was forced into the equation. The results showed that, for both Latency 100 and OMRT, Generic Speed explained a large amount of the variance in the first step. Nevertheless, in the following step the initial significant predictors still predicted an additional and large amount of variance. These findings indicate that Latency 100 and especially OMRT are not pure speed measures: these variables are affected by the real content of the predictors.

The question set at the start of this section was whether two different reading tests measured the same abilities. PCA and hierarchical regression showed OMRT is also affected by the real content of predicting variables such as Wordchains and Spelling. Therefore, both tests tap the same reading abilities, although OMRT has its own speed component too. Mann and Wimmer (2002) found that RAN did not predict the reading accuracy of German speaking children. Instead, it was the only predictor of reading latency. In highly transparent scripts it is usually the fluency measure, not accuracy, that discriminates between dyslexics and normal readers (Wimmer 1993). Due to the transparency of the Albanian orthography and successful use of phonological decoding, reading accuracy can be very high even for words that have never been encountered before. This suggests that speeded reading measures such as reading rate used in the current research can be more appropriate in examining the literacy development of children learning to read and write in highly transparent scripts.

However, one final observation that needs to be taken into account is the number of errors committed during the OMRT. It was predicted that younger children would make more errors than older children during the OMRT. The opposite was found. One explanation is that this pattern of errors reflects the use of different strategies as children get older. By the end of the first school year Albanian children know that by applying GP conversion rules they are certain that the pronunciations of words would be correct. But the use of such strategy can prove costly when faced with time-limited reading tasks. Relying on GP conversion rules takes longer than when relying on other strategies where representations for whole words or larger linguistic units than the graphemes are used. As a result even though Year 1children make fewer errors than Year 5 children they also read fewer words than Year 5 children. Thus the number of words read correctly within one minute fails to properly distinguish between a slow accurate strategy and a fast strategy with more errors. This flaw in the design of time-limited reading tests makes the interpretations of the results more difficult. Therefore, the use of other measures such as reading latencies for single items or total reading time for all items would be more appropriate for literacy research in highly transparent orthographies.

6.4.4 Conclusions on reading development

The present findings suggest that most of the hypotheses on reading development are confirmed. Young learners of Albanian use an alphabetic decoding strategy in reading, whereas older children use larger orthographic units and partial visual information on word recognition. This is largely supported by the predicting patterns of reading latencies and reading rates: although phonologically related tasks are the best predictors of reading across the years, the contribution of orthographic knowledge and rapid naming increase as children get older.

6.4.5 Spelling

As predicted, older children performed better at the spelling than did younger children. However, there was no significant difference between the spelling scores of Year 3 and Year 5 children, whatever the scoring scheme in spelling. With respect to the spelling strategy, error types and their proportions differed across the years. The overall pattern revealed that as children get older, the proportion of whole word replacements increases, whereas the number of nonword errors decreases.

A high proportion of nonword errors indicate a reliance on PG conversion strategy when spelling. A proportion of whole word replacements errors indicate a reliance on larger orthographic representations from the memory. In the current study, the spelling errors suggest that younger children have a less developed orthographic lexicon than older children. Nevertheless, the error patterns for Years 3 and 5, are not different enough from those in Year 1 to provide convincing evidence that older children who are learning to read and spell in a bi-directionally transparent orthography rely mainly on larger units when spelling.

Lexicality effects were evident in each year. Overall, all children could spell more real words than nonwords, with the ratio between spelling of real words and nonwords staying more or less the same across all three year groups. Most Albanian children use the alphabetic encoding strategy when spelling words or nonwords. As the PG conversions are highly predictable they are confident in spelling even words they have never seen before. From the error analysis and the comparisons of accuracy scores on words and nonwords it can be said that younger children heavily rely on an alphabetic decoding strategy. Older children, who have been exposed to literacy activities for a longer period, may make use of larger orthographic units from memory; however, they too rely heavily on an alphabetic encoding strategy when spelling. Lexicality effects also support the dual-route theory of spelling (Barry, 1994). In terms of the developmental models of Frith (1985) and Ehri (1986) it is clear that the results of Year 1 children are in accordance with the initial alphabetic/phonological stages. Exposure to print and experience on task allows children to use phonological decoding/encoding to build their orthographic lexicon (Share, 1995).

6.4.6 Predictors of spelling ability

The pattern of predictors across the years was similar for both spelling tests. This is not surprising as the score for Spelling 50 was derived from Spelling 100. For the entire Albanian sample, NWS, RAN Alphanumeric and Phoneme Deletion were the best predictors in Stepwise regression. RAN Objects and Colours was the last variable to predict a significant amount of variation in Spelling 100.

Developmental theories of spelling (Ehri, 1986; Henderson, 1985; Gentry, 1982) maintain that orthographic knowledge begins to contribute to children's spelling when they have accumulated a considerable number of words that can be recognised by sight. Treiman's (1993) observations of first grade spellings indicated that there is plentiful evidence of orthographic knowledge in children's daily writing work. She pursued this finding experimentally by administering an orthographic constraints test consisting of 16 pairs of pronounceable nonwords. For each pair, one of the nonwords conformed to a regular pattern; the other did not. She found that 1st and 2nd grades chose the conforming item significantly more than 50% of the time. Although the Albanian orthography is different from that of English, orthographic knowledge still plays an important role in spelling of words throughout the literacy development.

Year 1 analysis revealed that RAN Alphanumeric was the best predictor followed by NWS. This was an unexpected finding. In contrast to the literacy development research that has established a link between rapid naming and reading, where rapid naming is thought to be an indicator of phonological processing skill (Wagner & Torgesen, 1987) or automaticity skills (Bowers & Wolf, 1992), there is no reason to believe that rapid naming should be related to early spelling.

One possible explanation is that the RAN task is related to short-term verbal memory in the initial stages of spelling acquisition in Albanian. Whilst spelling new words, novice spellers may continuously recall individual graphemes of a word until the spelling of the word is complete. A difficulty in continuously naming phonological information may discriminate between good and poor readers. Spring and Capps (1974) found that poor and good readers differed on continuous-list digit naming and suggested that these differences were associated with dysfunctional rehearsal and memory processes.

In Year 3, the contribution of RAN Alphanumeric disappears. Instead NWS and Phoneme Deletion are the only predictors. They continue to be the best predictors in Year 5. In addition, RAN Objects and Colours and CPM are predictors only for the Spelling 100 task. Correlation coefficients in Years 3 and 5 show that spelling tasks are more strongly related to phonological than orthographic measures.

A longitudinal study would be more appropriate to answer these questions as cohort differences may be responsible for such findings. The lack of predicting power of Wordchains is another issue that deserves attention. The orthographic task does not predict spelling in any of the year groups.

To conclude, these data corroborates the existence of phonological skills in the final developmental stages of literacy.

6.4.7 Reading and Spelling comparisons.

Do children who receive formal teaching instruction in a bi-directionally transparent orthography read and spell at the same level from the beginning of literacy development?

Direct reading and spelling comparisons were made between the accuracy scores of 100-item reading and spelling tests. Analysis of variance (2x3) revealed a main effect for age and a main effect for the type of test. Overall, reading scores were higher than the spelling scores. Year 1 and 3 children read significantly more than they could spell, whereas in Year 5 there was no difference. Therefore, only by the age of 10, reading and spelling skills in Albanian children are at the same level.

These findings failed to replicate the pilot's study results, where reading and spelling scores within each year were not statistically different. Sample size differences may be responsible for these different findings. The pilot study sample consisted of only 20 participants per year group compared to 60 in the main study. A second reason that might explain these findings refers to the participant selection procedure. In the pilot study only middle achieving pupils were selected— restriction of range can have serious consequences on accuracy scores as well as on exploratory analysis such as regression analysis—whereas in the main study whole classes of children were selected. Hence, the findings of the main study may be more valid than those of the pilot study.

But if PG and GP conversions are perfect, why should younger children fail to reach equal scores in both tests? Could this indicate that young children read and write differently? Literacy research has suggested contrasting views. Bradley and Bryant (1979, 1985) view these skills as separate. They found that the same children could read certain words they could not spell and vice versa. This led them to suggest that different mechanisms are responsible for reading and spelling, and that the strategies employed for each skill are different. In contrast to this, Gough, Juel and Griffith (1992) assessed the reading and spelling ability of 20 children. They found that these children showed inconsistencies in successive reading and spelling tasks. This led them to suggest that the beginning reader read and spelled in the same way.

Such assumptions in languages like English may be due to the nature of the orthography of the language. The case of the Albanian orthography is ideal for further examining this issue because the asymmetries in performance cannot be due to asymmetries in PG/GP correspondences. In the current study, Year 1 and 3 children found reading easier than spelling: in Year 5 reading and spelling scores were relatively equal. Cossu, et al. (1995) examined reading and writing abilities of first and second grade Italian children. They reported that in the highly transparent orthography of Italian reading was easier than spelling. These findings do not necessarily mean that in early literacy development these skills are run by fundamentally two different mechanisms. Firstly, error data shows that for both reading and spelling, nonword errors were the most common type of errors, whereas the proportions of whole word replacement errors did not differ considerably across the tasks (see Figure 6.10). In addition, the rate of nonword errors drops proportionally in both tasks. This suggests that for both reading and spelling, similar strategies are used or even that the same memory representations are responsible for both reading and spelling.

Secondly, the correlation between reading and spelling increased across years. In Year 1 correlation coefficient was .48, in Year 3 was .50, and in Year 5 was .56. All these correlations were highly significant, indicating that reading and spelling may be interdependent rather than separate.

Nevertheless, two findings were different. The first finding relates to the ratio of the reading rates between OMRT and NWR, and between Spelling 50 and NWS. The differences between the reading tasks were more distinct than the differences between the spelling tasks.

The second finding relates to the pattern of predictors. Overall, the patterns had similarities in that phonological decoding was the best predictor in most years for both reading and spelling. In reading, however, Wordchains and RAN Alphanumeric were best predictors in Years 3 and 5. In spelling, RAN Alphanumeric was the best predictor in Year 1. It could be that there are major cohort differences, but this is unlikely as performance for the rest of the tests fits the general pattern on various cognitive measures.

As mentioned earlier, RAN Alphanumeric being the best predictor of spelling in Year 1 was not expected. If only Years 3 and 5 are examined, it emerges that phonological skills tasks are the best predictors of reading and spelling variance and that the orthographic skills are secondary, but in spelling the later skills are developing at a slower rate than in reading. With respect to the phonological skills, this is in line with the findings from Ellis and Cataldo (1990) and Cataldo and Ellis (1988) that explicit phonological awareness predicted spelling in the first three years, increasing over time. Furthermore, Sprenger-Charrolles et al. (1997), in a longitudinal study of literacy acquisition in French, also found that in the early stages of learning, phonological mediation was dominant and this contributed to the establishment of the orthographic lexicon. More importantly, they found that "the orthographic procedure develops later in spelling than in reading" (p.355).

There are other reasons as to why reading and spelling scores are not similar. Firstly, Albanian children read and spelled many words they had never seen before. Reading a word can be completed in milliseconds; spelling takes longer. If a word is new and long, the cognitive cost will be larger in spelling than in reading. If the underlying representations for a word are incomplete, due to the variable short memory demand or making use of context, one may be more likely to be successful at reading than at spelling. The current study did not assess the working memory of the participants: further research would be useful to answer this question.

Secondly, although reading and spelling may be similar, they require different motor skills. In young learners the motor skills for language may mature earlier than the fine motor skills required for spelling and hand movement.

Thirdly, with regard to younger children reading and spelling differences may depend on how long children spend learning to read versus learning to spell. According to the Albanian curriculum teachers are supposed to spend an equal number or hours for teaching reading and spelling. But human beings are constantly exposed to written stimuli, which we process consciously or unconsciously, but we rarely write down everything we see or hear, unless we have to. Therefore, due to the experience on task, even though reading and spelling share the same mental representations, reading will automatically be easier than spelling.

6.8.8 Conclusions

Older children perform better than younger children in most tasks including reading and spelling. With respect to reading, young readers rely more on an alphabetic decoding strategy. This in turn promotes the development of larger units in the mental lexicon. Older children use larger phonemic units, and their reading is a more visually oriented strategy. In spelling, a change from smaller to larger processing units is also evident, but this change is slower than in reading. Phonological skills predict reading throughout the development. Orthographic skills begin to contribute once a sight word vocabulary has been established.

In spelling, the predicting pattern for early readers was unusual: rapid naming and NWS were the best predictors. In later years phonological awareness tasks were the best predictors.

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Chapter 7: Cross-language comparisons

7.1. Introduction

Albanian, English and Welsh children's reading and spelling abilities were examined in detail in the three previous chapters. The present chapter attempts to capture the effect of orthographic transparency on the development of reading and spelling skills across the three languages.

Cross-language comparisons for reading and spelling ability are presented, where the following hypotheses were examined.

H.7.1. Reading Hypotheses

H.7.1.1. Young children learning to read a transparent orthography such as Albanian and Welsh should perform better in the OMRT test than English children who are learning to read a deep orthography.

H.7.1.2. Skilled English learners who have acquired orthographic knowledge of their language should have similar reading rates to Albanian and Welsh skilled readers.

H.7.1.3. Young Albanian and Welsh children should perform better in the NWR test than the English children.

H.7.1.4. Older English readers, who with experience have acquired the GP conversion rules, will have similar nonword reading rates as their Albanian and Welsh counterparts.

H.7.2. Spelling Hypotheses

H.7.2.1. In the early stages of literacy acquisition, the transparency of the orthography will have an effect on spelling accuracy: Albanian children should have higher spelling scores, closely followed by the Welsh children, whereas English children should show the lowest accuracy scores.

H.7.2.2. Young Albanian children should have higher NWS scores than Welsh and English children.

H.7.2.3. For both spelling and nonword spelling, the differences between the language groups will be smaller for older children.

H.7.3. Sub-skills Hypotheses

H.7.3.1. For the reading rate, Albanian and Welsh will show similar predicting patterns, whereas the English pattern will be different.

H.7.3.2. For Spelling 50, none of the predicting patterns are expected to be similar because of the different orthographic complexities for each language. With regard to the degree of feed backward transparency (phoneme to grapheme), the Albanian orthography is the most transparent orthography; the English orthography is the least transparent, with Welsh in between Albanian and English.

H.7.3.3. The nature of the written orthography will have an effect on the awareness of spoken language: young Albanian and Welsh children should perform better at phonological tasks (Phoneme Deletion, NWR, NWS) than English children.

H.7.3.4. RAN Alphanumeric, but not RAN Objects and Colours, will be associated with measures of reading ability.

7.2. Participants

A full description of participant selection procedures for the Albanian children was presented in Chapter 6.

The data for the English and Welsh speaking children was taken from WDP database (2003). In total 102 Year 2, 94 Year 4 and 106 Year 6 English-speaking children participated in the study, but not all the children completed all the tests. In total 118 Year 2, 92 Year 4 and 69 Year 6 Welsh-speaking children were selected, but not all the children completed all the tests.

Table 7.1 shows the average age each age-group across languages. None of the age-group comparisons were significantly different (p>.05).

	Albanian		English		Welsh	
Age Group	Mean age (months)	SD	Mean age (months)	SD	Mean age (months)	SD
1	86.77	4.34	87.56	3.81	87.62	3.98
2	112.10	5.16	110.32	3.16	110.86	3.43
3	135.65	4.80	134.58	4.93	136.46	4.00

Table 7.1. Mean age for each age-group and St. deviation across languages.

7.3. Materials

All the materials used here are described in Chapter 4, Section 4.3.

7.4. Results

In order to make sure that the basic cognitive abilities are equivalent across the three languages, two 3x3 Univariate ANOVAs examining the CPM and Generic Speed scores were carried out. Significant differences were found between the children for both tests. For the CPM test, there were significant main effects for Language and Age [Language, F(2,684)=78.36, p<.001; Age, F(2,684)=189.60,

$p<.001$]. The interaction between Age and Language was also significant $F(4,684)=3.57, p<.01$. From Figure 7.1, it is clear that Albanian children performed less well in the CPM task. Post-hoc analysis revealed that the differences between the Albanian and English/Welsh children for each year group were significant ($p<.001$).

Figure 7.2 shows that 8- and 10- year old Albanian children performed much better at the Generic Speed task. Significant main effects for Language and Age were found [Language, $F(2,716)=83.99, p<.001$; Age, $F(2,716)=320.77, p<.001$]. The interaction between Age and Language was also significant $F(4,684)=11.77, p<.001$. Post-hoc analysis revealed that differences between the language groups were significant ($p<.001$).

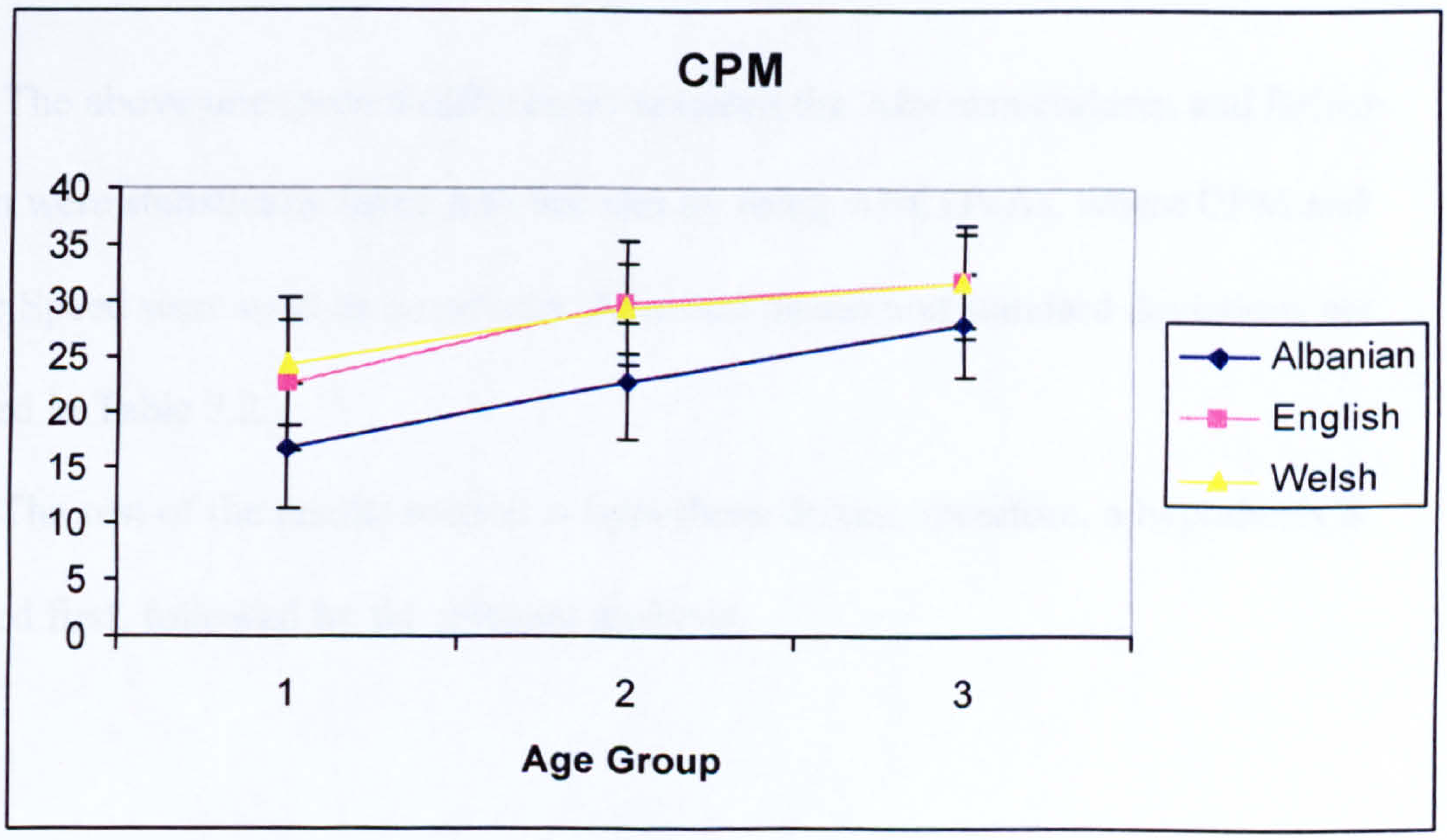

Figure 7.1. Means and St. Deviation of the CPM for the three year groups in Albanian, English and Welsh.

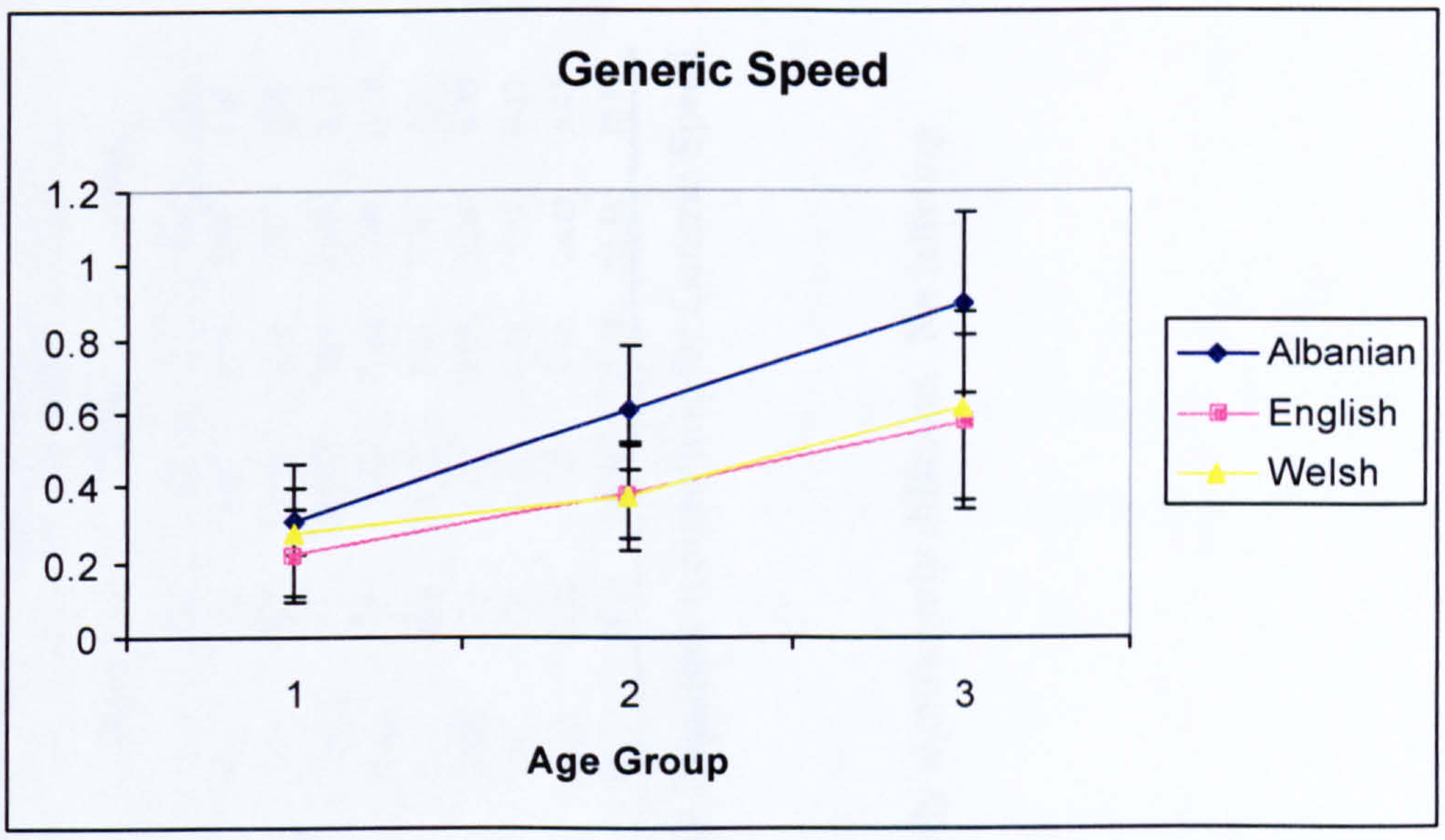

Figure 7.2. Means and St. Deviation of the Generic Speed for the three year groups in Albanian, English and Welsh.

The above unexpected differences between the Albanian children and British children were statistically taken into account by using ANCOVAs, where CPM and Generic Speed were used as covariates. Adjusted means and standard deviations are presented in Table 7.2.

The rest of the results section is hypothesis driven, therefore, a hypothesis is presented first, followed by the relevant analysis.

	Age-Group 1						Age-Group 2						Age-Group 3					
	Albanian		English		Welsh		Albanian		English		Welsh		Albanian		English		Welsh	
Variables	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
OMRT	0.53	0.33	0.43	0.29	0.45	0.29	0.69	0.28	0.72	0.27	0.67	0.28	0.92[a]	0.34	0.86	0.29	0.78[b]	0.29
NWR	0.32[a]	0.24	0.25[a]	0.20	0.41[b]	0.20	0.44[a]	0.20	0.42[a]	0.19	0.58[b]	0.20	0.51[a]	0.24	0.51[a]	0.20	0.65[b]	0.20
Spelling	43.13[a]	9.94	17.89[b]	9.73	18.99[b]	9.22	41.94[a]	9.12	27.28[b]	8.92	32.60[c]	8.77	40.61[a]	10.67	32.30[b]	9.44	34.44[b]	9.23
NWS	38.48[a]	12.25	15.28[b]	11.99	20.58[c]	11.36	37.09[a]	11.24	19.77[b]	11.00	35.77[a]	10.81	35.23	13.15	33.76	11.63	32.80	11.36
Comprehension	34.64[a]	8.20	28.91[b]	7.00	21.56[c]	7.11	38.57[a]	6.88	34.30[b]	6.63	29.61[c]	6.94	42.52[a]	8.28	39.93[a]	7.05	32.04[b]	7.11
RAN Alphanumeric	1.32[a]	0.44	1.53[b]	0.37	1.41	0.38	1.84	0.36	1.74[a]	0.35	1.94[b]	0.37	2.03[a]	0.44	1.99[a]	0.37	2.26[b]	0.38
RAN Objects/Colours	0.90	0.26	0.88	0.23	0.92	0.23	1.05	0.22	1.08	0.21	1.11	0.22	1.23	0.27	1.28	0.23	1.28	0.23
Phoneme Deletion	27.04[a]	6.28	19.98[b]	5.29	24.06[c]	5.37	26.24	5.22	25.15	5.07	27.15	5.25	25.32	6.32	25.39	5.37	26.12	5.43
Wordchains	28.37[a]	22.50	45.00[b]	22.01	26.55[a]	20.86	33.17[a]	20.67	65.51[b]	20.17	44.70[c]	19.98	42.22[a]	24.18	86.69[b]	21.34	55.58[c]	20.89

Table 7.2. Adjusted means and st. deviations of the literacy related variables for each age-group across languages (controlling for Generic Speed and CPM).

Note: [a, b, c] For comparisons within each year group, means with different letters were statistically significantly different. No lettering indicates that there are no significant differences between groups.

7.3.1. Reading hypothesis

7.3.1.1 OMRT

H.7.1.1. Young children learning to read a transparent orthography such as Albanian and Welsh should perform better in the OMRT test than English children who are learning to read a deep orthography.

Reading rates across the languages were compared. ANCOVA revealed a main effect for age-group but not for Language (Age-Group: $F(2, 402)=30.12$, $p<.001$). Figure 7.3 shows that within each age-group, the mean reading rates are not very different. The only significant difference found was between Albanian and Welsh children in Age-Group 3.

These findings do not support hypothesis *H.7.1.1.* No significant differences were found between the reading rates of young Albanian/Welsh children and English children.

H.7.1.2. Skilled English learners should have similar reading rates with Albanian and Welsh skilled readers.

This hypothesis is confirmed: in the last age-group, there were no differences between English children and Albanian/Welsh children.

Figure 7.3 shows that for the older age-group Welsh children have the lower reading rates. Post-hoc comparisons, however, revealed significant difference between Albanian and Welsh children. This was not expected.

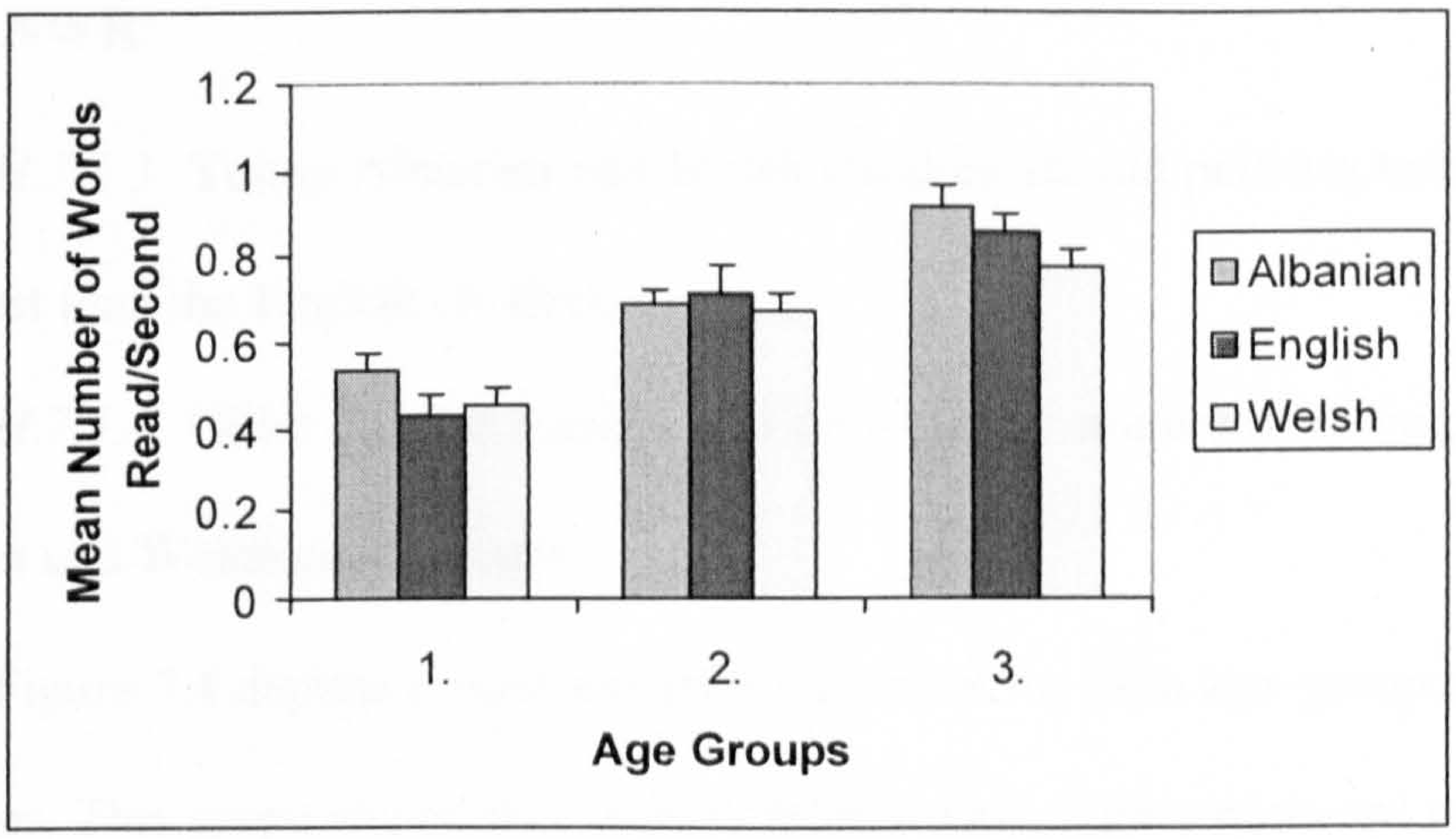

Figure 7.3. OMRT means and SEM for each age-group across languages.

An additional observation made within the OMRT reading tasks was the number of errors made by children of different language and age-groups. The youngest Albanian group made fewer errors than the older Albanian group. The opposite pattern was found for the Welsh and especially the English age-groups where, as expected, younger children made more errors than older children. A two-way ANOVA (3x3) revealed a significant main interaction between Language and Age-group [$F(2,401)=4.83, p<.01$]. Significant main effects were also found for Age-group [$F(2,401)=259.88, p<.001$] and Language [$F(4,401)=11.83, p<.001$]. Post-hoc Bonferroni differences between each of the groups are indicated in the table below.

	Albanian		English		Welsh	
	M	*SD*	*M*	*SD*	*M*	*SD*
Age-group 1	2.77 [a] (n=52)	2.06	10.21 [b] (n=34)	7.62	3.58 [a] (n=45)	3.26
Age-group 2	6.78 [a] (n=59)	5.31	7.16 (n=19)	7.47	3.39 [b] (n=46)	5.96
Age-group 3	5.80 [a] (n=55)	4.06	4.17 [a] (n=52)	3.57	2.40 [b] (n=48)	3

Table 7.3. Means and St. Deviations of OMRT Errors for each language and Age-group. *Note:* [a, b] For comparisons within each year group, means with different letters were statistically significantly different.

7.3.1.2 NWR

H.7.1.3. Young Albanian and Welsh children should perform better in the NWR test than the English children.

H.7.1.4. Older English readers will have similar nonword reading rates as their Albanian and Welsh counterparts.

Figure 7.4 depicts means and standard errors for each age-group across languages. This graph shows that Welsh children have higher nonword reading rates than Albanian and English children. ANCOVA for NWR did not find an interaction; however, main effects for Age and Language were present [Age, $F(2,408)=23.39$, $p<.001$; Language, $F(2,408)=20.43$, $p<.001$]. Overall, older children were significantly better than younger children. Most importantly, post-hoc tests showed that hypothesis *H.7.1.4.* was not supported by the current findings, whereas hypothesis *H.7.1.3.* was partly supported: although there were no significant differences between Albanian and English children, Welsh children performed significantly better at this task than their English and Albanian counterparts regardless of age-group.

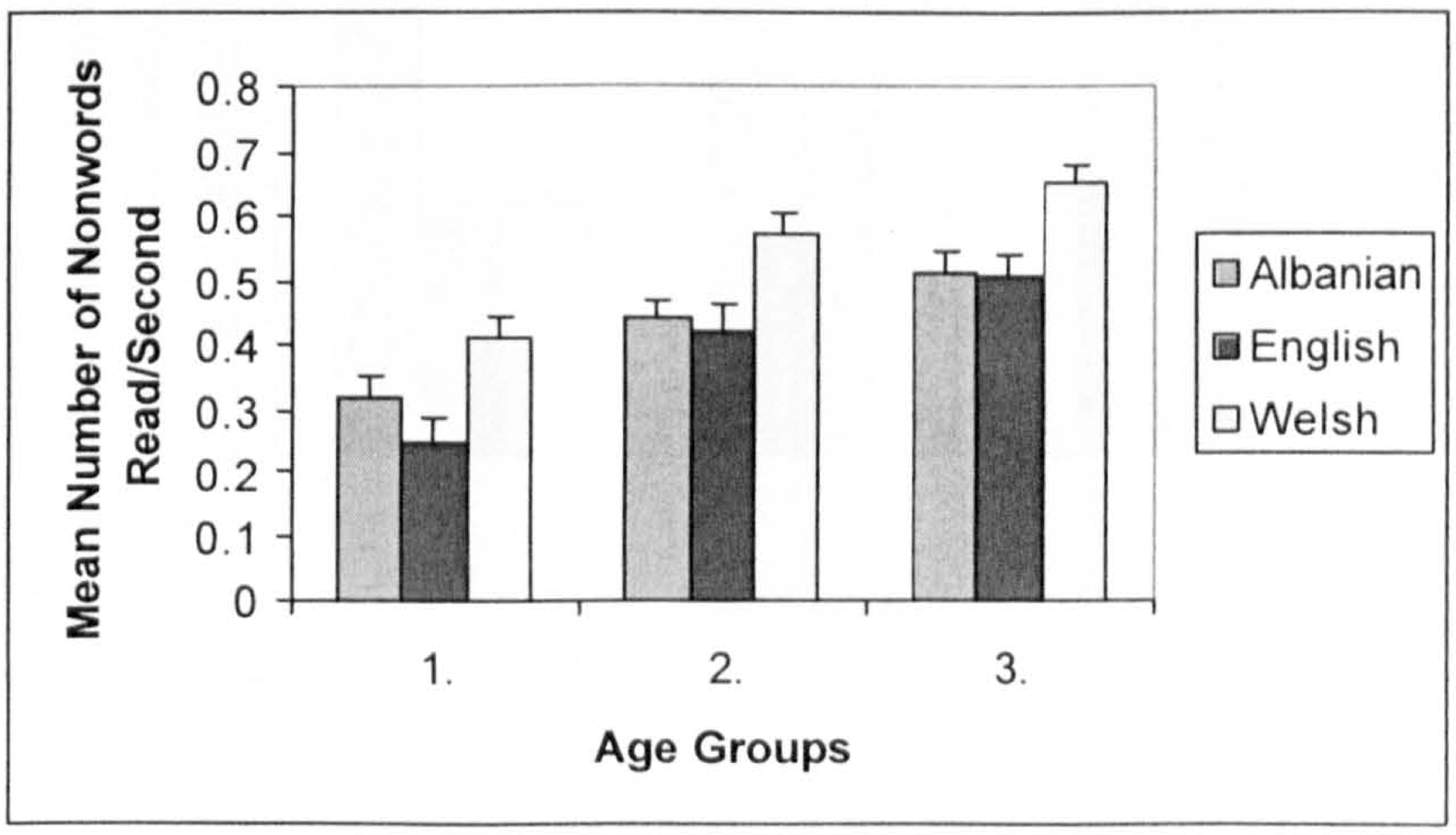

Figure 7.4. NWR means and SEM for each age-group across languages.

7.3.2 Spelling hypothesis

7.3.2.1 Spelling 50

H.7.2.1. In the early stages of literacy acquisition, the transparency of the orthography will have an effect on spelling accuracy: Albanian children should have higher spelling scores, closely followed by the Welsh children, whereas English children should show the lowest accuracy scores.

Analysis of covariance for Spelling 50 found an interaction between Age and Language, as well as main effects for each variable [Interaction $F(4,661)=23.97$, $p<.001$. Main effects: Age, $F(2,661)=34.12$, $p<.001$; Language, $F(2,661)=133.20$, $p<.001$]. Overall, older children spelt significantly more words than younger children. Figure 7.5 shows that Albanian children have significantly higher spelling accuracy scores than Welsh and English children regardless of the age-group. Welsh children have better scores than the English children—these differences are significant only for Year 2 and 4 children. Overall, these findings are in line with hypothesis *H.7.2.1*

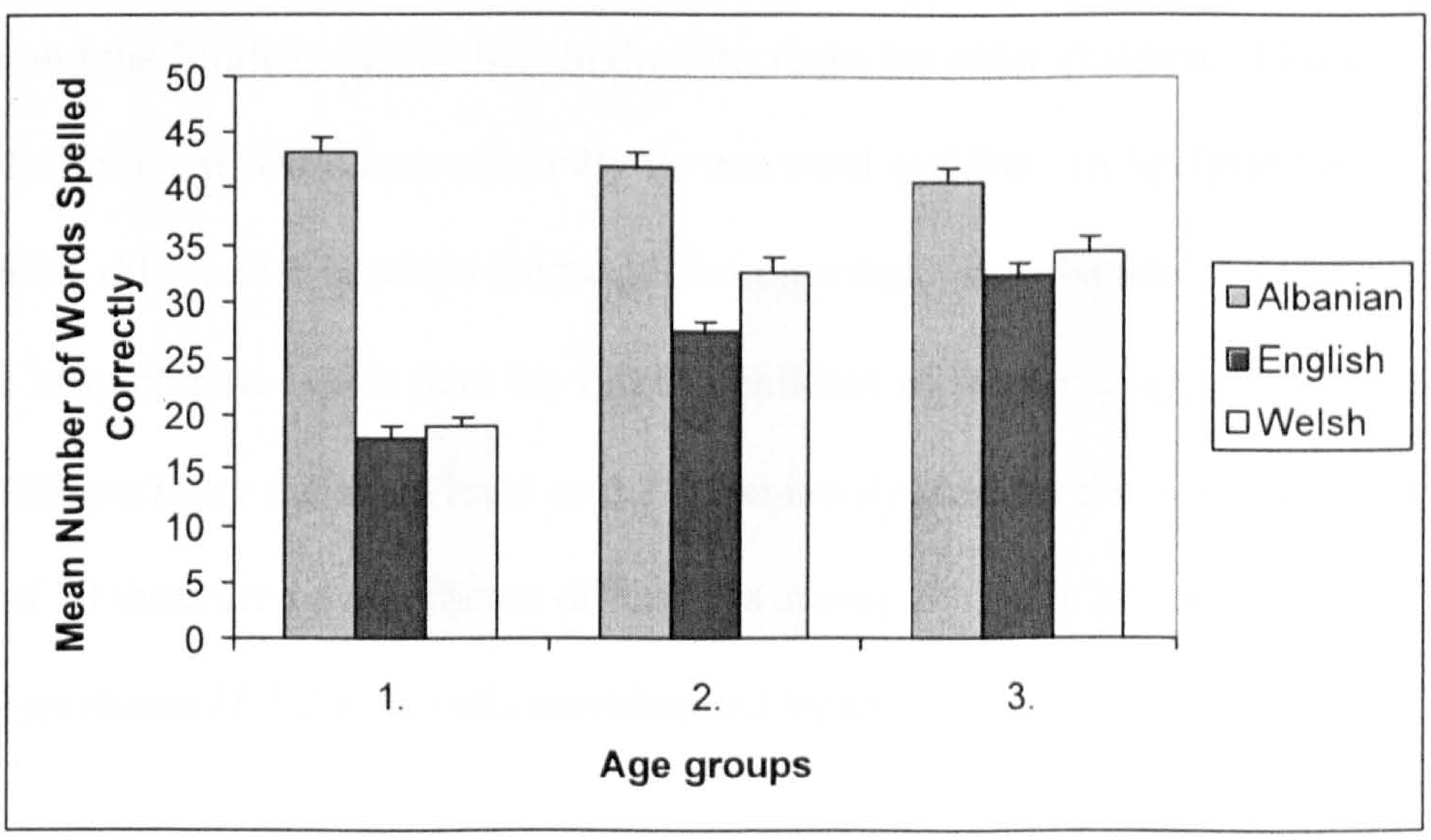

Figure 7.5. Spelling 50 means and SEM for each age-group across languages.

7.3.2.2 NWS

H.7.2.2. Young Albanian children should have higher NWS scores than Welsh and English children.

Analysis of covariance for NWS found a significant interaction between Age and Language, as well as main effects for each variable [Interaction $F(4,658)=27.74$, $p<.001$. Main effects: Age, $F(2,658)=19.60$, $p<.001$; Language, $F(2,658)=70.83$, $p<.001$]. Overall, older children were significantly better than younger children. Figure 7.6 shows that Age-Group 1 and 2 Albanian children have the highest nonword spelling accuracy scores. No significant differences were found for the last age-group. These findings fully support hypothesis *H.7.2.2.*

H.7.2.3. For both spelling and nonword spelling the differences between the language groups will be smaller for older children.

From Figures 9.5 and 9.6 it is clear that the differences between the Albanian children and the English and Welsh children decrease for older children. This is evident for both real word and especially for nonword spelling. In Spelling 50, although the differences between languages become smaller, Albanian children continue to spell more words than the English children of the same age. In NWS, the Welsh children reach the same level as the Albanian children by the age of eight. By the age of 10 there are no significant differences among the three language-groups. Hence, hypothesis *H.7.2.3.* is fully corroborated by these findings.

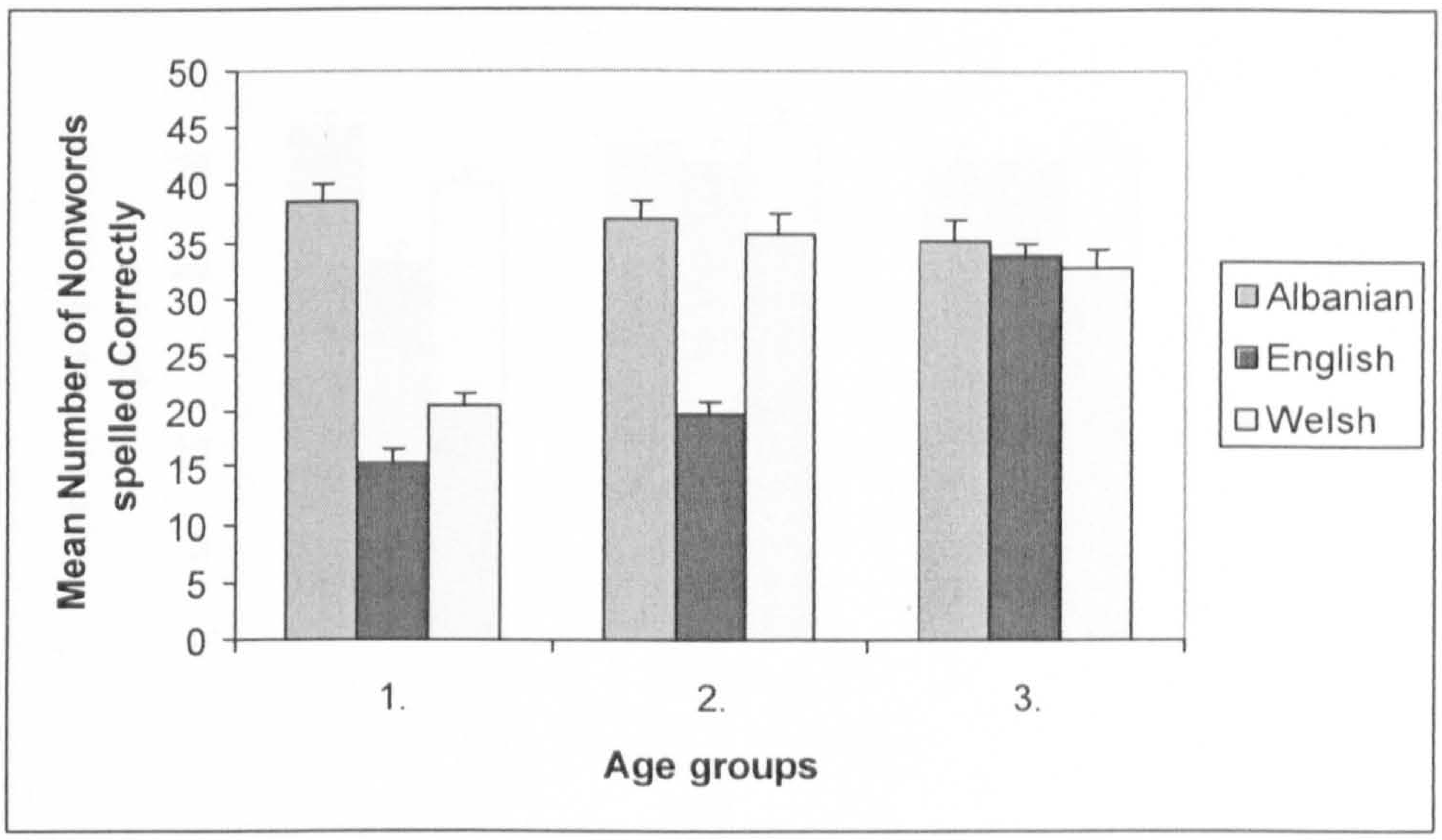

Figure 7.6. NWS means and SEM for each age-group across languages.

7.3.3 Sub-skills hypotheses

H.7.3.3. The nature of the written orthography will have an effect on the awareness of spoken language: young Albanian and Welsh children should perform better at phonological tasks (Phoneme Deletion, NWR, NWS) than English children.

7.3.3.1 Phoneme Deletion

Analysis of covariance for Phoneme Deletion found an interaction between Age and Language, as well as main effects for each variable [Interaction $F(4,400)=6.66$, $p<.001$. Main effects: Age, $F(2,400)=5.08$, $p<.01$; Language, $F(2,400)=7.60$, $p<.001$]. Overall, older children were significantly better at deleting phonemes than younger children. Figure 7.7 shows that Year 1 Albanian children have higher phoneme deletion scores than Welsh and English children. Welsh children have better scores than the English children. In Age-Groups 2 and 3 there are no significant differences between the groups.

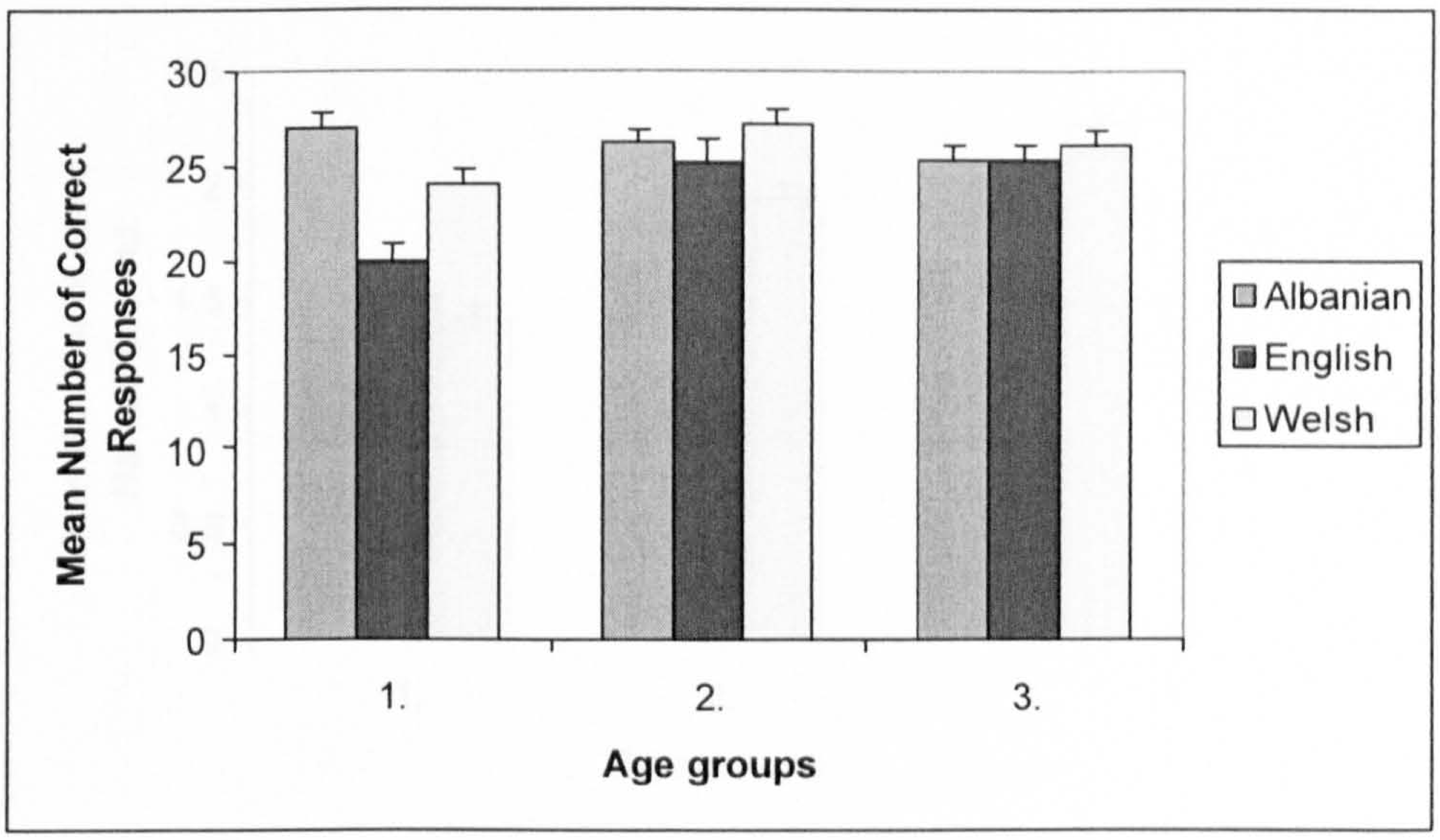

Figure 7.7. Phoneme Deletion means and SEM for each age-group across languages.

7.3.3.2 RAN Alphanumeric

Age and Language main effects were found when RAN Alphanumeric was used as the dependent variable in the analysis of covariance [Age, $F(2,400)=57.16$, $p<.001$; Language, $F(2,400)=5.29$, $p<.01$]. An interaction between these variables was also significant [$F(4,400)=3.84$, $p<.01$]. As expected, older children could name alphanumeric stimuli faster than younger children. Significant differences between languages were found within each age-group. In Age-Group 1, English children were faster than Albanian children; in Age-Group 2 there was a difference between English and Welsh children; and in Age-Group 3 the English children were slower than the Welsh children (see Figure 7.8). Differences within each age-group were not expected.

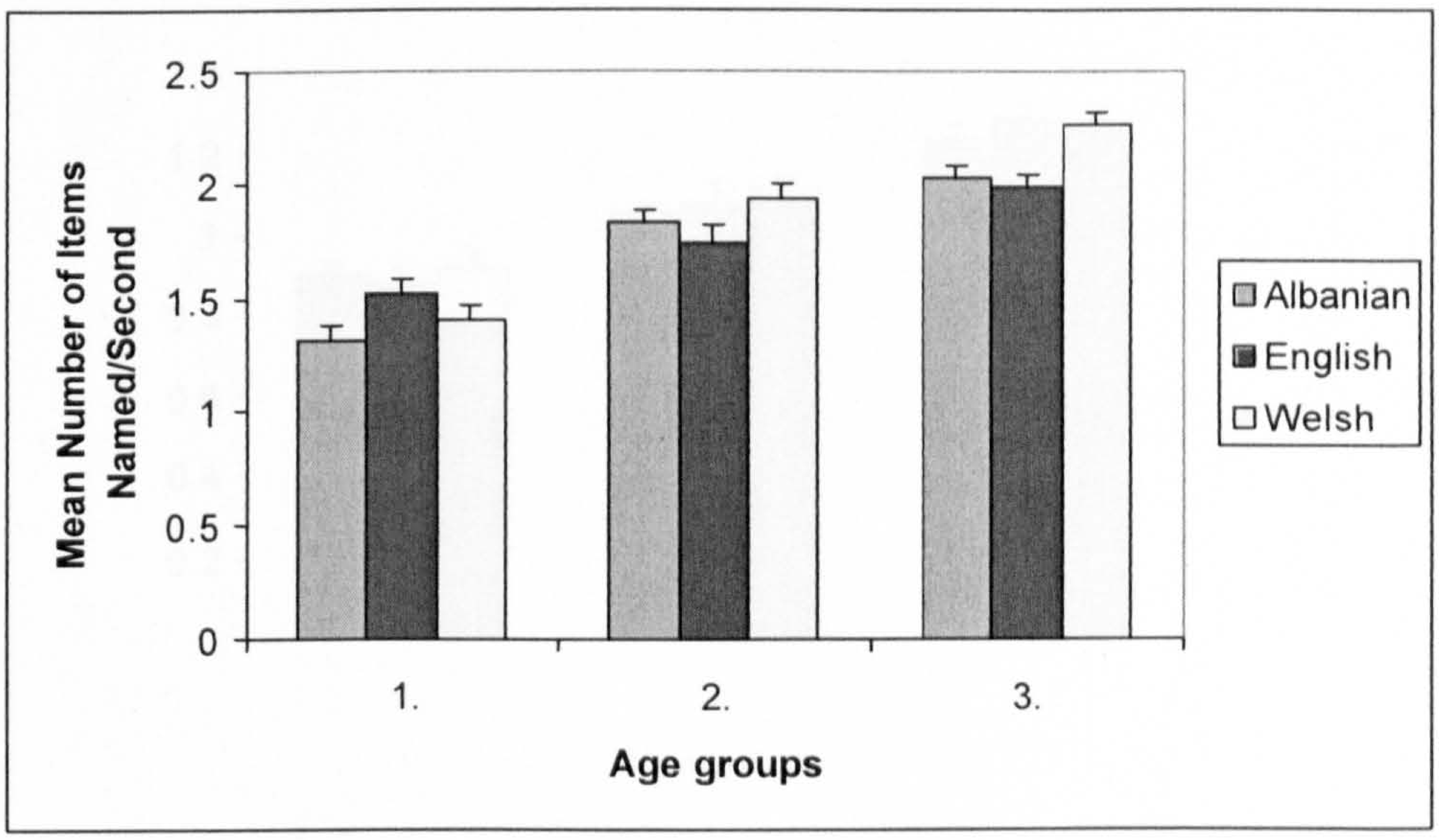

Figure 7.8. RAN Alphanumeric means and SEM for each age-group across languages.

7.3.3.3 RAN Objects and Colours

When RAN Objects and Colours was used as the dependent variable in the analysis of covariance only a main effect of Age was found. [Age, $F(2,405)=46.93$, $p<.001$]. As expected, older children could name pictures and colours stimuli faster than younger children (see Figure 7.9). A main effect for Language and a first order interaction for Language and Age were absent.

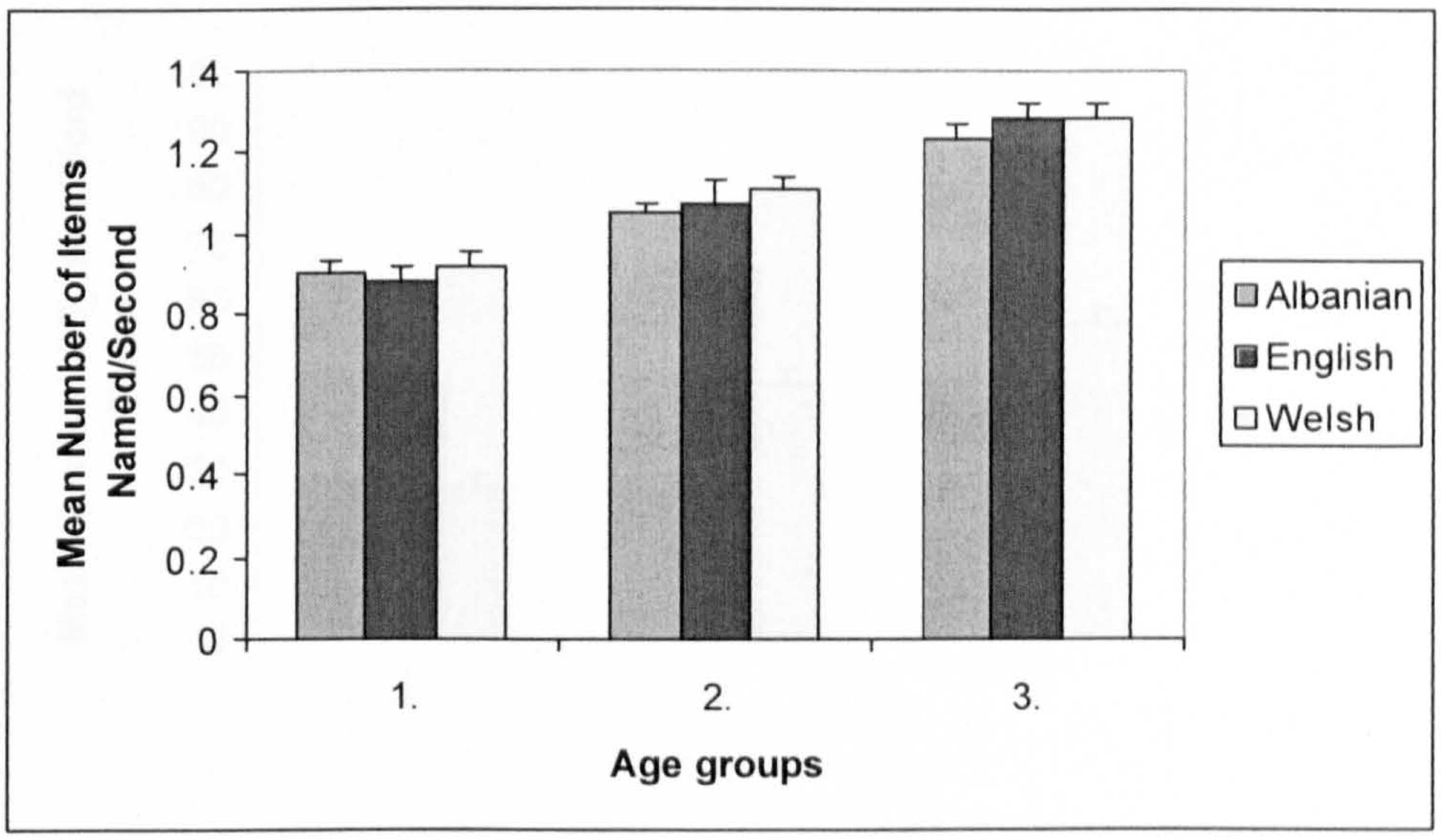

Figure 7.9. RAN Objects and Colours means and SEM for each age-group across languages.

7.3.3.4 Wordchains

With regard to Wordchains, analysis of covariance found an interaction between Age and Language, as well as main effects for each variable [Interaction $F(4,672)=9.53$, $p<.001$. Main effects: Age, $F(2,672)=51.37$, $p<.01$; Language, $F(2,672)=136.92$, $p<.001$]. Overall, older children were significantly better at splitting Wordchains correctly than younger children. Figure 7.10 shows that within each age-group, English children have the highest scores. Albanian and Welsh children's scores are not different for the younger children. Nevertheless, the mean differences between these two languages in Age-Groups 2 and 3 are significant—Welsh children performed better than Albanian children.

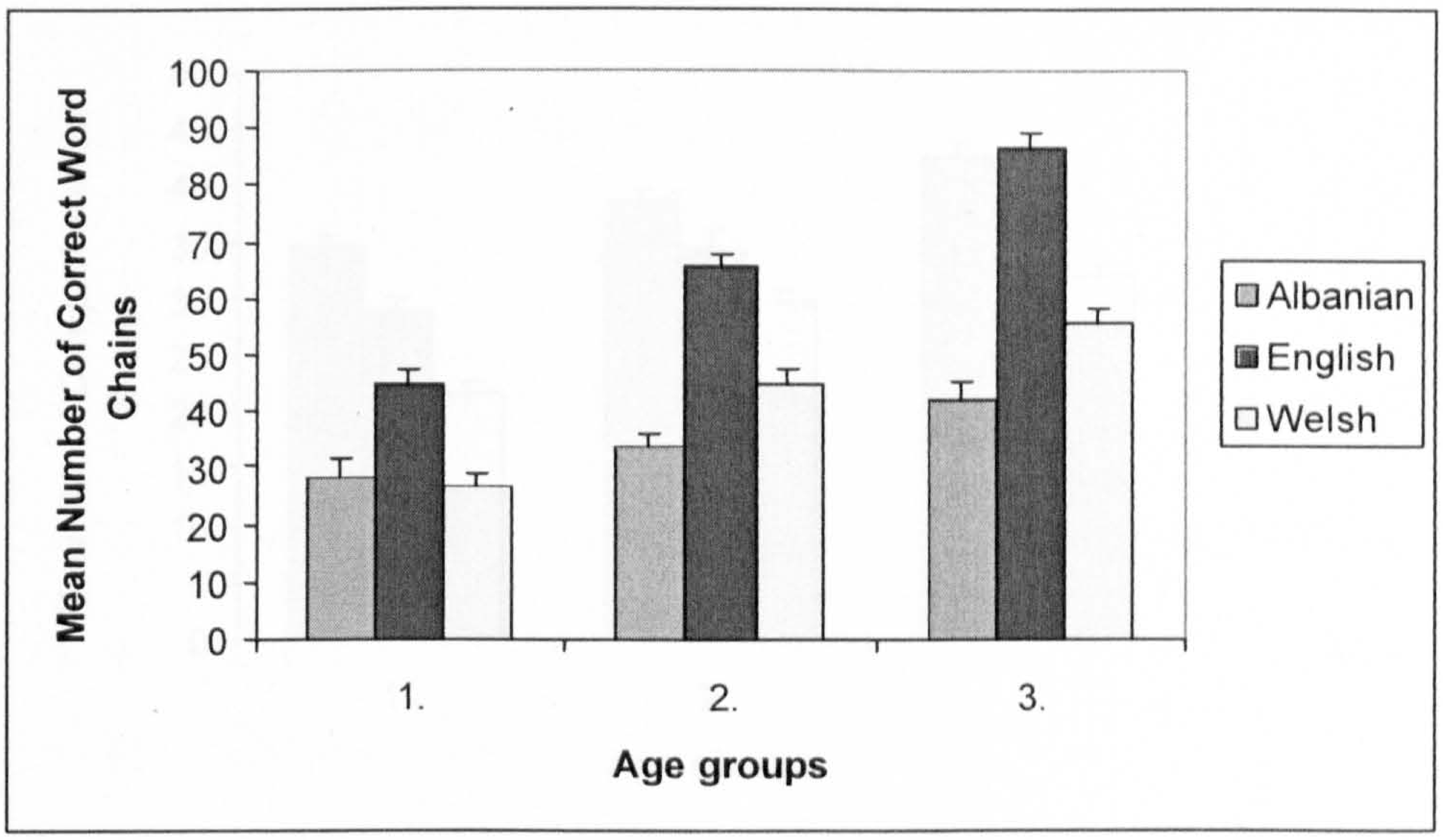

Figure 7.10. Wordchains means and SEM for each age-group across languages.

7.3.4 Word Comprehension

Age and Language main effects were found when Word Compression was used as the dependent variable in the analysis of covariance [Age, $F(2,398)=32.67$, $p<.001$; Language, $F(2,398)=72.30$, $p<.001$]. An interaction between these variables was absent. As expected, older children knew more word meanings than younger children. What is surprising is that for the first two age-groups (see Figure 7.11), is that Albanian children knew more word meanings than English and Welsh children. Word compression differences were not significant for the older Albanian and English children. Welsh children had the lowest scores, even in Year 6.

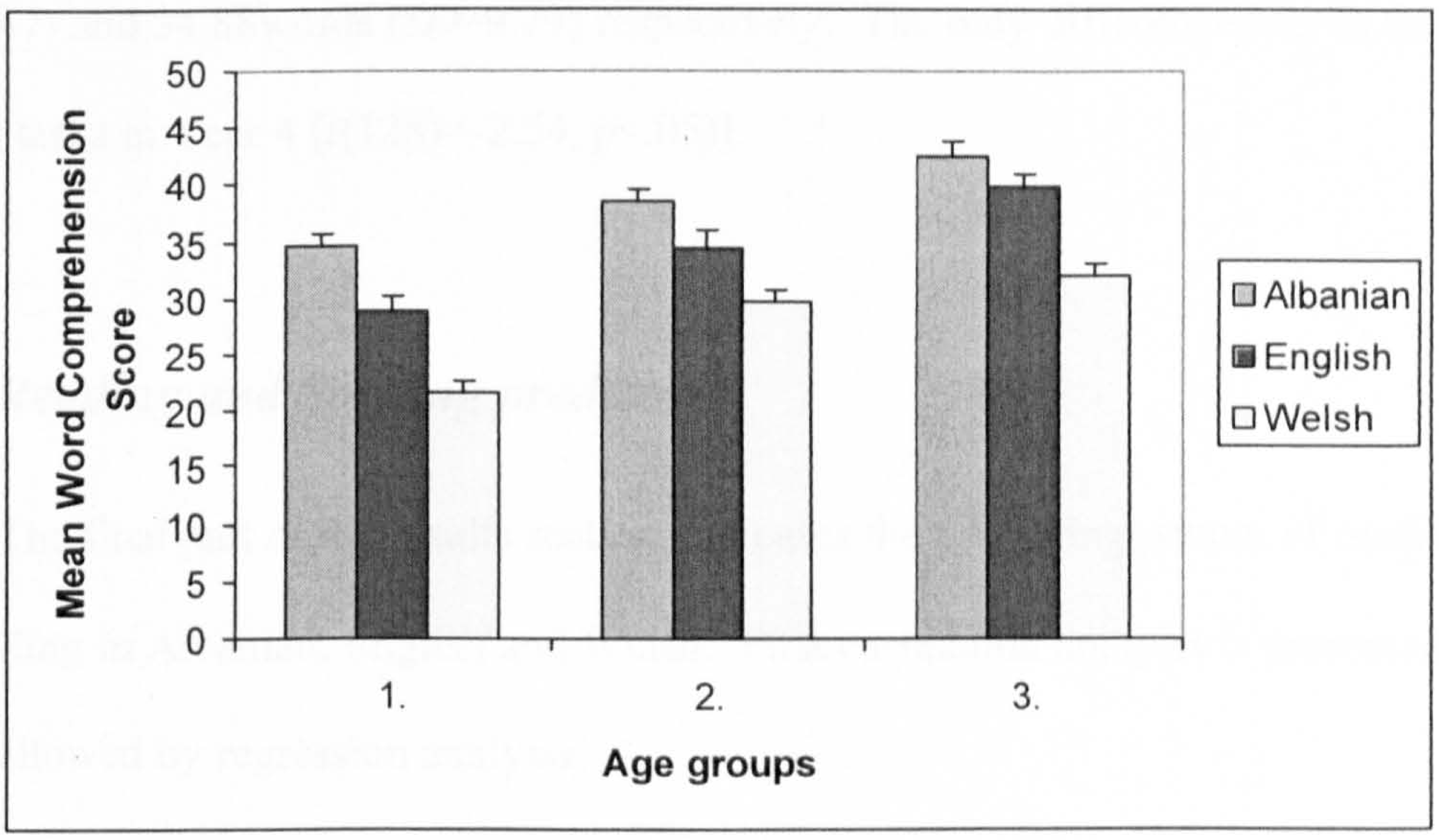

Figure 7.11. Word comprehension means and SEM for each age-group across languages.

7.3.5 Second language reading and spelling

The Welsh children who took part in this study came from families and schools where Welsh is the predominant language. However, the exposure to English cannot be fully avoided, especially for older children. The purpose of this analysis was to compare the English reading and spelling skills of Welsh bilingual children with those of the monolingual English children. The mean reading rate of English words read by the Year 4 Welsh children was .70 words/second (SD=.25) compared with .70 words/sec (SD=.28) for the English children; and .85 words/second (SD=.25) for Year 6 Welsh children, compared with .88 words/sec (SD=.30) for the English children. These results were not statistically different (t<1). In spelling, the mean number of English words spelled correctly by Year 4 Welsh children was 32.60 (SD=8.91), compared with 27.47 words (SD=11.52) for the English children. In Year 6 the English word spelling scores of Welsh and English children were 33.24 words

(*SD*=8.47) and 34.88words (*SD*=9.79) respectively. The only difference was in the spelling tasks in Year 4 [$t(128)=-2.54, p<.05$)].

7.3.6 Reading and Spelling predictors

The final part of the results section compares the predicting pattern of reading and spelling in Albanian, English and Welsh. First correlation analysis is presented; this is followed by regression analysis.

7.3.6.1 Correlation analysis

The line graphs in Figure 7.12 represent the correlation between OMRT and the rest of the tasks administered in this research for each language and age-group. Overall, for the Albanian and Welsh children NWR, RAN Alphanumeric and Wordchains are the variables that correlate most highly with OMRT.

In English, Spelling 50 is the variable that correlates most highly with OMRT. In addition there is an increase of correlation for Wordchains as a function of age.

Figure 7.13 represents the correlation coefficients between Spelling 50 and the rest of the tasks administered for each language and age-group. Whilst in Albanian and Welsh, Spelling 50 correlates most highly with NWS, for the first two English age-groups, it is OMRT that has the highest correlation with Spelling 50. Furthermore, the correlation for Wordchains for the English children increases as a function of age.

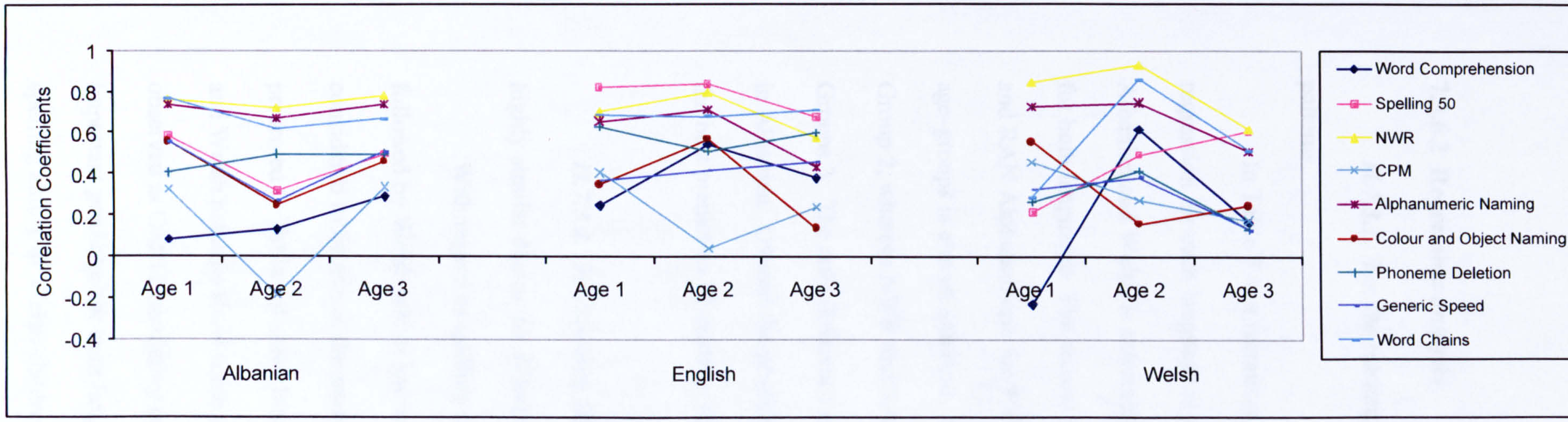

Figure 7.12. Line graph of correlation coefficients for OMRT.

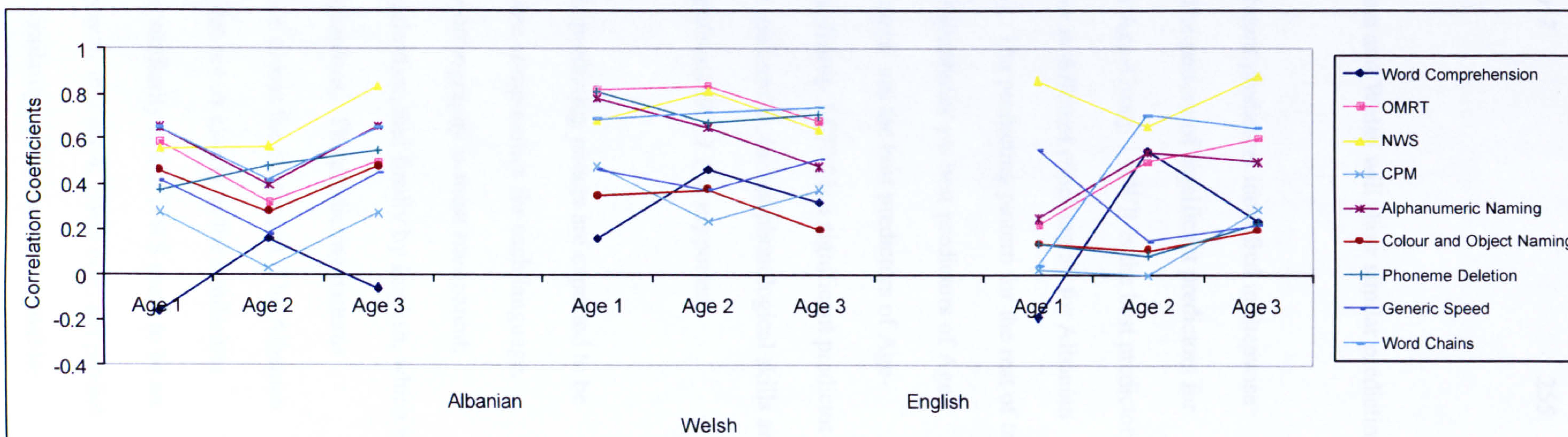

Figure 7.13. Line graph of correlation coefficients for Spelling 50.

7.3.6.2 Regression analysis

H.7.3.1. For the reading rate Albanian and Welsh will show similar predicting patterns.

In Table 7.4, a summary of all significant predictors identified in Stepwise regression for each language is presented. The pattern of significant predictors for Albanian and Welsh is extremely similar. In Age-Group 1 NWR is the best predictor for both languages. The second best predictor is different (Spelling 50 for Albanian and RAN Alphanumeric for Welsh children). The predicting pattern for the rest of the age-groups is almost identical. NWR and Wordchains are best predictors of Age-Group 2, whereas NWR and RAN Alphanumeric are the best predictors of Age-Groups 3. The only difference is that in Age-Group 2 CPM is a significant predictor in Albanian. Overall the predicting patterns are similar, in that phonological skills are the best predictors of reading; therefore, hypothesis *H.7.3.1* is supported.

H.7.3.2. For Spelling 50, none of the predicting patters are expected to be highly similar due to the different orthographic complexities for each language.

With regard to spelling the Albanian orthography is most transparent; followed by Welsh which has very few irregularities; and finally by English, which is considered to be one of the most deep orthographies. The predicting patterns presented in Table 7.4 show little resemblance across the languages. The Albanian and Welsh patterns show some similarities, but not as clearly as the similarities observed in OMRT predicting patterns. One similarity is that NWS seem to be an important predictor for both languages. However, in Year 4, NWS does not predict spelling ability of Welsh children. Another similarity is that the same variables predict spelling in Albanian and English in Age-Group 2. The lack of striking similarities for Spelling 50 support hypothesis *H.7.3.2.*

H.7.3.4. RAN Alphanumeric but not RAN Objects and Colours will be associated with measures reading ability.

Regression analysis results presented on Table 7.4 are also supportive of hypothesis H.7.3.4. Only RAN Alphanumeric predicted reading ability in Albanian and Welsh children. Additionally, correlations between RAN Alphanumeric and OMRT were much stronger than correlations between RAN Objects and Colours and OMRT.

	Age-Group 1	Age-Group 2	Age-Group 3
OMRT			
Albanian	NWR Spelling 50 R^2=.67	NWR Wordchains CPM R^2=.61	NWR RAN Alphanumeric R^2=.66
English	Spelling 50 R2=.68	Spelling 50 R2=.71	Wordchains Spelling 50 R2=.56
Welsh	NWR RAN Alphanumeric R^2=.77	NWR Wordchains R^2=.89	NWR RAN Alphanumeric R^2=.46
Spelling 50			
Albanian	RAN Alphanumeric NWS R^2=.58	NWS Phoneme Del. R^2=.42	NWS Phoneme Del. R^2=.74
English	OMRT Phoneme Del. R^2=.81	NWS Phoneme Del. R^2=.82	Wordchains NWS RAN C.& O. R^2=.71
Welsh	NWS R^2=.75	Wordchains Phoneme Del. Generic Speed CPM R^2=.81	NWS R^2=.77

Table 7.4. Predicting patterns of OMRT and Spelling 50 for each language and age-group.

7.5. Discussion

This chapter compared reading, spelling and various cognitive abilities of Albanian, English and Welsh children at three different age-groups (6- to 7-year olds, 8- to 9-year olds and 10- to11-year olds). The education system in England and Wales is similar as all children start formal education at the age of 5. In Albania, children start school at the age of 6 with little or no preschool literacy training. As a result, the

Albanian sample although matched for chronological age, had received less formal literacy instruction than the English and Welsh children.

7.5.1 Reading and spelling across languages

The first issue addressed was the effect of orthographic depth in reading and spelling development in alphabetic scripts. Reading and spelling abilities were examined using frequency matched reading lists with 50-items of decreasing log10 frequency. Analysis of variance revealed that Albanian children had lower CPM scores but higher Generic Speed scores. Hence, for the rest of the cross-language comparisons CPM and Generic Speed were used as covariates.

To test reading ability, a time-limited test was used (OMRT). Whilst an age effect was present, no language effect was found. This finding was not anticipated. Many previous research findings (e.g., Spencer & Hanley, 2003; Ellis & Hooper, 2001, Wimmer & Goswami, 1994; Seymour at al., 2003), including the data presented in the pilot study in Chapter 5, have consistently identified differences across languages differing in orthographic transparency. Children who learn to read a transparent orthography tend to rely on an alphabetic principle when reading. This allows them to read more accurately and be more confident in trying new words. Seymour et al. (2003) presented a classification of European languages according to their orthographic depth at the level of GP correspondences. In comparison to the other orthographies included in that study, English was the most inconsistent when placed on the continuum of orthographic transparency. In degrees of increasing consistency, it was followed by French, Dutch and Swedish, German and Spanish, and Finnish as the most consistent orthography that displays regular and symmetrical GP correspondences. The rate of reading development in English was more than twice as slow as in more orthographically transparent orthographies. Seymour et al.

argued that syllabic complexity and orthographic depth are responsible for the cross-language differences.

With regard to the OMRT error rates it was found that the youngest Albanian group made fewer errors than the older Albanian group. The opposite pattern was found for the Welsh and especially the English age-groups where younger children made more errors than older children. These different patterns or error rates suggest that Albanian children use a different reading strategy to that of the English children

However, in the main study, processing speed is a major confounding variable with the OMRT. Although Albanian children may be able to read unfamiliar words, the strategy they use is slow and time consuming. English children who can be very fast at reading high frequency familiar words may struggle when trying to apply GP conversion rules to infrequent words. Thus the number of words read correctly within one minute fails to properly distinguish between a slow accurate strategy and a fast strategy with more errors. This flaw in the design of time limited reading tests (including OMRT) makes the interpretations of the results more difficult. Due to limited resources and to the short period of time available to collect the cross-linguistic data, it was decided that OMRT would be used in the main study. This seemed convenient at the time of the data collection process. Here it is acknowledged that this was not the best choice. The use of reading accuracy and reading latencies for individual items would have been more appropriate for the purposes of this thesis.

If the test was not time limited, significant differences would have been observed at least for the first age-group. Indeed, the results from the pilot study presented in Chapter 5 support this as Albanian children could read more words than English children. In addition, Hanley et al. (2004) re-examined reading abilities of English and Welsh children (Spencer & Hanley, 2003) who had been in formal schooling for six years. They found that, when reading regular words, most of the English children had caught up with children learning to read Welsh. In the current study, there was a significant difference between Albanian and Welsh for the oldest age-group; however, this was not anticipated.

With regard to NWR no differences were found for the Albanian and English children regardless of age-group. Wimmer and Goswami (1994) and Landerl (2000) found that German-speaking children had substantially higher scores for pseudoword reading tasks than English children. The Welsh children outperformed both Albanian and English children on NWR. Once again this result was unexpected but similarly to the real word reading (OMRT), reading speed is a confounding variable. Furthermore, the Welsh children have received formal literacy education for a longer period than Albanian children. Therefore, they have had more opportunities to learn and thus may be faster at accessing the sound representations of graphemes.

Hanley et al. (2004), assessed reading abilities of English and Welsh children. They found that an advantage of learning to read in a transparent orthography was absent in 10-year-olds. The main study presented in this thesis failed to find an advantage of orthographic transparency in learning to read across even in very young children. However, strong evidence for such an advantage was found for the spelling tasks. Moreover, it was found that such an advantage continued to be present even in Albanian and Welsh children's spelling even in Age-Group 3. Albanian children spelled more words than English and Welsh children; Welsh children spelled more words than the English children. This replicates data from other transparent orthographies studies, such as that of Wimmer and Landerl (1997) who reported that German children who had received formal instruction for 8 to 9 months, showed higher accuracy for spelling vowel phonemes and consonant clusters than English children. Spelling accuracy differences got smaller for older children; nevertheless, the Albanian children continued to spell significantly more words than their English and Welsh counterparts.

High predictability of GP correspondences encourages young Albanian children to rely on phonological encoding. The asymmetry between phoneme and grapheme correspondences in English encourages English children to rely on larger orthographic units. Nevertheless, more empirical data is necessary to validate this assumption.

Analysis of covariance for NWS revealed that Year 1 Albanian children could spell more nonwords than their age matched English and Welsh counterparts. This indicates that a one-to-one conversion strategy is more effective in highly transparent orthographies than in non transparent ones. The development of phonological encoding skills depends upon the transparency of the orthography: Welsh children performed similarly to the Albanian children in the second age-group, whereas for the oldest children no differences were found. The more transparent the orthography, the faster is the development and reliance on GP conversion strategy for spelling.

7.5.2 Awareness of the structure of the spoken language

These findings on NWS suggests that orthographic transparency also affects the awareness of the structure of the spoken language. Phoneme Deletion analysis of covariance revealed that in Age-Group 1, Albanian children had higher phoneme deletion scores than Welsh and English children; Welsh children had better scores than the English children. No differences were found in Age-Groups 2 and 3. The Phoneme Deletion task taps explicit phonological skills at the smallest unit—the single phoneme. Research has shown that explicit phonological awareness begins to develop when formal schooling is introduced (Cossu et al., 1988; Morais et al., 1979). This suggests that the more transparent the orthography being learned, the faster the development of fine-grained phonological skills. Other studies comparing explicit phonological awareness have found ceiling or close to ceiling effect for children learning to read in a transparent orthography. For example, accuracy level was 100% correct for Greek children (Porpodas, 1999), 97% for Italian children (Cossu et al., 1988), 92% for German children (Wimmer, Landerl, Linorter, & Hummer, 1991). Perfetti, Beck, Bell and Hughes (1987) found that the accuracy level of English children was only 65 %. Hanley et al., (2004) found that English speaking children had very low scores on tests of phoneme awareness; however they performed well on the rhyme awareness test. According to Goswami (2002) English speaking children exploit onset-rime skills, holistic patterns as well as GP recoding. The development of multiple strategies for reading may be one reason why grapheme-phoneme recoding might develop at a slower pace.

Further evidence that the awareness of the structure of the spoken language and use of multiple strategies arises in deep orthographies comes from the Wordchains analysis of covariance. It was found that English children consistently outperformed Albanian and Welsh children. Welsh children split more Wordchains than Albanian children in Age-Groups 2 and 3. This pattern indicates that the more deep the orthography, the more likely the reliance on larger orthographic units will be.

The findings on NWS, Phoneme Deletion and Wordchains support the findings presented in the pilot study: the nature of the orthography being learned affects reading strategy. Successful reliance on GP conversion rules promotes the development of fine-grained phonological skills; reliance on visual recognition of larger orthographic units promotes the development oforthographic skills. However, the structure of the spoken language can affect children linguistic tasks scores. Albanian, for example, has mainly an open syllable structure, whereas in English the most common structure is CVC, with relatively few CV syllables (e.g., baby)(De Cara & Goswami, 2002). The syllable structure of the languages assessed in this thesis was not taken into account. Seymour et al. (2003) study classified languages on an orthographic depth continuum, as well as on a syllable structure continuum. In their study, a distinction was made between Romance languages (e.g., Italian, Spanish), which have a high proportion of open CV syllables with few initial or final consonant clusters and the Germanic languages (e.g. English, German), which have a predominance of closed CVC syllables and complex consonant clusters in both onset and coda position. In this respect Albanian is similar to the Romance languages. They found that for simple syllable structure languages, lexicality effects were smaller, and nonword reading accuracy was higher.

One major issue here is that experimenter errors occurred in the manipulation and production of the English nonword items. Many of the items contained illegal combinations of letters (e.g., sver, srice and sroop). This error penalises the English scores in two ways. First, English children's NWR and NWS scores are less likely to be accurate as the items with illegal combinations were more difficult to pronounce and spell. Secondly, due to this difficulty, more time is needed to attempt each item. Because, NWR is a time-limited test then English children would have had fewer opportunities to attempt to read as many words as their Albanian and Welsh counterparts. These errors undermine the argument that the transparency of the orthography affects the structure of the spoken language.

To summarise: the present cross-linguistic findings on NWS, Phoneme Deletion and Wordchains, indicate that orthographic transparency affects the awareness of the structure of the spoken language and reading strategies. These findings suggest that transparent orthographies promote a fine-grained level of phonological awareness in young children and that deep orthographies promote coarse-grained awareness, which is based on word-specific orthographic representations. However, this research failed to take into account the syllable structure of the spoken language and more importantly, the English stimuli were flawed.

7.4.3 RAN tasks

With regard to the rapid naming tasks, older children are faster than younger children. No differences were found for RAN Objects and Colours in any of the language groups. Differences were found in RAN Alphanumeric—these results were not expected. English children were faster than Albanian children in Age-Group 1, but slower than the Welsh children in Age-Groups 2 and 3.

Automatic recognition of simple letters digits and words should not differ across languages. Analysis of variance reveals no difference between Albanian and Welsh children. This might indeed suggest that children learning to read in transparent orthographies learn to rapidly name stimuli in a different way to children who learn to read in deep orthographies. However, this argument is very unlikely to hold because the stimuli used in each language are very familiar. Furthermore, no previous studies have reported differences in RAN tasks across-linguistic, thus the mixed pattern or RAN Alphanumeric tasks for English children are very difficult to interpret. One other reason why the English data fluctuates across the year-groups is that the sample size is too small: RAN data was available for 31 Year 2 children and only 18 Year 4 children. However, neither argument is convincing and further research with larger sample sizes need to be carried out.

7.5.4 Second language reading and spelling

Second language reading and spelling of Year 4 and 6 Welsh children revealed that they could read and spell English words at a similar level to that of age matched English children. In Year 4 they could spell more English words than the English children. These findings suggest that learning a transparent orthography does not become a stumbling block when subsequently learning to read and spell in a deep orthography. These findings replicate those of Hanley et al. (in press), who also compared bilingual Welsh children with monolingual English-speaking age-matched children.

7.5.5 Word Comprehension

Welsh children had the lowest Word Comprehension scores regardless of age-group. Ellis and Hooper (2001) found similar results with Year 2 Welsh speaking children. They attributed this finding to the fact that Welsh children living in North Wales are bilingual.

Albanian children start school a year later than the English and Welsh children and low SES should go against the comprehension levels of the Albanian children. Duncan and Seymour (2000) have shown that low SES is associated with delayed acquisition of foundation literacy skills. It remains to be confirmed whether the similarities and differences observed in the current research apply across different SES groups. Nevertheless, Word Comprehension analysis of covariance revealed that Albanian children knew more word meanings than English and Welsh children. This may be an effect of orthographic transparency in comprehension. The self teaching-mechanism, put forward by Share (1995), maintains that phonological recoding allows children to achieve a direct access to meaning. Alphabetic reading results in appropriate whole-word pronunciations while the corresponding orthographic patterns are continually restructuring. Hence, larger units of orthography can become associated with larger units of pronunciation following sufficient exposure to print. This, together with a combination of use of context and ability to successfully read word they have never seen before, might help Albanian children expand their semantic representations faster than children learning to read in less transparent orthographies such as English.

7.5.6 Predicting patterns for OMRT

The final comparisons relate to the predicting patterns of reading and spelling development across languages. For the OMRT it was predicted that because of the transparency of the orthography, Welsh and Albanian predicting patters should be relatively similar. This was exactly what was found. For both languages and for each age-group (1) NWR reading was the best predictor, (2) Wordchains was the second best predictor in Age-Group 2 and (3) RAN Alphanumeric was the second best predictor in Age-Group 3. This suggests that children learning to read in similar orthographies use similar component skills. Young Albanian and Welsh children tend to rely on alphabetic decoding. As children get older, when reading, they use larger units form the orthographic knowledge they have acquired. Two differences between Albanian and Welsh children in Age-Group 1 are: Spelling 50 being a predictor for Albanian and RAN Alphanumeric being a predictor for Welsh. A contribution of spelling to reading is well documented. According to Frith's model, in young learners, it is alphabetic spelling that is the pacemaker of alphabetic reading. RAN Alphanumeric being a predictor for Welsh but not for Albanian may be a result of reading experience: Welsh children had received one more year of formal reading instruction. This allows Welsh children to be more familiar with alphanumeric stimuli, which subsequently allows them to name these stimuli more quickly than children who have had less literacy experience.

The feedforward consistency of the English orthography is not as regular as that of Albanian and Welsh. This difference is reflected on the correlation and regression analysis findings. The predicting pattern for English children is very different from the other two language groups: Spelling 50 is the best predictor for the first two age-groups and the second best for the last age-group; Wordchains is the best predictor for the oldest children. Spelling 50 is a good predictor of skilled and unskilled reading. Orthographic skills are the most important contributors to skilled reading. This finding may also be interpreted under the framework of Friths's model, which proposes in the second stage, alphabetic spelling is a pacemaker of alphabetic reading. Therefore, overall the findings form all three languages are in line with the second stage of Friths's model, as well as findings from Juel et al. (1986) and Stanovich (1986). However, the high correlations between Wordchains and OMRT, are also supportive of Trieman's (1993) findings that suggest that young children are sensitive to orthographic conventions from an early stage.

For older children, however, orthographic transparency has an effect on the predictors of reading rate. For Albanian and Welsh children, phonological tasks continued to be the best predictors of OMRT even in Age-Group 3. For English children, Wordchains was the best predictor. Therefore, only the English findings fully support the final stage of Frith's model.

Due to the different levels of feed-backward consistency of the three languages concerned, no striking similar patterns were found for spelling ability. In

Albanian, the overall predicting pattern suggests a mediation of phonological skills across the three age-groups.

In Welsh, the pattern is mixed with phonological skills mediation for the first and last age-groups and orthographic skills mediation followed by phonological mediation for the second age-group. It could be that cross-language transfer takes place in these children who subsequently learn a deep orthography. The second explanation is that these differences may be due to cohort differences. Whilst the predictor of the first and last age-groups may indicate a similarity between the age-matched Albanian children, the predictors for the middle age-groups are very different. The findings from the Albanian and Welsh children support the second stage of Frith's model but regression analysis does not provide any evidence for the final stage, which suggests that orthographic reading is the pacemaker of orthographic spelling (especially in Albanian). However, Sprenger-charroles et al. (1997) have suggested that the orthographic procedure develops later in spelling than in reading.

The predicting pattern of the English children is different from that of Albanian and Welsh children. A phonological mediation is relevant for the first two age-groups. For the oldest children regression analysis revealed an orthographic skills mediation followed by phonological skills. Along similar lines, Cataldo and Ellis (1988), and Ellis and Cataldo (1990) found that the contribution of explicit phoneme awareness to spelling ability in the first three years of formal schooling increased over time; however, it accounted for growth in reading only in Age-Group 1. Burns and Richgels (1989) also found that the influence of phonological awareness was more important in explaining early spelling than early reading development. They examined children's invented spelling not in terms of accuracy but in terms of phonological plausibility. Four-year-old children who could produce invented spellings were compared with children who could not spell on a battery of tests comprising reading skill, letter knowledge and phoneme segmentation. The non-spellers were inferior to their peers who were inventive spellers in letter-sound knowledge, and segmentation skills, although only 44% of later group could read. Burns and Richgels concluded that in the early stage of literacy development, phonemic segmentation and letter-sound knowledge were vital precursors of spelling ability, whereas reading was a related but separate skill from word writing.

In addition, a reciprocal relationship between reading and spelling was apparent for Year 2 English children: OMRT predicted Spelling 50 and vice versa. In older children only Spelling 50 continues to predict OMRT. Several studies have obtained a reciprocal longitudinal relationship between reading and spelling (e.g. Foorman, Francis, Novy & Liberman, 1991). Most importantly, Ellis and Cataldo (1990) found that early spelling predicted later reading, whereas the effect of early reading on later spelling was much weaker.

Overall, the English data supports the final two stages of Firth's model of reading and spelling development (1985), which propose that alphabetic spelling is the pacemaker for alphabetic reading, and that orthographic reading is the pacemaker of orthographic spelling.

These findings provide support for two suggestions: 1) phonological abilities are fundamental to literacy development in alphabetic scripts and the contribution of orthographic skills increases with age; 2) orthographic transparency has an effect on the sub-skills involved in literacy development.

7.5.7 Conclusion

The effect of orthographic depth was examined in children learning to read and spell Albanian, English and Welsh. Reading rate differences did not show any advantages for children learning to read transparent orthographies. This result was due to the way reading ability was measured.

In spelling, the orthographic depth effect obtained was large: Albanian children spelled more words than the English and Welsh children. Following experience, highly predictable GP correspondences allow children to quickly build and rely upon the orthographic knowledge. The orthographic depth effect is evident only in spelling because the spelling tasks—both for real word spelling and nonword spelling—were not time limited.

Orthographic depth has consequences in phonological orthographic skill development. Young children learning to read in transparent Albanian show high scores on explicit phoneme awareness, whereas children learning to read in the deep orthography of English showed highest accuracy scores for the Wordchains task.

As expected, the predicting patterns of OMRT for Albanian and Welsh were almost identical. For spelling the patterns were less similar. It is suggested that phonological abilities are fundamental to literacy development in alphabetic scripts and the contribution of orthographic skills increases with age.

Chapter 8: Final Discussion

8.1. Introduction

This Chapter is divided into two main sections. In the first section a general discussion is presented; the second section highlights some of the current methodological limitations, and makes suggestions for future research.

As there are no known studies on the acquisition of reading and spelling in the Albanian language, additional efforts have been made to examine the development of the literacy skills in Albanian.

8.2. General Discussion

The present research shows a number of effects of orthographic transparency on the literacy development of young children learning to read in Albanian, English and Welsh. It was found that: (1) Year 1 Albanian children could read more words than Welsh and English children of the same age who had received one more year of formal teaching instruction; (2) young Welsh and Albanian children use a different reading strategy from that of English children; (3) Albanian children outperformed Welsh and English children in spelling of words and non-words across three different age-groups; (4) young Albanian children were better at phoneme deletion, whereas English children were better at separating chains of words, and (5) the predicting pattern of phonological and orthographic skills was affected by orthographic transparency. These findings indicate that orthographic transparency affects: the rate reading and acquisition, the sort of reading and spelling strategy children use, young children's structure of the awareness of the spoken language and the contribution of related sub-skills to reading and spelling development.

8.2.1 Pilot study: Reading rate

In the pilot study, reported in Chapter 5, it was found that Year 1 Albanian children could read more words of their language then their age-matched Year 2 Welsh counterparts, who in turn, could read more than the English children. These data triangulates and confirms the conclusions of Ellis and Hooper (2001) with respect to the effect of orthographic transparency on the rate of reading acquisition and the strategies children use in the beginning stages of learning to read. These findings are consistent with other studies of the effect of transparency on rate of acquisition (e.g., Wimmer and Goswami, 1994; Öney & Durgunoglu,1997; Seymour et al., 2003; Spencer & Hanley, 2003), and provide further support for the Orthographic Depth Hypothesis which suggests that reading development may depend on the consistency of the written language (Lukatela, Carello, Shankweiler & Liberman, 1995).

8.2.2 Pilot study: Reading strategy

Two strands of evidence show that beginning readers in the shallow orthography of Albanian rely on a grapheme-phoneme conversion strategy: the strong effect of word length on their reading latency, and their high proportion of non-word errors.

Albanian children's reading latencies were greatly affected by word length. This is consistent with their attempting to pronounce long, novel, or infrequent words by phonological recoding using a left-to-right parse, thus, the more letters in a row, the longer the production time. This suggests that young children learning to read in transparent orthographies rely on a phonological reading strategy when reading new or unfamiliar word items.

The second strand of evidence comes from reading error analyses. Unlike their English counterparts, the Albanian children made more non-word errors than any other kind of error. This high proportion of non-word errors suggests that their reading strategy relies heavily on alphabetic recoding, as demonstrated for reading of other transparent scripts such as German (Wimmer & Hummer, 1990) and Welsh (Spencer & Hanley, 2003). When phonological recoding goes wrong, the likely pronunciation error is a nonword; when whole-word lexical access on the basis of partial visual analysis goes wrong or when partial phonetic cueing is employed, the likely result is a word. A phonological reading strategy also means that children are prepared to 'have a go' at reading any word: despite the fact that the Albanian children have had less time on task of reading than the English children, they tended to make very few null responses. Thus, the regularity of orthography gives children greater confidence in trying to read new words. Following this strategy they will develop a 'self-teaching' mechanism, which allows them to enlarge their sight-word reading lexicon (Share, 1995).

8.2.3 Pilot study: Word Comprehension

The word comprehension level of the Year 1 Albanian children was superior to that of Welsh children. Albanian children gave accurate definitions for 50% of the words, compared to the English children 45%, and Welsh children 36%. The finding that the Year 1 monolingual Albanian children performed better in word comprehension than did Year 2 bilingual Welsh children of the same age is consistent with Ellis and Hooper's (2001) suggestion that their Welsh children's low comprehension scores may be a consequence of bilingualism.

8.2.4 Main study: Reading rate

In Chapter 9, the literacy development of Year 1, 3 and 5 Albanian children was compared with that of age-matched Year 2, 4 and 6 English and Welsh children. Data analysis for the OMRT failed to show any advantage for Albanian and Welsh children. This result was not anticipated. Previous research findings (e.g., Spencer & Hanley, 2003, Ellis & Hooper, 2001; Seymour et al., 2003), including the data presented in the pilot study, have consistently identified differences across languages differing in orthographic transparency. This result is due to the nature of the reading test used: OMRT it is a time-limited test where children have to read as many words as possible. Although Albanian and Welsh children may be at a great advantage when reading unfamiliar words, the alphabetic decoding strategy on which they rely with confidence, is slow. English children who can be very fast at reading high frequency familiar words may struggle when trying to apply GP conversion rules to infrequent words. As a result, reading scores across languages 'balance out'. If the test was not time limited, significant differences would have been observed for at least the first age-group.

No differences were found for the Albanian and English children in the NWR, but the Welsh children's NWR rate was significantly higher than the other two language groups. This pattern was not expected. One reason why Welsh children read more words than the Albanian group is that they have been exposed to print for a longer period.

There are two explanations as to why Welsh children read more nonwords than English children. First, the transparency and regularity of the Welsh orthography helps Welsh children to be more confident in correctly applying a GP conversion strategy. Second, experimenter errors occurred when creating the English nonwords. Several, nonwords contained illegal letter combinations. These would have slowed the reading speed of the English children. However, as already mentioned in the previous chapters, processing speed is a major confounding variable with the OMRT. The number of words/nonwords read correctly within one minute fail to properly distinguish between a slow accurate strategy and a fast strategy with more errors. This confounding substantially weakens all the related conclusions on reading rate, reading strategy and the true contribution of the phonological and orthographic skills to reading development.

8.2.5 Main study: Word Comprehension

With regard to the Word Comprehension test, Albanian children knew more word meanings than English and Welsh children. The self teaching-mechanism, put forward by Share (1995), maintains that phonological recoding allows children to achieve a direct access to meaning. Alphabetic reading results in appropriate whole-word pronunciations while the corresponding orthographic patterns are continually restructuring. Hence, larger units of orthography can become associated with larger units of pronunciation following sufficient exposure to print. This, together with a combination of use of context and ability to successfully read words they have never seen before might help Albanian children expand their semantic representations faster than children learning to read in less transparent orthographies such as English. With respect to the Welsh comprehension scores, Hanley et al. (in press) found that Welsh children performed poorly on a reading comprehension test, suggesting that the advantage of orthographic transparency does not extend to word comprehension. As Ellis and Hooper (2001) suggested, poor word comprehension scores of Welsh children may have been due to the exposure of a second language. However, further research is needed to understand and extend these cross-language comparisons of word comprehension.

8.2.6 Main study: Spelling rate

Although cross-language differences were not found in reading, a persistent difference was found in spelling[1]: Albanian children spelt more words than English and Welsh children, and Welsh children spelt more words than the English children. This replicates data from German language studies. Wimmer and Landerl (1997), for example, found that German children who had received formal instruction between 8 and 9 months, had higher accuracy for spelling vowel phonemes and consonant clusters than English children.

Across the three age-groups, the differences in spelling accuracy were smaller for older children. However, Albanian children continued to spell significantly more words than their English and Welsh counterparts in each age-group. High predictability of grapheme and phonemes correspondences encourages younger and older Albanian children to rely on the successful phonological encoding strategy.

NWS scores significantly differ across the languages: Age-Group 1 Albanian children spelt more nonwords than age-matched Welsh children, who in turn spelt more than English children. As Albanian is more transparent than Welsh, and Welsh is more transparent than English, this finding is a clear indication of the effect of

[1] Spelling 50 was not a time limited test

orthographic depth on spelling skills. Albanian children are very confident in applying phoneme-grapheme conversion rules in spelling. Knowledge of letter names and their highly consistent sound correspondences allow Albanian and Welsh children to spell with high accuracy. Welsh children performed similarly to the Albanian children in the second age-group, whereas for the oldest children no differences were found. The more transparent the orthography, the faster is the development and reliance on GP conversion strategy for spelling.

The observed patterns of performance for NWR and NWS are not similar. Given that both tasks assess phonological skill one would have expected to find similar patterns across languages. However, it is difficult directly compare these tasks because the measurement method differs—NWR is a timed task whereas NWS is not. In addition, as already mentioned at the end of Section 8.2.4 the English language NWR and NWS tasks are further confounded in that they contain items with illegal combination of letters. This can be another reason why English children NWS scores are significantly below to those of Albanian and Welsh children.

8.2.7 Awareness of the structure of the spoken language

These findings on NWS suggest that orthographic transparency also affects the awareness of the structure of the spoken language (i.e., the development of phonological skills is significantly affected by the transparency of the orthography). Indeed, in the Phoneme Deletion task, Albanian Age-Group 1 children outperformed Welsh children, who in turn outperformed English children of the same age. These findings on phoneme deletion strongly suggest that transparent orthographies promote a fine-grained level of phonological awareness in young children. Knowledge of letter names and their highly consistent sound correspondences allow Albanian and

Welsh children to perform NWS and Phoneme Deletion tasks with ease. This does not mean that a fine-grained awareness is not developed in children learning to read deep orthographies. The current findings suggest that this development may be delayed in English speaking children. Instead, young children learning to read and spell in deep orthographies may develop orthographic representations of spoken words at a different level. On the Wordchains task, for example, the advantage of the English children and the poorer performance of the Albanian children, within each age-group, is noticeable. This suggests that deep orthographies promote coarse-grained awareness, which is based on word-specific orthographic representations. This is supportive of Goswami et al. (1998) study, which suggests that children use analogies in reading—these analogies would reflect grapheme-phoneme relations in transparent orthographies and rime-based coding in deep orthographies.

However, this thesis failed to take into account the syllable structure of the languages concerned. Albanian has a mainly an open syllable structure (CV). English and Welsh tend to have more CVC structures. The structure of the spoken language can potentially affect children's performance on various phonological tasks. Another problem identified here relates to the stimuli used for the English NWR and NWS tasks. Due to experimenter error items that contained illegal letter combinations were included in the final version of these tasks, thus putting English children at a disadvantage when they read/spelt these items. These errors undermine the argument that the transparency of the orthography affects the structure of the spoken language.

8.2.8 The contribution of phonological and orthographic skills to literacy development

Reading. In this thesis an attempt was made to identify which sub-skills predict reading and spelling at different ages. It was predicted that for both reading and spelling, phonologically related tasks would predict literacy development in young children, whereas the orthographic task would be the best predictor in older children. With regard to reading, Albanian and Welsh predicting patterns were very similar. Phonological tasks were the best predictors in all age-groups, whereas Wordchains was the second best predictor in Age-Group 2, suggesting that the contribution of phonological skills is the most important skill in reading whereas the contribution of orthographic skills increases over time but is secondary in highly transparent orthographies. The pattern for predicting English reading was very different. Phonological tasks did not predict reading. Instead, spelling skills was the only predictor for the first two age-groups. For the last age-group, Wordchains was the best predictor. Correlation data for the English speaking children revealed that the correlation coefficient between Spelling 50 and OMRT decreased as a function of age whereas the coefficients between Wordchains and OMRT increased. These findings suggest that the English predicting pattern is in line with Frith's model (1985), which suggests that in the second stage alphabetic spelling is the pacemaker of alphabetic reading and in the third stage orthographic reading is the pacemaker of the orthographic spelling.

In fact, regression findings from all three languages are supportive of the second stage of Frith's model. However, the high correlations between Wordchains and OMRT are also supportive of Treiman's (1993) findings that suggest that young children are sensitive to orthographic conventions from an early stage. Overall, these patterns suggest that orthographic depth affects the nature of sub-skills involved in reading development.

Spelling. With regard to spelling skills, the predicting patterns across the languages were different. It was expected that phonological skills would predict early spelling whereas orthographic skills would predict skilled spelling. Only the English data provided evidence for this pattern.

In Albanian only the contribution of phonological skills was evident in all age-groups, whereas in Welsh, Wordchains was the best predictor in Age-Group 2 but did not appear in the other two age-groups, in which the phonological skills tasks were the only predictors.

In orthographies where the phoneme-grapheme rules are regular and consistent, relying on a phonological recoding strategy when spelling seems to be a sensible strategy regardless of literacy experience. This does not mean that children learning to spell in highly transparent orthographies rely only on phonological recoding. Sprenger-Charroles et al. (1997), for example, have suggested that the orthographic procedure develops later in spelling than in reading. In deeper orthographies, reliance on letter names alone will not produce the correct spelling; reliance on word-specific level of information such as that of onsets and rimes may be more practical (Goswami & Bryant, 1990).

Furthermore, the findings from the regression analysis, once again highlight the scientific debate over the universality of stage theories of literacy development. As suggested by Wimmer and Hummer (1990) reading strategies children adopt depend upon the language the children learn.

To conclude, the sub-skills that contribute to the development of spelling ability differ depending on the depth of the orthography being learnt: the deeper the orthography, the larger the contribution of orthographic skill to reading development. However, various confounding related to the choice of tests and selection of test items (OMRT, NWR, NWS and Wordchains), make it very difficult to correctly interpret the contribution of phonological and orthographic skills.

8.2.9. Additional research findings in Albanian

To date, little research has been conducted to examine the effect of the extremely transparent orthography of Albanian on reading and spelling acquisition. As a result, further tests and analysis were carried out with children from this language group. In addition to the OMRT, a 100-word reading test was administered to Albanian children. The results provided further evidence of the development of reading strategy. First, reading latencies were larger and the world length effect was stronger for youngest Albanian children. Second, the type and frequency of reading errors varied across the years. The highest proportion of nonword errors was made by Year 1 children and the least by Year 5 children. The reverse pattern of distribution occurred for whole-word replacement errors. Third, the lexicality effect for reading was larger for Year 5 than Year 1 children. These findings provide further support for the hypothesis that younger Albanian children rely more heavily on grapheme-phoneme conversion reading strategy, whereas older children rely on bigger orthographic units, such as onset, rime, or sight word recognition as suggested by the developmental models of Frith (1985) and Ehri (1999).

A 100-word spelling test was used to assess spelling development—this was matched for written frequency to the Reading 100 test. Lexicality effects existed in each age-group but these remained similar across the year-groups. Error analysis revealed similar patterns to the Reading 100 errors: the highest proportion of nonword errors was made by Year 1 children, whereas the highest proportion of whole-word replacement errors were made by Year 5 children. Therefore, from the error analysis and the lexicality effects it can be concluded that younger and older Albanian children rely heavily on an alphabetic decoding strategy. Given the extremely transparent orthography of Albanian, relying on a phonological encoding strategy in spelling seems to be a sensible strategy to use regardless of literacy experience.

8.3 Current limitations and suggestions for future research

Future research is needed in order to discover how children learn to read and spell, and how the current findings can be used in applied settings with children who display reading and spelling difficulties. This section highlights some the limitations of this study. For most of the limitations described, possible solutions and improvements that can be employed in future research are suggested.

8.3.1. Current limitations

Creating comparable measures for reading and spelling across-languages can prove a very difficult task. In the current research reading and spelling tests were matched for written frequency (Ellis & Hooper, 2001). The written text corpora used for selecting word items for the reading and spelling tests came from adult written language rather than child input. It is very unlikely that the particularities of a text corpus might significantly affect the higher frequency words of a language, but they can have a great impact upon frequency estimates of less common words. Thus, lack of adequate representation may result in measurement error. It would be more sensible if the text corpora were made up solely of children's written literature. In the Albanian text corpus an attempt to include children's books was made, however, this is not sufficient in making sure that an adequate representation is achieved. When the current research began no text corpus was available for Albanian, thus creating this took a considerable amount of time. This was because the availability of electronic texts was scarce. This meant that certain materials that were not comparable to the English and Welsh text corpora were included in the Albanian corpus (e.g., the Bible, translated in Albanian). This difference in materials would certainly result in very different word items being selected for the reading tests. For example, one of the items in Albanian was the word *Jezu* 'Jesus'. This issue is a matter of concern as it undermines the theoretical basis for choosing frequency matched items. Therefore, if research of this kind is to continue, larger text corpora are a necessity. A need for a proper Albanian text corpus has been identified by other academics. Efforts to create such a corpus have recently already started and the future of a good and balanced Albanian text corpus is looking bright[2].

Another issue that deserves attention is the age at which children start school. This is not a problem for the English and Welsh children as the education system is the same. In Albania children start school at the age of 6-years. Could the advantages of Albanian children on reading and spelling be due to the late print exposure? It is not clear if the cognitive maturity of these older children helps them grasp faster the alphabetic principle than children who start earlier but who may not be ready. In order to address this issue, comparisons between the development of literacy skills of monolingual English (and/or Albanian) children who start school at 5 and children

[2] Findings as well as various problems that have come to light through this thesis were presented at the

who start at 6-years-old would be appropriate. This kind of study would definitely provide hard evidence whether the age at which children are introduced to literacy severely affects their ability to develop reading and spelling skills.

Other sub-skills variables of theoretical value should have been taken into account. For example, a measure on short-term working memory skills or letter knowledge would have been helpful for further analysis in spelling development.

The vocabulary measure in the pilot study was based on BPVS II (1997). This vocabulary test is standardized for English but not for Albanian children. Therefore the data collected from the Albanian children should be carefully treated. The Albanian version was created by translating the English items into Albanian—during the translation process the level of difficulty was not taken into account, therefore, these scores may not serve as an accurate index of children's vocabulary knowledge. Indeed, there is a need for standardized vocabulary tests in Albanian. The availability of such tests would make cross-linguistic comparisons much easier.

The Orthographic Awareness Test used in the pilot study had low reliability. There is disagreement as to what the content and structure of an orthographic tasks should be as most of these can be regarded as phonological skills tasks rather than orthographic tasks. In the main study, Wordchains were used as a measure of orthographic skills. Because this is a time-limited test, performance is enhanced if children have accurate orthographic representation of the words stored in memory. However, a major problem was that this task actually involved reading real words, therefore it is not surprising that reading and Wordchains are highly correlated. The choice of this test was somewhat naïve because it is not the best task to examine orthographic skills. The limitations of the Wordchains task and NWR English task,

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first Albanian Corpus Initiative workshop (University of Osnabrueck, Germany, September 2004).

have several implications in that the interpretations of results related to the contribution of orthographic skills to literacy development and the effect of orthographic depth to the awareness of the structure of the spoken language may not be entirely reliable. In this thesis, phonological awareness was found to be a major contributor to literacy development, however, several tasks were used to measure this awareness at the phonemic level (e.g., Phoneme Deletion, NWR, NWS, RAN). Therefore, in order to thoroughly measure the true contribution of orthographic skills to literacy a range of orthographic awareness tasks should be used (e.g., orthographic awareness, orthographic choice task, Wordchains, etc.). Furthermore, Principal Component Analysis can be used to see if separate factors will be identified for phonological and orthographic related tasks.

Albanian children were administered 100-word reading and spelling tests, where reading latencies and error frequency types for both reading and spelling gave insight to the development of literacy strategies. Using 100-word tests with Welsh English children would be necessary to examine whether a shift of strategies occurs during reading and spelling development. Furthermore, if the findings are replicated in other transparent (e.g., Greek, Spanish, Italian, German) and deep (e.g., Danish, French) orthographies it would increase the external validity of the study.

This study was limited to single word reading. Adams (1990) suggests that during reading, children can make a great use of contextual guessing. Therefore, single word reading in which accuracy, latencies and error types measures can be obtained, speeded reading tests, and reading in context, should be employed in order to have a robust measure of reading ability across languages.

With regard to the development of phonological awareness development, many studies have shown that initially young children show a sensitivity to the syllable level, followed by the onset/rime and finally to the phoneme level as a function of age (Treiman, 1987; Goswami & Bryant, 1990). Liberman et al. (1974) found that 4 and 5-year-old children found it easy to segment words into syllables, but not into phonemes. Is this the case with Albanian children? Pre-school phonological skills of Albanian children need to be examined. Several tasks can be used to assess these skills. For example, an oddity task can be used to measure the phonological sensitivity at the onset/rime level (Bradley & Bryant, 1983). Another useful task is the tapping task: this can be used to measure the development of phonological awareness at the syllable and phoneme level (Liberman et al., 1974). The same/different judgement task (Treiman & Zukowski, 1991) can was used to measure the development of phonological awareness at syllable, onset-rime and phoneme level. In this thesis, phonological awareness was measured only at the phoneme level. However, research has shown that young English children are more sensitive to the larger linguistic units (e.g. onset and rime). If tasks that assess phonological awareness at the larger units are used then it would be expected that their contribution in the regression analysis would be evident. For example, Hanley et al. (2004) showed that phonemic tasks were more closely related to reading ability of Welsh children, whereas rhyme judgement ability was the best predictor of English-speaking children. If further research is carried out in Albanian it is expected that Albanian-speaking children will perform at a level similar to the Welsh-speaking children.

In order to have reliable and valid conclusions from regression analysis results, a large number of participant is required, especially if there is a large number of independent variables. Tabachnick and Fidell (2001) recommend the following formula to work out the required sample size for multiple regression analysis: $N = 50 + 8m$, where m is the number of Independent Variables (IV). Thus, if there are 10 IVs, then necessary the sample size would be 130 [50 +(8)(10)=130]. The current thesis examined the contributions of phonological and orthographic skills to literacy. However, if the causal relationship between these skills and reading/spelling is to be further examined a longitudinal study would be required. This type of study would make it possible to investigate which levels of phonological awareness predict later reading and spelling development. This would provide more evidence as to whether the developmental literacy models of Frith (1985) and Ehri (1997, 1999) apply to highly transparent orthographies such as Albanian, as well as they apply to deep orthographies such as English.

To date, evidence of dyslexia in Albanian has not yet been presented. This, however, does not indicate that reading and spelling difficulties do not exist in the very transparent orthography of Albanian. Hoxhallari (2000) interviewed experienced primary school teachers in Albania. Many of them had come across children who had excellent general intelligence and social skills but could never do well even in 'easy' reading and spelling tasks. Furthermore, Paulesu et al.s' (2001) neuroimaging findings strongly suggest a case for the universality of dyslexia, and how orthographic transparency may help dyslexic children during their literacy development. However, whilst the neuroimaging studies suggest a universal basis for dyslexia (Paulesu et al., 2001), behavioural studies suggest that the nature and prevalence of dyslexia might differ between orthographies (Landerl et al., 1997). Wimmer (1993), for example, found that German-speaking dyslexic children did not show accuracy but speed deficits. The development ofdyslexia screening tools for Albanian is important. If these tools are successful in identifying dyslexic children, the next step would be to examine where there is there evidence for reduced incidence in Albanian.

Orthographic depth is not the only factor that affects literacy. According to researchers like Duncan and Seymour (2000) and Lundberg (2002), Social Economic Status (SES) is one of the main variables that affect literacy development. Albanian children are greatly disadvantaged to their British counterparts as they come from schools in a country which is a much less wealthy than Britain, with concomitantly fewer resources to invest in education and health. In countries with strong economies and high levels ofhealth and adult literacy, most students become competent readers (Elley, 1994). Limited access to written materials and parental involvement in literacy support can seriously affect the initial steps of literacy development, and may easily outstrip any facilitating effects of orthographic transparency.

Children examined in this thesis were taught by different teachers, in different schools, in different countries. Indeed, it is extremely difficult to balance teaching methods and environments across countries. It is advantageous that the English and Welsh data came from the same region of Wales. Nevertheless, their ethos may be very different from the Albanian education style. The main aim of this thesis was to examine reading and spelling development of children learning to read and write in Albanian because research of this nature does not yet exist. The main achievement of the present research was that a start in this new research field concerning Albanian has been made. This is only the beginning and the methodologies used need further improvement. However, despite cultural, educational, socio-economic differences across countries it is important to make every possible effort to carry out cross-linguistic comparisons. It was equally important to compare the Albanian language findings to other orthographies. In this thesis Albanian children were compared with

English and Welsh children. By carrying out such comparisons the Albanian findings are brought closer to the ongoing cross-linguistic research happening in different countries. Furthermore, by comparing Albanian literacy development with the pattern of development in English- and Welsh-speaking children it is possible to provide further support for the universality of theories of literacy development.

Finally, it is the aim of the author of this thesis to make the Albanian Ministry of Education aware of the current research findings and challenge their decision to prescribe a whole-word (Global) teaching method of reading. Given the extreme bi-directional transparency of the Albanian orthography, this teaching method is unreasonable. Phonics based teaching methods would be more practical in teaching literacy.

8.5. Final conclusions

To conclude, the findings of this thesis suggest that orthographic transparency affects the development of reading and spelling abilities. However, the current research has several methodological problems which substantially weaken the validity of the conclusions. In addition, cultural, sociological and educational factors which were not measure here may easily outstrip any facilitating effects of orthographic transparency.

1- Orthographic depth affects the reading accuracy of young children. Albanian children could read more words of their language than either Welsh or English children.

2- Orthographic transparency affects the reading strategy of young children. Evidence from reading error types and word length effect suggest that Albanian and

Welsh children seem to rely more on alphabetic decoding whereas English children seem to rely more on partial visual analysis. But word length effect and log10 frequency are confounded hence, one cannot be entirely sure that there are distinct strategy differences.

3- Orthographic transparency affects the spelling accuracy of young children. Albanian children could spell more words of their language than either Welsh or English children.

4- Orthographic transparency affects the spelling strategies of young children. Children learning to spell in bi-directionally transparent orthographies like Albanian may use letter names and rely on the perfect sound-letter correspondences for spelling more often than children learning to spell in more opaque orthographies. Different to spellers of less transparent orthographies, Albanian children may continue to use sound-letter correspondences even for skilled spelling. Children learning to spell in deep orthographies may rely on spelling by analogy based on larger word units (e.g. onset and rime).

5- Orthographic transparency affects the awareness of the structure of the spoken language. Albanian children's phonemic skills develop very fast in comparison to English children, with Welsh children being in between the two. English children seem to make use of word-specific orthographic representations effectively. Two major problems undermine this conclusion. The NWR and NWS tasks for English contained items with illegal letter combinations. NWR is further confounded because it is a time limited test and it fails to distinguish between slow and accurate and a fast and inaccurate reading strategy.

6- Orthographic transparency affects the contribution of sub-skills to reading development—the deeper the orthography, the larger the contribution of orthographic skill to reading development. Whilst the contribution of phonological skills to early reading skill was evident in all three languages, in Albanian and Welsh the contribution of orthographic skill increases over time but is secondary to phonological skills. For English children orthographic skill was the most important contributor of reading for the oldest age-group. However, the Wordchains task is more of a reading task than orthographic skills task thus failing to properly measure orthographic skills. Furthermore, the NWR and NWS tasks for English contained items with illegal letter combinations. These limitations also apply to the conclusion below.

7- Orthographic transparency affects the contribution of sub-skills to spelling development. Phonological tasks were the best predictor of early spelling in all three languages examined. The contribution of the Wordchains task (orthographic skills) was the best predictor of skilled spelling for the English sample, but did not appear as a predictor in any of the Albanian age-groups. Hence, in orthographies where the phoneme-grapheme rules are consistent, relying on a phonological recoding strategy when spelling seems to be a sensible strategy even in skilled spelling. In deep orthographies reliance on letter names alone will not produce the correct spelling; reliance on word-specific knowledge may be necessary.

8- It is suggested that further literacy development research is needed particularly in Albanian where research of this kind is non-existent.

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Appendices

Appendix 1

Albanian, Welsh and English Log10 frequencies and percentages of children who correctly read the words aloud.

Test Word number	Albanian			Welsh			English		
	Word	Log10 frequency	% read correct	Word	Log10 frequency	% read correct	Word	Log10 frequenc y	% read correct
1	të 'you'	4.83	95	yn 'in'	4.74	95	the	4.78	100
2	e 'of'	4.83	100	y 'the'	4.65	100	of	4.48	85
3	në 'in'	4.78	100	i 'to'	4.51	100	and	4.46	100
4	dhe 'and'	4.73	90	a 'and'	4.51	100	a	4.67	100
5	i 'of'	4.69	100	o 'from'	3.99	100	to	4.30	100
6	që 'that'	4.64	100	ar 'on'	4.42	100	in	4.27	100
7	për 'for'	4.59	100	ei 'his/her'	4.19	100	it	4.05	100
8	me 'with'	4.54	100	yr 'the'	4.16	85	i	4.04	100
9	një 'one'	4.49	100	ac 'and'	3.95	100	is	3.97	100
10	nga 'from'	4.44	90	oedd 'was'	4.15	100	he	3.95	100
11	ka 'has'	4.40	100	bod 'to be'	4.06	100	that	3.88	100
12	më 'more'	4.35	95	mae 'is'	3.96	100	with	3.84	100
13	se 'that'	4.30	100	am 'about'	3.88	100	be	3.79	100
14	është 'is'	4.25	95	ond 'but'	3.78	95	at	3.75	100
15	do 'want'	4.15	100	eu 'their'	3.72	75	was	3.73	100
16	nuk 'not'	4.11	90	fel 'like'	3.69	95	not	3.71	90
17	së 'by'	4.06	95	â 'with'	3.60	100	this	3.68	100
18	u 'to them'	4.01	100	ni 'us'	3.54	100	by	3.64	95
19	por 'but'	3.96	100	ôl 'back'	3.45	85	from	3.62	100
20	edhe 'and'	3.91	100	nid 'not'	3.40	100	we	3.56	100
21	ai 'he'	3.86	90	dim 'nothing'	3.36	100	there	3.53	85
22	si 'how'	3.82	100	iawn 'very'	3.32	95	if	3.48	95
23	tij 'his'	3.77	95	mawr 'big'	3.29	100	as	3.44	100
24	kanë 'have'	3.72	100	fy 'my'	3.26	75	out	3.40	85
25	po 'yes'	3.67	100	trwy 'through'	3.21	65	them	3.37	95
26	duke 'whilst'	3.62	90	nhw 'them'	3.17	90	has	3.33	100
27	janë 'are'	3.57	95	rhaid 'have to'	3.15	95	then	3.27	100
28	kishte 'had'	3.53	100	chi 'you' (formal)	3.11	100	now	3.24	85
29	shumë 'many'	3.48	100	meddai 'said he'	3.07	100	people	3.16	85
30	këtë 'this'	3.48	100	plant 'children'	3.01	95	any	3.10	75
31	ta 'them'	3.43	95	bach 'small'	2.98	100	don't	3.05	100

32	prej 'from'	3.38	95	eto 'again'	2.94	100	over	3.00	85
33	gjithë 'all'	3.33	95	dwy 'two'	2.89	45	never	2.95	95
34	qenë 'were'	3.28	80	blwyddyn 'year'	2.84	90	going	2.90	95
35	sipas 'according'	3.24	100	nifer 'many'	2.80	85	how	2.86	90
36	disa 'some'	3.19	95	pethau 'things'	2.77	95	same	2.82	65
37	ne 'we'	3.14	80	arno 'on it'	2.73	85	though	2.76	20
38	para 'before'	3.09	85	cyfarfod 'meeting'	2.69	60	himself	2.71	95
39	deri 'until'	3.04	95	bore 'morning'	2.66	100	much	2.61	100
40	jetë 'life'	3.00	95	newid 'to change'	2.62	95	seen	2.58	90
41	kam 'have'	2.95	100	dosbarth 'class'	2.59	100	moment	2.52	60
42	policisë 'of the police'	2.90	75	cwmni 'company'	2.55	80	political	2.48	5
43	ose 'or'	2.85	95	union 'exactly'	2.52	70	itself	2.45	95
44	cilët 'who'	2.80	85	ambell 'some'	2.48	90	I'll	2.41	95
45	mënyrë 'maner'	2.75	70	gellid 'one can'	2.44	75	education	2.37	15
46	tjerë 'others'	2.71	75	gweithredu 'to operate'	2.40	55	use	2.33	80
47	nëpër 'through'	2.66	85	siwr 'sure'	2.36	40	particular	2.29	5
48	o 'o' - like in: o God	2.61	100	cylch 'cirlce'	2.32	85	short	2.26	75
49	lidhur 'connected'	2.56	85	helpu 'to help'	2.28	90	information	2.22	30
50	jenë 'are'	2.51	90	cariad 'love'	2.25	90	rate	2.15	45
51	deklaruar 'declared'	2.46	45	cefais 'i had'	2.21	90	find	2.11	75
52	rast 'case'	2.42	85	cymuned 'community'	2.17	45	thought	2.07	60
53	Jezu 'Jesus'	2.37	95	cymharu 'to compare'	2.14	60	arms	2.03	70
54	ditët 'days'	2.32	65	croes 'cross'	2.10	65	found	1.98	75
55	ati 'father'	2.27	65	cefnogaeth 'support'	2.06	40	complete	1.94	60
56	vrarë 'killed'	2.22	75	coeden 'tree'	2.02	85	costs	1.89	45
57	bëra 'did'	2.17	55	gwragedd 'wives'	1.98	55	top	1.85	85
58	gjithnjë 'always'	2.13	80	llinell 'line'	1.94	90	progress	1.81	20
59	komisariatit 'of the commissariat'	2.08	25	cenedlaetholdeb 'nationalism'	1.89	15	quick	1.77	65
60	Rakipi - Albanian name	2.03	75	medr 'metre'	1.84	65	protection	1.73	10
61	prokurori 'prosecutor'	1.98	60	ynghynt 'before'	1.79	20	accident	1.69	20
62	yt 'yours'	1.93	80	ardderchog 'excellent'	1.75	60	typical	1.63	10
63	firmosur 'signed'	1.88	70	daliai 'hold'	1.70	50	cheap	1.59	60
64	rrethit 'of the cirlce'	1.84	85	tei 'tie'	1.64	60	title	1.53	35
65	mal 'mountain'	1.79	90	goblygiadau	1.59	25		1.49	40

				'implications'			enterprise		
66	njihet 'get to know'	1.74	60	dwsin 'dozen'	1.53	60	cheque	1.45	0
67	lashtë 'ancient'	1.69	70	awgrymir 'it is suggested'	1.48	20	procedure	1.38	10
68	datë 'date'	1.64	75	caeodd 'shut'	1.41	40	poetry	1.32	25
69	qëndrimi 'the stay'	1.59	70	cyfeiriwyd 'referred'	1.34	15	perception	1.26	0
70	personale 'personal'	1.55	60	amserau 'times'	1.28	30	acute	1.20	20
71	paguajë 'to pay'	1.50	65	awgrymog 'suggestive'	1.20	25	restraint	1.11	0
72	flasim 'speak'	1.45	75	datblygwyd 'developed'	1.11	5	monetary	1.04	15
73	organizatë 'organisation'	1.40	45	trefol 'town-like'	1.00	45	sound	0.95	35
74	prodhimit 'production'	1.35	60	prydyddion 'poets'	0.90	20	bliss	0.90	25
75	varrit 'grave'	1.30	75	segurdod 'idleness'	0.78	15	outrage	0.78	30
76	verifikuar 'verify'	1.26	60	babandod 'infancy'	0.70	5	echoing	0.70	15
77	s'është 'isn't'	1.21	75	melltithio 'to curse'	0.48	25	blind	0.60	25
78	ndan 'separate'	1.16	70	grymuster 'power'	0.30	30	attache	0.48	0
79	valën 'wave'	1.11	80	moliannau 'to praise'	0.00	35	cryptic	0.30	0
80	gjashtëdhjetë 'sixty'	1.06	65	achwynwr 'complainant'	0.00	15	marigolds	0.00	15
81	liderit 'lider'	1.01	65	pechai 'to sin'	0.00	15	precipitously	0.00	0
82	mjegull 'fog'	0.97	80	pegiau 'pegs'	0.00	30	gourmet	0.00	0
83	thelluar 'deepened'	0.92	55	esgeulusai 'would neglect'	0.00	10	guitars	0.00	5
84	grindjet 'quarrellings'	0.87	65	maindy 'stone-cottage'	0.00	25	punctuated	0.00	0
85	përhershme 'permanent'	0.82	25	ymyriadau 'retirement'	0.00	20	distinctively	0.00	0
86	deklarimi 'declaration'	0.77	75	socedi 'sockets'	0.00	25	subtraction	0.00	5
87	premtimeve 'promises'	0.72	70	nodweddwyd 'was'	0.00	20	occurrences	0.00	0
88	klani 'klan'	0.68	80	troisai 'would turn'	0.00	10	resignedly	0.00	0
89	llum 'sludge'	0.63	80	rhifais 'i numbered'	0.00	30	disgusted	0.00	0
90	rivalitet 'rivalry'	0.58	60	gweinydd 'waiter'	0.00	20	governorship	0.00	5
91	numrash 'numbers'	0.53	70	ddi-amod 'unconditional'	0.00	25	architecturally	0.00	0
92	mirënjohjeje	0.48	10	ymneilltuad	0.00	10		0.00	5

	'gratefulness'			'retirement'			fiercer		
93	servilizmi 'servility'	0.43	45	tanseiliwyd 'was undermined'	0.00	20	nightingale	0.00	5
94	milleniumit 'millennium'	0.39	30	torgest 'rupture'	0.00	15	antechamber	0.00	0
95	nishan 'mole'	0.34	75	talwch 'pay'	0.00	30	moron	0.00	0
96	parakalimin 'parade'	0.19	80	gogledd-gorllewinol 'north-western'	0.00	20	militaristic	0.00	0
97	tepërtit 'excess'	0.14	55	trwmbal 'lorry trailer'	0.00	20	slung	0.00	5
98	imperialiste 'imperialist'	0.10	40	dychwela 'would return'	0.00	15	maxims	0.00	5
99	lëvdoni 'worship'	0.05	65	cywydd-un-cwpled 'type of welsh peotry'	0.00	5	marquees	0.00	0
100	shkumës 'chalk'	0.00	80	treigla 'mutate'	0.00	25	moped	0.00	5

(log10 frequencies Albanian $M = 2.475$, $SD = 1.402$; English $M = 2.058$, $SD = 1.459$; Welsh $M = 2.0678$, $SD = 1.453$)

Appendix 2

NWR and NWS items (Pilot Study).

	Nonword reading items	*Nonword spelling items*
1	fyj	nëk
2	vët	dut
3	byr	fët
4	mëj	ubë
5	nun	suj
6	soç	kir
7	nas	per
8	zeg	lyg
9	jom	aly
10	bep	tiç
11	hykë	ëktë
12	këma	deqë
13	padë	pigë
14	divu	pazi
15	dyfë	fahë
16	bëkë	pana
17	tebë	këzë
18	dida	murd
19	furd	vege
20	mubi	bati

Appendix 3

Blending and segmenting tasks

Blending task items	*Segmenting task items*
p a s	kjo
a t a	atë
k u r	unë
u j ë	dua
k u d o	kokë
f o r t	duar
t o k ë s	forcë
k o n t r o ll	ndeshjen
m i n u t ë n	shpresën
sh k e n c o r	shtëpive
d i r i gj e n t	përleshjet
rr e g u ll i m e	rreptësinë
d e gj e n e r i m	murmurimash
m b ë sh t i ll e n	allishverishet
sh t r ë n g i m e v e	kundërshtarësh
sh p ë r q ë n d r i m	gjakftohtësinë

Appendix 4

Orthographic Awareness Task

stal	mtal
mink	mind
sast	sasf
fleb	dleb
kbad	mbad
bilt	bilm
çfav	cfav
liks	likv
gnen	gren
bent	bemt
skep	spep
paft	pafb
parg	rapg
zakm	zakt
lbom	blom
zken	zben
xnel	nxel

Appendix 5

Rapid Naming Tasks (Pilot Study)

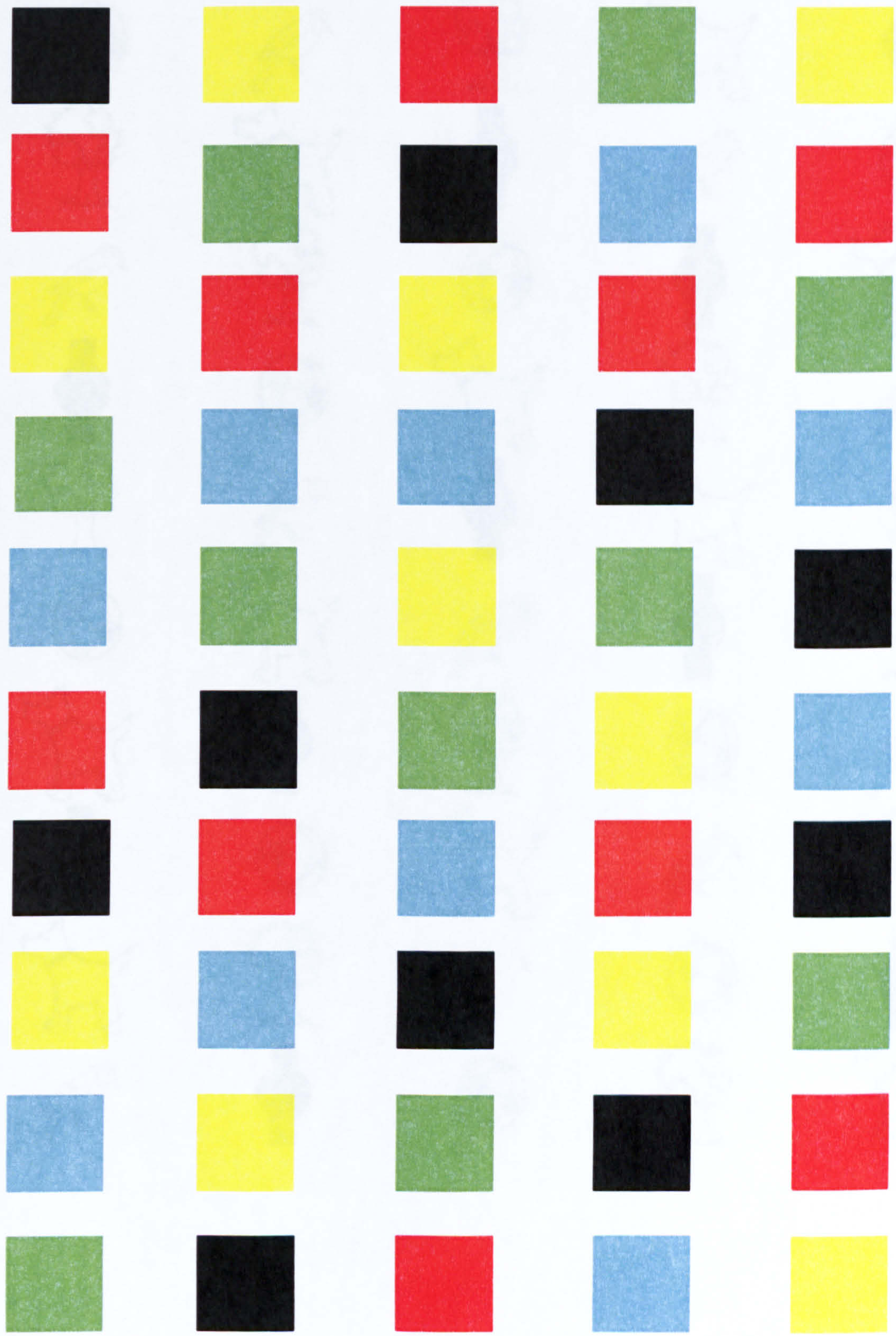
Digits

4	7	9	2	7
9	2	4	7	9
7	9	7	1	2
2	1	9	4	1
1	2	7	2	9
9	4	2	7	1
4	9	1	9	4
7	1	4	7	9
1	7	2	4	1
2	4	9	1	7

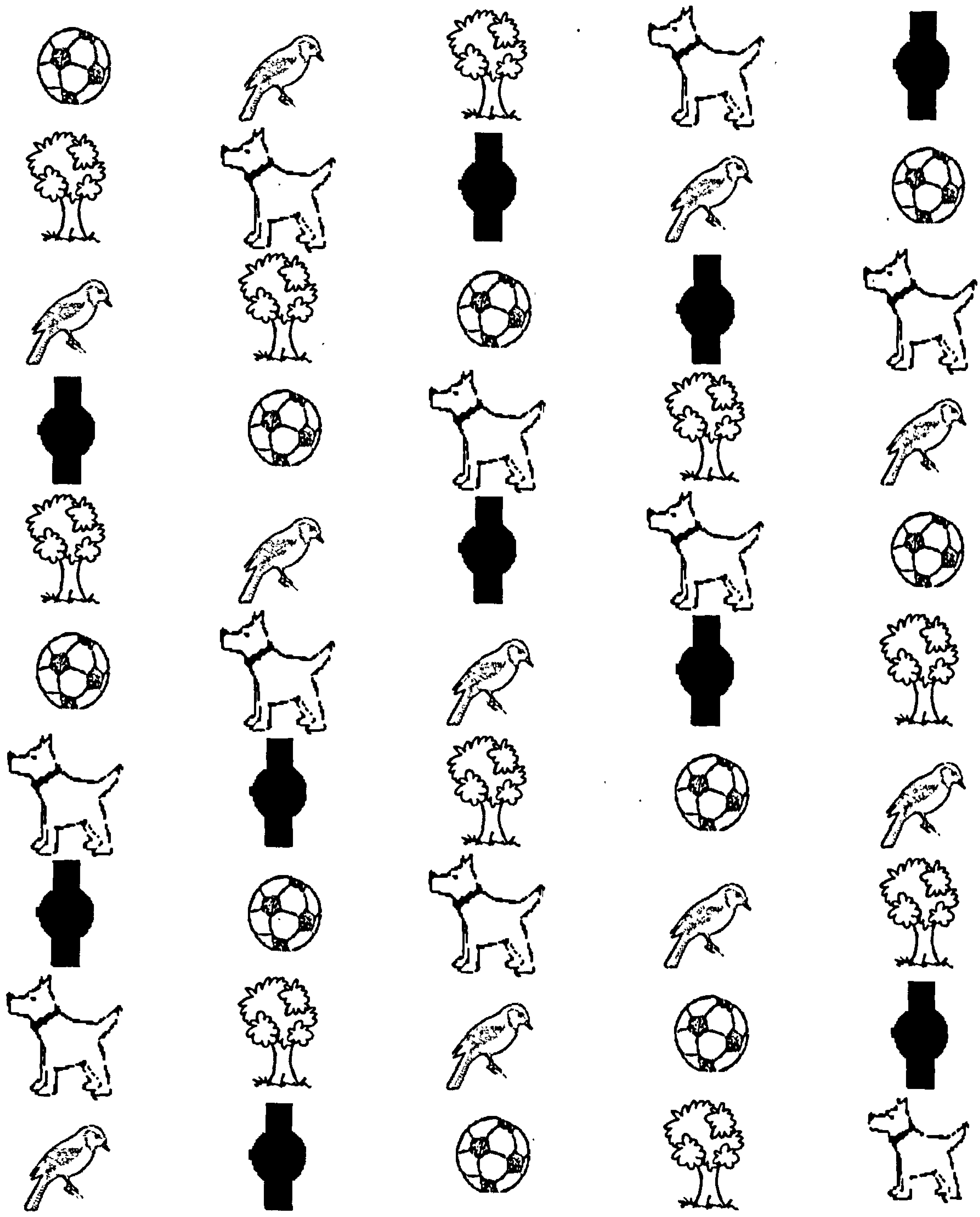
Letter Naming

E	S	A	T	S
A	T	E	S	A
S	A	S	P	T
T	P	A	E	P
P	T	S	T	A
A	E	T	S	P
E	A	P	A	E
S	P	E	S	A
P	S	T	E	P
T	E	A	P	S

Colour naming



Object naming



Appendix 6
BPVS-II in Albanian

Administrimi i Ushtrimit

.1 Fillo duke i pergatitur pjesemarresit me faqet A, B, C, dhe D.
2. Kur fillon nje grup fjalesh perdori te gjitha fjalet
3. Grupi bazor vendoset kur asnje gabim nuk eshte bere ne emertimin e figurave.
4. Perdor Grupin bazor me te ulet per te llogaritur rezultatin perfundimtar.
5. Grupi me te larte vendoset kur tete ose me shume gabime behen ne emertim.
6. Perdor Grupin me te larte per te llogaritur rezultatin perfundimtar.

Gr. 1	Fillo me moshat 2.5-3		Pergjigjia	
1		1		O
2		2		O
3		2		O
4		4		O
5		4		O
6		3		O
7		4		O
8		1		O
9		3		O
10		2		O
11		1		O
12		3		O
	Numuri i gabimeve			

Gr. 2	Fillo me moshat 4-5		Pergjigjia	
13		2		O
14		1		O
15		4		O
16		2		O
17		2		O
18		4		O
19		4		O
20		1		O
21		3		O
22		3		O
23		3		O
24		1		O
	Numuri i gabimeve			

Gr. 3	Fillo me moshat 6-7		Pergjigjia	
25	Paketim	4		O
26	Fruta	1		O
27	Nuhat	3		O
28	Shigjetë	1		O
29	Mësues	2		O
30	Plot	3		O
31	Arri	4		O
32	Ushtrim fizik	4		O
33	Monedhë	2		O
34	Kthetra	1		O
35	Mat	2		O
36	Qërim	3		O
	Numuri i gabimeve			

Gr. 4	Fillo me moshat 8-9		Pergjigjia	
37	dajre	1		O
38	kwshtjellw	2		O
39	dry	4		O
40	teleskop	3		O
41	pikon	2		O
42	gjigante	3		O
43	me push	4		O
44	vrimw hunde	1		O
45	rrwnjw	1		O
46	perime	3		O
47	zhytje	2		O
48	lwng	4		O
	Numuri i gabimeve			

Gr. 5	Fillo me moshat 10		Pergjigjia	
49	bagazh	3		O
50	dentist	3		O
51	nuselalw	2		O
52	twrheqje	1		O
53	koshere	1		O
54	e gwzuar	4		O
55	glob	3		O
56	i inatosur	4		O
57	mocal	1		O
58	kamarjer	2		O
59	tablw e qitjes	2		O
60	shqiponjw	4		O
	Numuri i gabimeve			

Gr. 6	Fillo me moshat 11		Pergjigjia	
61	palw	2		O
62	vjen	4		O
63	gypor	2		O
64	interviston	1		O
65	hungwrim	1		O
66	ilac	4		O
67	bishtajw	1		O
68	drith	4		O
69	pedale	3		O
70	grabitqar	2		O
71	ballkon	3		O
72	ndot	3		O
	Numuri i gabimeve			

Gr. 7	Fillo me moshat 12		Pergjigjia	
73	mirwpritje	4		O
74	bri degw	1		O
75	orbitw	1		O
76	pwrplasje	1		O
77	fryrw	4		O
78	duartrokitur	3		O
79	ushquese	3		O
80	pershtatet	2		O
81	mbikafkw	2		O
82	zvarranik	2		O
83	rringjallje	3		O
84	lidh	4		O
	Numuri i gabimeve			

Gr. 8	Fillo me moshat 13-15		Pergjigjia	
85		2		O
86		2		O
87		3		O
88		1		O
89		2		O
90		3		O
91		1		O
92		3		O
93		4		O
94		4		O
95		1		O
96		4		O
	Numuri i gabimeve			

Gr. 9	Fillo me moshat 16-21		Pergjigjia	
97		4		O
98		3		O
99		2		O
100		4		O
101		3		O
102		2		O
103		4		O
104		3		O
105		1		O
106		2		O
107		1		O
108		1		O
	Numuri i gabimeve			

Gr. 10			Pergjigjia	
109		2		O
110		4		O
111		1		O
112		4		O
113		3		O
114		3		O
115		3		O
116		1		O
117		2		O
118		1		O
119		2		O
120		4		O
	Numuri i gabimeve			

Gr. 11			Pergjigjia	
121		1		O
122		2		O
123		2		O
124		3		O
125		4		O
126		1		O
127		1		O
128		2		O
129		3		O
130		4		O
131		4		O
132		3		O
	Numuri i gabimeve			

Gr. 12			Pergjigjia	
133		1		O
134		4		O
135		2		O
136		1		O
137		3		O
138		3		O
139		4		O
140		3		O
141		1		O
142		2		O
143		4		O
144		2		O
	Numuri i gabimeve			

Llogaritja e rrezultatit perfundimtar:

Numuri i fundit i Grupit me te larte ____________

minus gabimet ____________

rrezultati perfundimtar: [ ]

Shenime mbi nxenesin:

Appendix 7

Coloured Progressive Matrices answer sheet.

Emri:						
A 1	1	2	3	4	5	6
A 2	1	2	3	4	5	6
A 3	1	2	3	4	5	6
A 4	1	2	3	4	5	6
A 5	1	2	3	4	5	6
A 6	1	2	3	4	5	6
A 7	1	2	3	4	5	6
A 8	1	2	3	4	5	6
A 9	1	2	3	4	5	6
A 10	1	2	3	4	5	6
A 11	1	2	3	4	5	6
A 12	1	2	3	4	5	6
	1	2	3	4	5	6
AB 1	1	2	3	4	5	6
AB 2	1	2	3	4	5	6
AB 3	1	2	3	4	5	6
AB 4	1	2	3	4	5	6
AB 5	1	2	3	4	5	6
AB 6	1	2	3	4	5	6
AB 7	1	2	3	4	5	6
AB 8	1	2	3	4	5	6
AB 9	1	2	3	4	5	6
AB 10	1	2	3	4	5	6
AB 11	1	2	3	4	5	6
AB 12	1	2	3	4	5	6
	1	2	3	4	5	6
B 1	1	2	3	4	5	6
B 2	1	2	3	4	5	6
B 3	1	2	3	4	5	6
B 4	1	2	3	4	5	6
B 5	1	2	3	4	5	6
B 6	1	2	3	4	5	6
B 7	1	2	3	4	5	6
B 8	1	2	3	4	5	6
B 9	1	2	3	4	5	6
B 10	1	2	3	4	5	6
B 11	1	2	3	4	5	6
B 12	1	2	3	4	5	6

Appendix 8

Generic Speed

A	B
1+1 =____	2-1 =____
2+1 =____	3-2 =____
3+0 =____	4-2 =____
4+1 =____	3-0 =____
2+3 =____	5-2 =____
7+2 =____	8-3 =____
3+5 =____	6-0 =____
0+7 =____	9-2 =____
2+5 =____	7-5 =____
4+3 =____	8-6 =____
6+3 =____	7-4 =____
4+3 =____	8-7 =____
8+1 =____	7-6 =____
1+6 =____	8-3 =____
5+2 =____	6-5 =____
1+7 =____	9-6 =____
4+5 =____	5-1 =____
6+2 =____	6-3 =____
0+9 =____	4-1 =____
2+4 =____	7-4 =____
2+2 =____	9-0 =____
3+1 =____	8-2 =____
1+0 =____	7-3 =____
3+3 =____	1-1 =____
0+2 =____	9-1 =____

Appendix 9

Computerised reading test—Albanian main study (Reading 100)

N.	Words	Rank	Freq/million	Log10Freq	Length	N.	Words	Rank	Freq/million	Log10Freq	Length
1	atë	46	1973	3.30	3	51	banesën	2115	44	1.64	7
2	bërë	54	1757	3.24	4	52	burrat	2294	41	1.61	6
3	mos	56	1680	3.23	3	53	shërbimin	2464	38	1.58	9
4	mbi	59	1467	3.17	3	54	kompanisë	2677	35	1.54	9
5	kështu	66	1328	3.12	6	55	pakta	2915	32	1.51	5
6	te	70	1258	3.10	2	56	lagjes	3112	30	1.48	6
7	mirë	77	1177	3.07	4	57	amerikanët	3335	28	1.45	10
8	duhet	81	1119	3.05	5	58	deti	3585	26	1.41	4
9	kishin	88	1047	3.02	6	59	bëre	3829	24	1.38	4
10	vetë	92	930	2.97	4	60	arrihet	4126	22	1.34	7
11	asnjë	97	869	2.94	5	61	dëshmitarët	4506	20	1.30	11
12	ashtu	101	832	2.92	5	62	shëndetësia	4697	19	1.28	11
13	policisë	107	778	2.89	8	63	sigurojnë	5152	17	1.23	9
14	pjesë	114	719	2.86	5	64	ekzistuese	5421	16	1.20	10
15	ose	118	687	2.84	3	65	kryeqytetas	5733	15	1.18	11
16	ndaj	132	637	2.80	4	66	tregua	6091	14	1.15	6
17	fund	143	578	2.76	4	67	shkelin	6509	13	1.11	7
18	diçka	149	544	2.74	5	68	valën	6963	12	1.08	5
19	siç	158	509	2.71	3	69	bankë	7464	11	1.04	5
20	njeri	171	469	2.67	5	70	liderit	8021	10	1.00	7
21	asgjë	190	437	2.64	5	71	mjegull	8724	9	0.95	7
22	gjëra	207	389	2.59	5	72	studion	8731	9	0.95	7
23	politike	218	367	2.56	8	73	thelluar	9602	8	0.90	8
24	vendin	233	344	2.54	6	74	fik	10567	7	0.85	3
25	keni	255	318	2.50	4	75	antikomuniste	10568	7	0.85	13
26	fare	274	299	2.48	4	76	thesin	11814	6	0.78	6
27	qind	297	274	2.44	4	77	shumtët	11818	6	0.78	7
28	treguar	315	255	2.41	7	78	premtimeve	13364	5	0.70	10
29	veç	335	236	2.37	3	79	padrejta	13370	5	0.70	8
30	jeni	374	220	2.34	4	80	braziliane	15544	4	0.60	10
31	ca	405	204	2.31	2	81	lundrimin	15547	4	0.60	9
32	plot	430	187	2.27	4	82	viç	16467	4	0.60	3
33	koha	462	175	2.24	4	83	rivalitet	18483	3	0.48	9
34	grupi	505	161	2.21	5	84	avarive	18496	3	0.48	7
35	ngritur	546	150	2.18	7	85	profane	18497	3	0.48	7
36	kulturës	603	139	2.14	8	86	gishtërinjtë	18656	3	0.48	12
37	gjashtë	655	129	2.11	7	87	milleniumit	23014	2	0.30	11
38	mendjen	720	120	2.08	7	88	adhuruesit	23019	2	0.30	10
39	vetes	791	111	2.05	5	89	reformatore	23025	2	0.30	11
40	takimin	852	103	2.01	7	90	spikerja	23029	2	0.30	8
41	jashtëm	939	95	1.98	7	91	vatrës	23113	2	0.30	6
42	rritur	1009	88	1.94	6	92	imperialiste	31699	1	0.00	12
43	merren	1089	82	1.91	6	93	adaptimin	31707	1	0.00	9
44	thoni	1193	76	1.88	5	94	çarçafët	31718	1	0.00	8
45	drejtorit	1282	70	1.85	9	95	lëvdoni	31720	1	0.00	7
46	herët	1391	65	1.81	5	96	tremujorit	31726	1	0.00	10
47	shtetin	1506	60	1.78	7	97	vujatur	32629	1	0.00	7
48	vështirësi	1632	56	1.75	10	98	noteri	33981	1	0.00	6
49	munduar	1766	52	1.72	7	99	efikasitet	34517	1	0.00	10
50	anës	1925	48	1.68	4	100	goma	43016	1	0.00	4

Appendix 10

OMRT word items in Albanian, English and Welsh

	Albanian	English	Welsh
1	atë	one	pob
2	mos	only	mai
3	kështu	even	ein
4	mirë	were	daeth
5	kishin	back	cyfer
6	asnjë	also	math
7	policisë	going	gwir
8	ose	I'm	pawb
9	fund	against	dy
10	siç	year	ceisio
11	asgjë	child	ohonynt
12	politike	party	dosbarth
13	keni	lot	sefyllfa
14	qind	car	cymorth
15	veç	business	perthynas
16	ca	coming	arwain
17	koha	paper	pymtheg
18	ngritur	present	tystiolaeth
19	gjashtë	find	byddwch
20	vetes	play	uniongyrchol
21	jashtëm	relationship	ninnau
22	merren	wide	esbonio
23	drejtorit	rain	gyrrwr
24	shtetin	appropriate	hogiau
25	munduar	plenty	dyled
26	banesën	asks	brown
27	shërbimin	Roman	ysbrydion
28	pakta	photographs	gemau
29	amerikanët	medieval	gweddw
30	bëre	risks	hunaniaeth
31	dëshmitarët	objectives	cychod
32	sigurojnë	disarmament	fflamau
33	kryeqytetas	partners	troedfeddi
34	shkelin	prosperity	pelydrau
35	bankë	mornings	arbenigo
36	mjegull	today	copaon
37	thelluar	racing	ffigyrau
38	antikomuniste	disgrace	coediog
39	shumtët	outbreak	postyn
40	padrejta	medicines	amherffaith
41	lundrimin	click	gweinyddiad
42	rivalitet	identities	gwirfoddolodd
43	profane	squinting	dianaf
44	milleniumit	shrimps	harmoni
45	reformatore	fermentation	cynffonnau
46	vatrës	mortuary	newynu
47	adaptimin	docility	difesur
48	lëvdoni	omitted	clinig
49	vujatur	cots	geirda
50	efikasitet	baptized	calliodd

Appendix 11
Spelling test—Albanian main study (Spelling 100)

N.	Words	Rank	Freq/million	Log10Freq	Length	N.	Words	Rank	Freq/million	Log10Freq	Length
1	ju	47	1972	3.29	2	51	njërit	2116	44	1.64	6
2	ku	53	1807	3.26	2	52	specialistëve	2295	41	1.61	13
3	saj	57	1563	3.19	3	53	parlamentit	2462	38	1.58	11
4	tjetër	61	1397	3.15	6	54	ngritjen	2676	35	1.54	8
5	ti	63	1385	3.14	2	55	vullnetit	2918	32	1.51	9
6	herë	68	1305	3.12	4	56	dikujt	3111	30	1.48	6
7	tani	72	1234	3.09	4	57	nënvizoi	3336	28	1.45	8
8	ato	80	1131	3.05	3	58	ngrihej	3569	26	1.41	7
9	ditë	87	1064	3.03	4	59	studimit	3831	24	1.38	8
10	jetë	91	931	2.97	4	60	prodhimit	4125	22	1.34	9
11	kam	96	876	2.94	3	61	qëlloi	4630	20	1.30	6
12	atëherë	102	818	2.91	7	62	kontakt	4698	19	1.28	7
13	atyre	105	799	2.90	5	63	ndanë	5154	17	1.23	5
14	a	111	731	2.86	1	64	mesazhi	5420	16	1.20	7
15	tepër	120	680	2.83	5	65	jetojmë	5730	15	1.18	7
16	vend	134	628	2.80	4	66	përkohësisht	6079	14	1.15	12
17	mënyrë	146	562	2.75	6	67	guxonte	6510	13	1.11	7
18	tek	151	533	2.73	3	68	vlerësimit	6965	12	1.08	10
19	duket	161	500	2.70	5	69	shpinës	7453	11	1.04	7
20	mua	172	469	2.67	3	70	gjeografik	8129	10	1.00	10
21	shqipëri	191	436	2.64	8	71	minoritetit	8728	9	0.95	11
22	o	205	401	2.60	1	72	përbërje	8729	9	0.95	8
23	milionë	220	363	2.56	7	73	afron	9605	8	0.90	5
24	ndër	232	345	2.54	4	74	grindjet	10561	7	0.85	8
25	erdhi	256	318	2.50	5	75	avokatin	10594	7	0.85	8
26	shkurt	272	299	2.48	6	76	rrëzohej	11813	6	0.78	8
27	thanë	298	274	2.44	5	77	reagime	11815	6	0.78	7
28	akoma	314	256	2.41	5	78	lehtësuese	13365	5	0.70	10
29	bë	337	236	2.37	2	79	kurs	13479	5	0.70	4
30	doli	390	211	2.32	4	80	klani	15540	4	0.60	5
31	shqipëria	406	204	2.31	9	81	kufizime	15545	4	0.60	8
32	fjala	431	186	2.27	5	82	dush	15900	4	0.60	4
33	pesë	463	175	2.24	4	83	mirënjohjeje	18485	3	0.48	12
34	krijuar	502	162	2.21	7	84	paskan	18488	3	0.48	6
35	dhjetë	547	150	2.18	6	85	tabelën	18623	3	0.48	7
36	mi	604	138	2.14	2	86	lirojë	18625	3	0.48	6
37	ndodhet	657	129	2.11	7	87	nishan	23015	2	0.30	6
38	s'ishte	723	119	2.08	7	88	binjakëzim	23021	2	0.30	10
39	zyrtare	788	111	2.05	7	89	eliminohej	23028	2	0.30	10
40	pashë	854	103	2.01	5	90	pushtuesve	23031	2	0.30	10
41	prokurori	938	95	1.98	9	91	quash	26525	2	0.30	5
42	dera	1010	88	1.94	4	92	marrdhënie	31703	1	0.00	10
43	pastër	1097	82	1.91	6	93	botanikën	31714	1	0.00	9
44	fytyra	1192	76	1.88	6	94	përsëdrejti	31715	1	0.00	11
45	opozita	1283	70	1.85	7	95	pijes	31722	1	0.00	5
46	dakord	1393	65	1.81	6	96	tratativë	31806	1	0.00	9
47	pësuar	1505	60	1.78	6	97	gjëmime	32565	1	0.00	7
48	premtuar	1631	56	1.75	premtuar	98	mbedhja	33318	1	0.00	7
49	fshatrat	1772	52	1.72	fshatrat	99	bojkotojnë	35079	1	0.00	10
50	projektet	1927	48	1.68	projektet	100	bujk	47986	1	0.00	4

Appendix 12
NWR and NWS items in Albanian, English and Welsh

	NWR				NWS		
	Albanian	English	Welsh		Albanian	English	Welsh
1	kund	shen	wawn	1	tenë	ento	han
2	mipas	rour	mefyd	2	pisa	nery	pyd
3	ry	bur	ona	3	ge	phese	wrall
4	cara	tay	ys	4	gundit	hont	mun
5	neri	sver	arbyn	5	rili	ots	ceth
6	pje	mears	ra	6	pësaj	shose	tach
7	lëtij	fes	myna	7	thofë	zere	cwlad
8	shqiptake	kway	oeth	8	fasur	aff	istod
9	cemi	geally	symdeithas	9	ie	sithout	sifer
10	erte	phat's	orno	10	fjerë	timself	grwy
11	shriptar	dater	ffyfr	11	kolicia	pind	penedlaethol
12	nitur	enow	dymud	12	gënë	hoint	claid
13	menë	thole	lunain	13	gjeriu	gumber	muag
14	kjalët	paking	pylid	14	njetur	nirl	nytrach
15	siti	froblems	hweithredu	15	mbali	jouldn't	igos
16	fryesore	zay	caratoi	16	irën	jable	hais
17	kërgjithshme	bown	ryson	17	pime	dentre	cwreiddiol
18	vua	iun	edynt	18	njer	gark	certhyn
19	gjënuar	ghat's	ewnebu	19	kuhet	shought	awrop
20	igali	yone	craf	20	da	potal	lynradd
21	troblemi	srice	byrhaeddodd	21	getit	dractice	lant
22	baktuar	ottitude	tapus	22	samilja	mutting	edlewyrchu
23	billuan	ley	bwyrdd	23	trojekt	glant	ewyddus
24	qotel	efrican	grannoeth	24	bajmëruar	plow	lynged
25	fritej	gareer	bweithgor	25	tërfundim	flosely	proesawu
26	eutori	sroops	engau	26	pregut	tixture	dynhyrchiad
27	neprën	termanent	hodloni	27	gutbollistët	nersion	ryfarwyddyd
28	bjecarit	hootball	bynigir	28	lapim	gelps	ernoch
29	poganës	apent	tur	29	dlasim	tassed	garluniau
30	zoli	ippointment	emylon	30	linjve	swareness	sylif
31	renoncimi	kuice	gaearyddol	31	shkumrinit	hactories	ryll
32	xhohësh	firculation	cystion	32	ozoluar	pentally	ffwim
33	klumba	drey	thwedloniaeth	33	shpëfojnë	fispatch	emgueddfa
34	tisin	quess	emdrechu	34	gejfin	roodland	etgasedd
35	gjakëdhjetë	gupplies	irdalwyr	35	findikata	pourteen	edwaenir
36	tranvera	panks	syfyngiadau	36	tënvizuar	jates	lyrd
37	senduan	plare	ecer	37	bryezat	flose	beryddwyr
38	tëmshme	bolicitors	owdures	38	kero	pounts	sludiog
39	arpëtimet	atimulating	terchog	39	dreskët	zary	esbrydiaeth
40	ndërmjekësimi	heriodically	pwrol	40	fanceri	gennies	egosau
41	tollëzat	jame	senchwiban	41	fyjet	dolder	toethach
42	ponvikt	snock	prwydrais	42	pumrash	yomes	pwatwar
43	zbucja	gisgivings	lamddefnyddio	43	zigurshëm	umbryo	tarwr
44	dervilizmi	pilken	salwyni	44	kërcaktojmë	gisappointments	bylchlythyron
45	ponetikes	reekdays	bwrthbwyso	45	elibinohej	pautions	ffosgfynydd
46	deqësohet	tapt	llitrwydd	46	zereku	onns	morffwysfa
47	prespigjatori	kolish	draffach	47	biguruan	scrimonious	prefwyr
48	shtumës	jinfulness	sapiwr	48	bargësitë	deaked	leidiant
49	faraparë	thoked	byfreithloni	49	bobilizoi	jupervisory	coteri
50	lizgjedhur	strocity	tled	50	vasqyrim	tid	ersyllu

Appendix 13

CPM Answer Sheet: Main study

A 1			AB 1			B 1	
A 2			AB 2			B 2	
A 3			AB 3			B 3	
A 4			AB 4			B 4	
A 5			AB 5			B 5	
A 6			AB 6			B 6	
A 7			AB 7			B 7	
A 8			AB 8			B 8	
A 9			AB 9			B 9	
A 10			AB 10			B 10	
A 11			AB 11			B 11	
A 12			AB 12			B 12	

Appendix 14

Rapid naming tasks: Main study

Letters

E	T	S	A	P
S	E	T	P	A
A	S	A	T	P
S	P	E	P	T
T	A	P	E	S
P	T	A	A	E
T	S	P	S	A
P	E	S	T	T
E	A	E	S	E
A	P	T	E	S

Digits

2	3	1	5	8
1	2	3	8	5
5	1	5	3	8
1	8	2	8	3
3	5	8	2	1
8	3	5	5	2
3	1	8	1	5
8	2	1	3	3
2	5	2	1	2
5	8	3	2	1

Numerals: Albanian

një	pesë	dy	pesë	tre
tre	dy	pesë	një	pesë
pesë	një	një	tre	dy
tetë	tetë	tre	dy	një
dy	tre	tetë	pesë	tetë
pesë	dy	një	tetë	pesë
një	pesë	tre	tre	dy
tre	tetë	dy	tetë	një
dy	tre	tetë	një	tetë
tetë	një	pesë	dy	tre

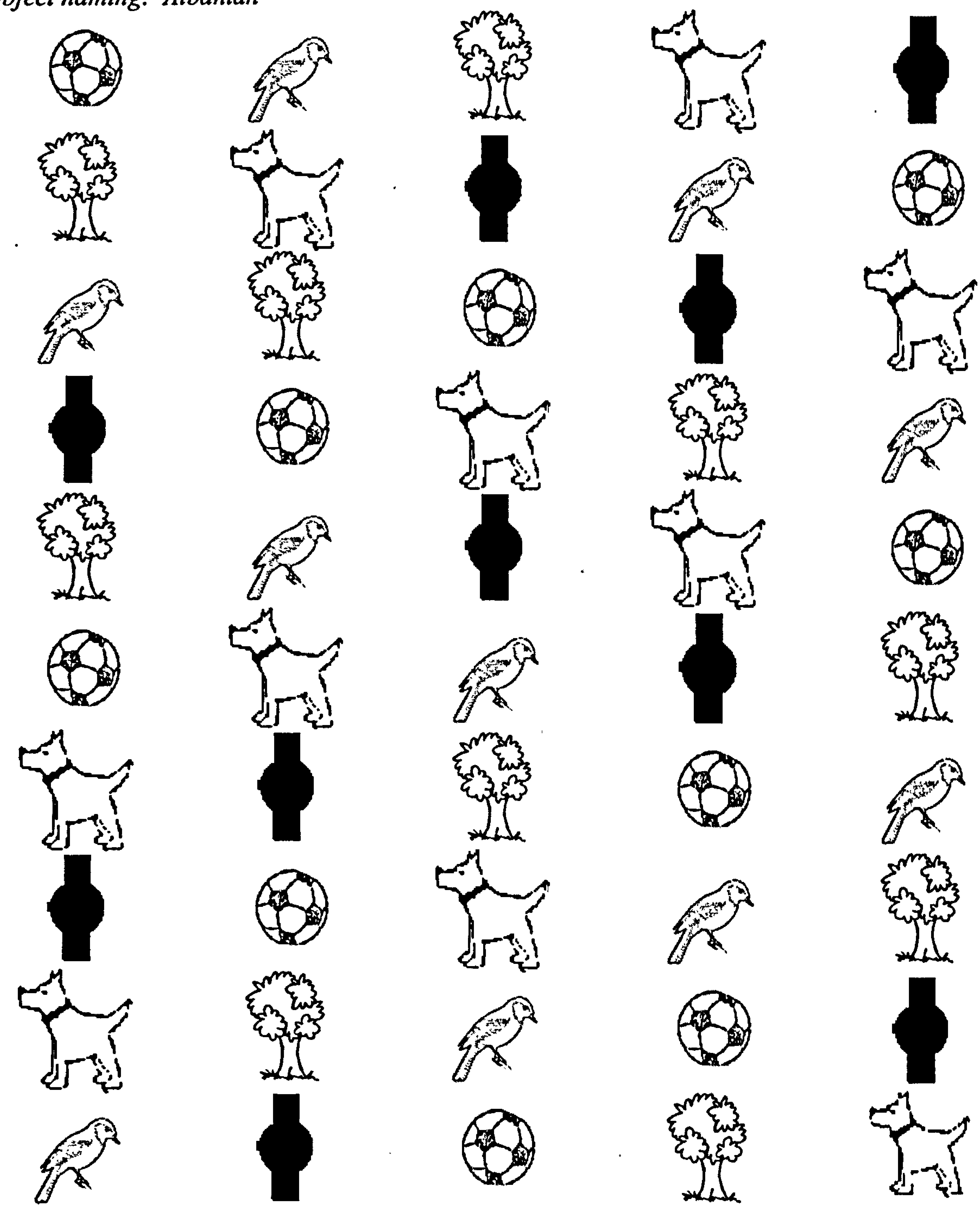
Numerals: English

one	five	two	five	three
three	two	five	one	five
five	one	one	three	two
eight	eight	three	two	one
two	three	eight	five	eight
five	two	one	eight	five
one	five	three	three	two
three	eight	two	eight	one
two	three	eight	one	eight
eight	one	five	two	three

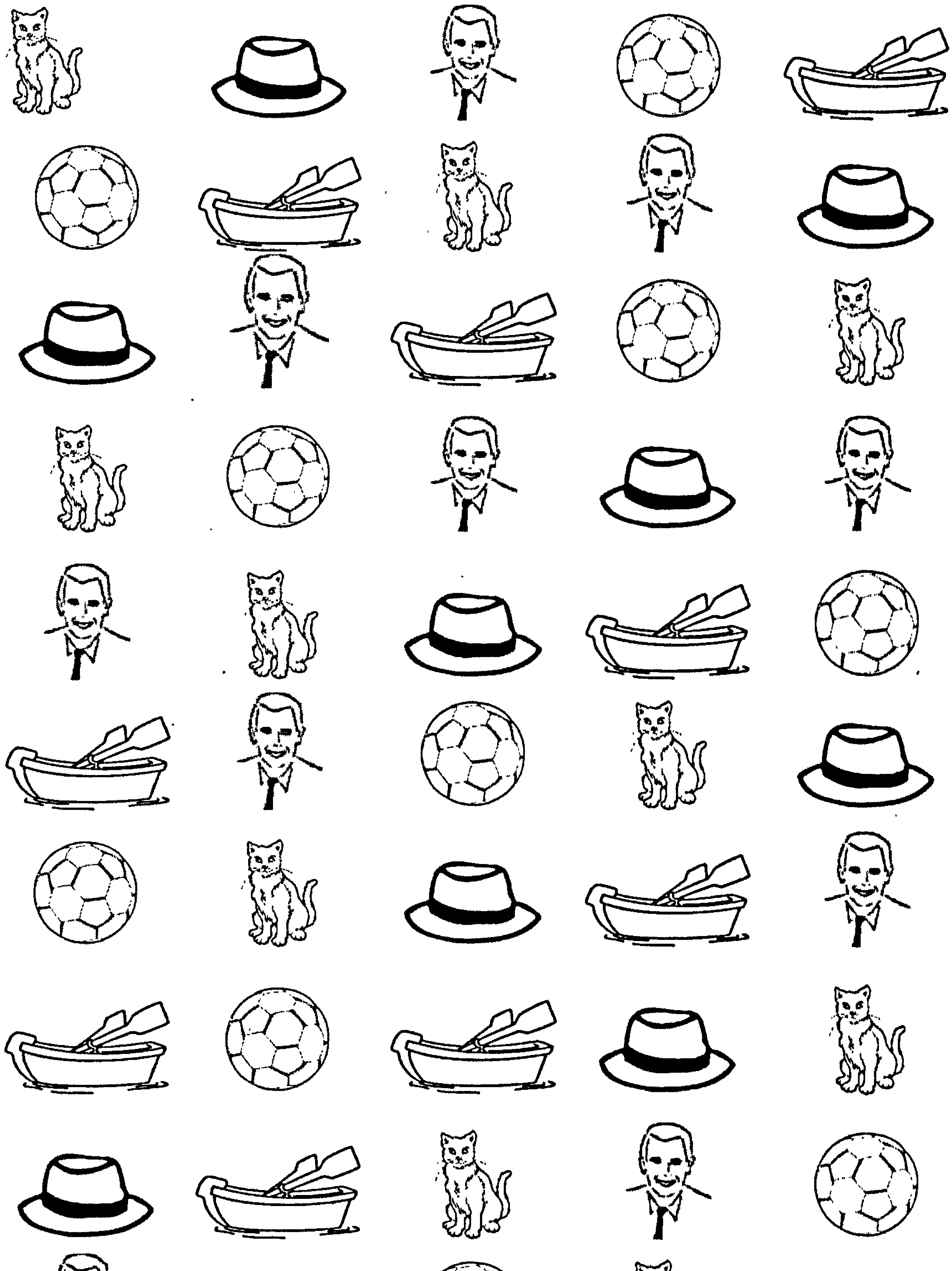
Numerals Welsh

un	pump	dau	pump	tri
tri	dau	pump	un	pump
pump	un	un	tri	dau
wyth	wyth	tri	dau	un
dau	tri	wyth	pump	wyth
pump	dau	un	wyth	pump
un	pump	tri	tri	dau
tri	wyth	dau	wyth	un
dau	tri	wyth	un	wyth
wyth	un	pump	dau	tri

Object naming: Albanian



Object naming: English and Welsh



Word Picture naming: Albanian

top	zog	qen	orë	pemë
qen	top	zog	pemë	orë
orë	qen	orë	zog	pemë
qen	pemë	top	pemë	zog
zog	orë	pemë	top	qen
pemë	zog	orë	orë	top
zog	qen	pemë	qen	orë
pemë	top	qen	zog	zog
top	orë	top	qen	top
orë	pemë	zog	top	qen

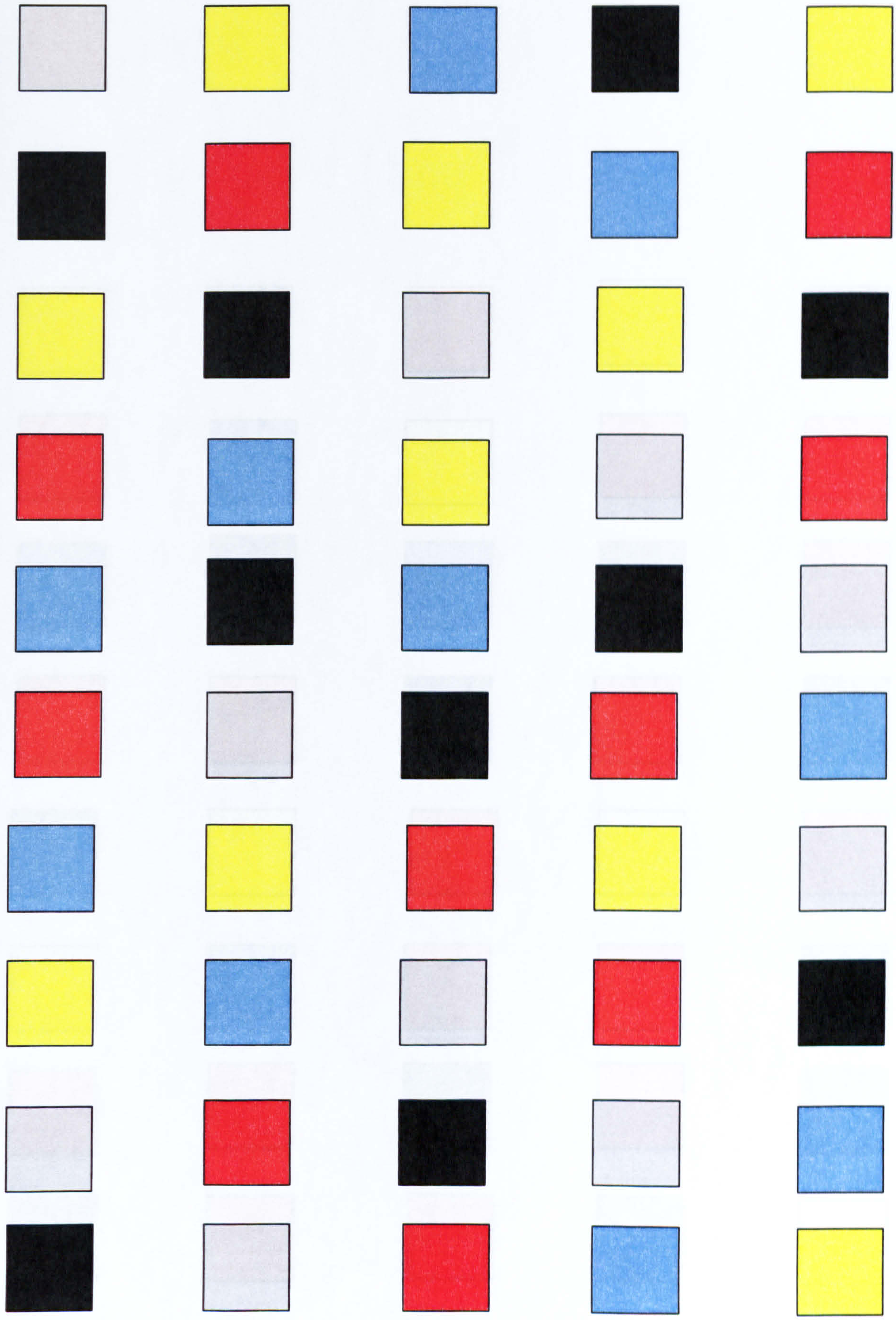
Word Picture naming: English

ball	boat	cat	man	hat
cat	ball	boat	hat	man
man	cat	man	boat	hat
cat	hat	ball	hat	boat
boat	man	hat	ball	cat
hat	boat	man	man	ball
boat	cat	hat	cat	man
hat	ball	cat	boat	boat
ball	man	ball	cat	ball
man	hat	boat	ball	cat

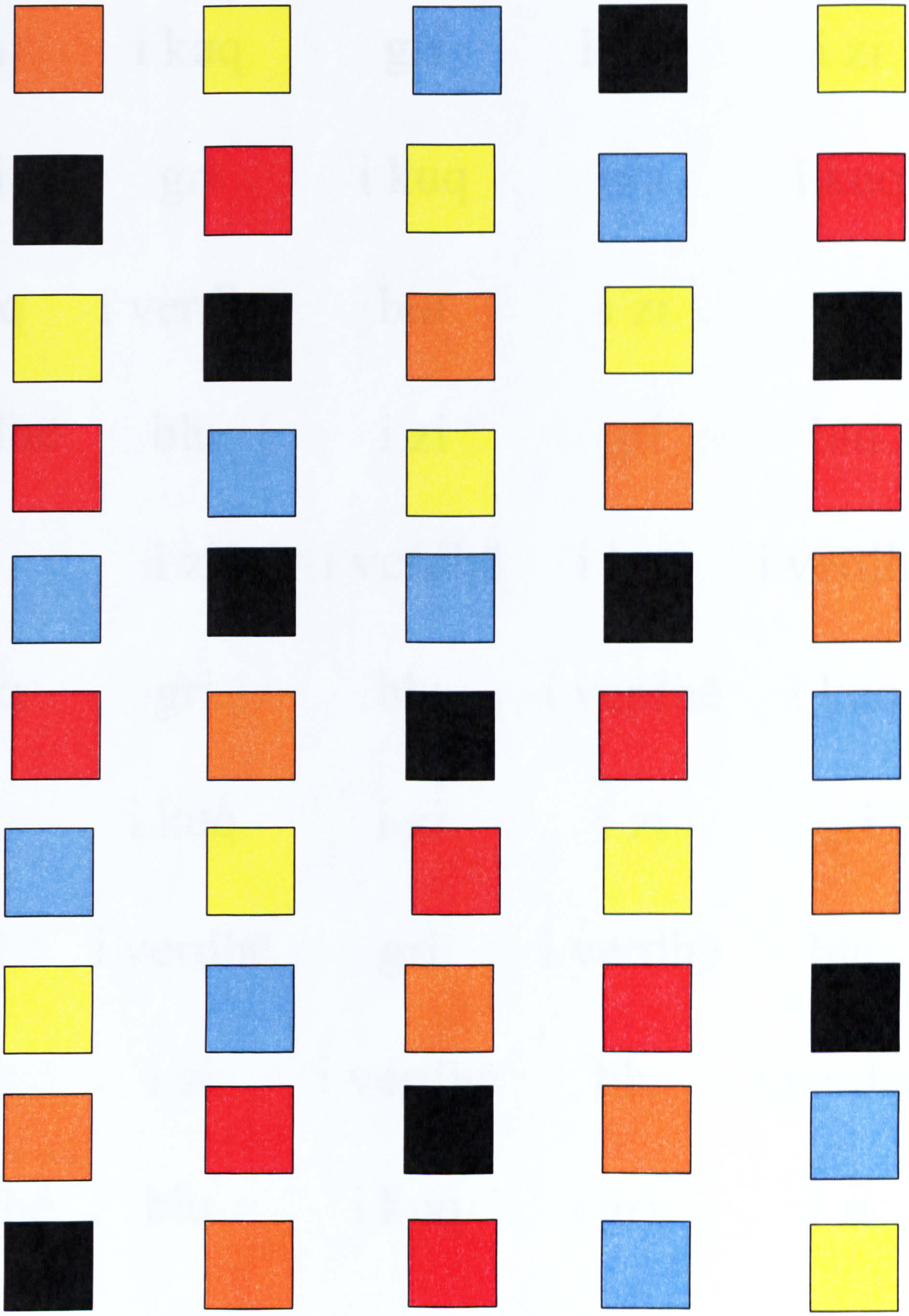
Word Picture naming: Welsh

cwch	dyn	het	cath	pêl
het	cwch	dyn	pêl	cath
cath	het	cath	dyn	pêl
het	pêl	cwch	pêl	dyn
dyn	cath	pêl	cwch	het
pêl	dyn	cath	cath	cwch
dyn	het	pêl	het	cath
pêl	cwch	het	dyn	dyn
cwch	cath	cwch	het	cwch
cath	pêl	dyn	cwch	het

Colour naming: Albanian



Colour naming: English and Welsh



Word colour naming: Albanian

blu	i kuq	gri	i kuq	i zi
i zi	gri	i kuq	blu	i kuq
i kuq	i verdhë	blu	i zi	gri
i verdhë	blu	i zi	gri	blu
gri	i zi	i verdhë	i kuq	i verdhë
i kuq	gri	blu	i verdhë	i kuq
blu	i kuq	i zi	i zi	gri
i zi	i verdhë	gri	i verdhë	blu
gri	i zi	i verdhë	blu	i verdhë
i verdhë	blu	i kuq	gri	i zi

Word colour naming: English

blue	red	orange	red	black
black	orange	red	blue	red
red	blue	blue	black	orange
yellow	yellow	black	orange	blue
orange	black	yellow	red	yellow
red	orange	blue	yellow	red
blue	red	black	black	orange
black	yellow	orange	yellow	blue
orange	black	yellow	blue	yellow
yellow	blue	red	orange	black

Word colour naming: Welsh

oren	melyn	coch	melyn	glas
glas	coch	melyn	oren	melyn
melyn	oren	oren	glas	coch
du	du	glas	coch	oren
coch	glas	du	melyn	du
melyn	coch	oren	du	melyn
oren	melyn	glas	glas	coch
glas	du	coch	du	oren
coch	glas	du	oren	du
du	oren	melyn	coch	glas

Appendix 15
Phoneme Deletion tasks in Albanian, English and Welsh

Albanian

	Heqja e tingulllit te pare				Heqja e tingulllit te fundit				Heqja e tingulllit te mezit		
	Word	Answer	Y Ω		Word	Answer	Y Ω		Word	Answer	Y Ω
1	***L***opë	opë		11	Lexo***j***	lexo		21	Test	Tet	
2	***K***alë	alë		12	Ven***d***	Ven		22	Pikturë	Piturë	
3	***D***ora	ora		13	Shoqe***n***	Shoqe		23	Sto*f*a	Soa	
4	Çati	ati		14	Fil***m***	Fil		24	Gjumë	Gjuë	
5	***R***inor	inor		15	Aku***ll***	Aku		25	Shkëmb	Shëmb	
6	***P***rinci	rinci		16	Beto***n***	Beto		26	Kështu	Këtu	
7	***V***arkë	arkë		17	Shko***p***	Shko		27	Cakto	Cato	
8	***Sh***tëpi	tëpi		18	Kova***ç***	Kova		28	Shtatë	Shatë	
9	***S***ekret	ekret		19	Marke***t***	Marke		29	Festë	Fetë	
10	***D***rasë	rasë		20	Shty***p***	Shty		30	Tra*f*ik	Traik	

English

	Delete First Sound				*Delete Last Sound*				*Delete Medial Sound*		
	Word	Answer	Y Ω		Word	Answer	Y Ω		Word	Answer	Y Ω
1	***L***ist	ist		11	Fla***p***	Fla		21	Test	Tet	
2	***C***lip	lip		12	Win***d***	Win		22	S***k***in	*Sin*	
3	***P***ink	ink		13	Gree***n***	Gree		23	So***f***a	Soa	
4	***B***read	read		14	Fil***m***	Fil		24	S***l***eep	Seep	
5	***M***inor	inor		15	Screa***m***	Screa		25	Ra***bb***it	Rait	
6	***P***rince	rince		16	Crus***t***	Crus		26	Chun***k***y	Chuny	
7	***S***alad	alad		17	Traine***r***	Traine		27	Te***m***ple	Teple	
8	***S***tamp	tamp		18	Plan***t***	Plan		28	Sto***r***y	Stoy	
9	***S***ecret	ecret		19	Baske***t***	Baske		29	Tar***g***et	Taret	
10	***D***ragon	ragon		20	Silen***t***	Silen		30	Tra***ff***ic	Traic	

Welsh

	Dileu'r Swn Cyntaf				*Dileu'r Swn Olaf*				*Dileu'r Swn Canol*		
	Gair	Ateb	Y Ω		Gair	Ateb	Y Ω		Gair	Ateb	Y Ω
1	***P***unt	unt		11	Ola***f***	Ola		21	La***m***p	lap	
2	***G***law	law		12	Myn***d***	myn		22	***Pawb***	***pwb***	
3	***P***inc	inc		13	Bra***w***	bra		23	So***ff***a	Soa	
4	***B***raf	raf		14	Ffil***m***	ffil		24	C***l***off	Coff	
5	***P***apur	apur		15	Sger***t***	sger		25	Ni***f***er	Nier	
6	***D***raig	raig		16	Gwyn***t***	gwyn		26	Cra***f***u	crau	
7	***S***alad	alad		17	Sere***n***	sere		27	ha***nn***er	haer	
8	***S***tamp	tamp		18	Plan***t***	plan		28	Sto***r***i	Stoi	
9	***C***archar	archar		19	Basge***d***	basge		29	Tar***g***ed	Tared	
10	***P***rysur	rysur		20	Tenan***t***	tenan		30	Tra***ff***ig	Traig	

Appendix 16

Wordchains: Albanian

Shembull:

Rërëkafeblu tingulldrushakadhelpër mjelmëbardhëbaltë	3
raktëkapsemace dhelodërnjerëzliqen qengjxhamçizme	6
kërmilllagradio merimangështëpiduall vjetërkopështrosëmjekër	9
hafurçëlaj bluzëpasqyrëdollappastër lopatështratxhep	12

toppunëmollë	qypqajderë	këpucëgjoksparkmish	3
limonbukëdjathë	faqerosëvazo	plazhçadërrrotëdritare	6
farëkampmakinë	trupfarmëtasgafore	ëmbëlrrushpulë	9
bebepirunmagjikbletë	kafshëarrëstol	dhomëkafazzvarrë	12
Fundvalleec	farëdrejtëqencopë	shenjërrushhallo	15
ngasbukëfemijëlag	lugëdritëflluskë	qepëpeshklëng	18
ketërfrutëgazdjalë	pastevijëdrejtë	uluthyuejshko	21
kuqedarkëkrem	delehakohë	rekërcevëllalojë	24
dyqanrrugëçaj	sallatëdoktorfurxhilule	kovëtulleshi	27
tavolinëlilaverëthikë	errëtdrekëstuhi	shkundpostëmiu	30
njëfyellqytet	pyetjeaksionlibër	hapqershifletëveri	33
ftohtënatëlaj	faqembyllhapfshat	sprirancëkamionlaps	36
tetëzjejmotor	dytëfjalëtridhjet	sahatmësueslumturkëndoj	39
metërmjegullbarzjarr	tokëletërshtatë	derrkokëthonj	42

dhjetëdjegmuaj	mbesëjetëlaj	trashërrotulldhëmbmadh	45
mbrëmjemiserpiano	sheqerlartëdritë	kalifushëkutimur	48
kyçorëbarishterrit	pinguinbletren	katrorqyrkdhimbje	51
lagpesëveturë	shkoppresnumërthellë	gishtvarkëqime	54
ikagodasnatëminutë	borakuqmillion	tigerthuapastër	57
kopjomavindjej	gomështegtrafiknot	lëmojluankembë	60
trishtuarkatërlojësy	ngrohtëflamurmirë	mprehtëshurdhërdy	63
gjumizog	sëmurëlakrorpudër	lëkurëujkkëngërëndë	66
pritëtrashëfytyrë	egërpallatthuakeq	vajzogbryl	69
ngaskofshëbishtfushë	sapunndërtoshkruaj	ujëdashurithatë	72
vogëlflokëçekan	erëdyrrudhëzemër	xhuxhprekbalenë	75
kazannatyrëhundë	vrridrejtojgjatëkujdes	anijeegërdelfin	78
gjirafëbarkqesh	verbërlarttroket	motërinsektbuzëflakë	81

portokallvirusmacelojë	garëndihmolexo	veshmirëzanë	84
fatmbretbie	guritreburrëshi	njëzetujëpaste	87
ulëtfrymëmajmun	mizëgojëmizëbojë	kecbimëkyç	90
shpresëngrijzezë	druakullnjëzetjavë	tavolinëkrahuthundër	93
lundrokrizështëpi	qafëqenrrethkasap	biemiktako	96
qiellkollëbalonëbirrë	hollëvonëlufto	qetëdhepikturë	99
gjuhëkitarëkafe	bardhëtapëkuarc	vogëlhyjcirkbie	102
dentistpizë	kohëlilahënaflas	marrarigrua	105
qepprincbeko	butëlopalepurmëngjes	bëjparazile	108
bluzakonmuzikë	shesurrejnxetëkarrotë	flaslodhpemë	111
vendpylldoctor	shtyjthajpjatë	shtrydhmendojpagëverë	114
pamjeylldítë	sportvraplitardajo	folëpersonluaj	117
djellnjëjam	qeshkërcevajzë	borëshpejtthekfryj	120

Appendix 17

Wordchains: English

Example:

sandcoffeeblue	soundwoodjokefox	swanbrightmud	3
rocketpegcat	soiltoypeoplepond	lambglassboot	6
snailwetradio	spiderhomebull	oldgardengoosechin	9
eatbrushwash	vestmirrorfridgeplain	spadebedcombl	12

ballworkapple	potcrydoor	shoechestparkmeat	3
lemonbreadcheese	cheekduckjar	beachtentwheelwindow	6
beancampcar	shellfarmbowlcrab	sweetgrapehen	9
babyforkmagicbee	animalnutchair	roomzoocrawl	12
skirtdancewalk	berryrightpuppychip	signpearaunt	15
drivefoodchildwet	spoonlightbubble	onionfrogjuice	18
apefruitgasboy	caketrackfair	seatbreakgo	21
yellowdinnercream	sheepsnackweather	cloudhopbrothergame	24
shoproadtea	saladnursebakerdaisy	bucketbrickrain	27
desklilacwineknife	darklunchstorm	shakeposthamster	30
oneflutetown	questionactionbook	opencherrypaperpole	33
coldnightbath	pagecloseyawnvillage	anchortruckpen	36
eightboilmotor	secondwordthousand	clockteacherhappysing	39
yardmistgrassfire	earthletterhundred	pigheadclaw	42
thirteenburnmonth	niecelifemop	thickroundtoothbig	45
eveningcornpiano	sugarloudlamp	horsefieldtrunkwall	48
lockhourweedgrow	penguinbuytrain	squareleatherpain	51
splashtencar	stickcutnumberdeep	fingerboatfur	54
skiphurteyeminute	sleetpinkmillion	tigertoeclean	57
recordbruisefeel	tyrepathtrafficswim	smoothlionfoot	60
sadfivefuneye	warmflagnice	sharpdeafsix	63

Kneemousebat	sickpiepowder	skinwolfsonghard	66
holdthickface	roughflatnailnasty	hambirdelbow	69
ridelegtailground	soapbuildwrite	paddlelovecrisp	72
smallhairhammer	windtwofrownheart	trollticklewhale	75
dishnaturenose	youngleadlongcare	shipmonsterdolphin	78
giraffebarkwriggle	blindhighbeat	sisterbeetlelipflame	81
orangebugpetdoll	racehelpread	earfinefairy	84
luckqueenring	rockthreemanfog	twelvewaterpasta	87
lowbreathmonkey	antmouthflypaint	goatplantkey	90
hopefreezeblack	oakicetwentyweek	tablehandhoof	93
sailhumphouse	neckdogcirclebutcher	fallfriendmeet	96
skycoughkitebeer	thinlatefight	quietdustpicture	99
tongueguitarbrown	whiteplugpebble	elfcreepcircusdial	102
dentistdrinkvoice	timepurplemoonwhisper	buzzbearwoman	105
sewprincessbless	softcowrabbitmorning	tickmoneybell	108
greencommonmusic	sellhatehotcarrot	talktiredtree	111
lawnforestdoctor	swingdryplate	squeezethinkpaymilk	114
watchstarday	sportrunropeuncle	shoutpersonplay	117
sunfourjam	laughjumpgirl	snowquicktoastblow	120

Appendix 18

Wordchains: Welsh

Esiampl:

rhawcoffiglas clochprenauroen prygolaumwd	3
rocedpegcath priddcarpoblpwll oenglasdoli	6
gafrhetradio neidrgwelytarw hengarddgwyddgan	9
topbrwswal sgertdrychtostplaen rhawgwelypethcrib	12

pobgwaithafal	potcriodrws	cigsiopcuroparc	3
lemonbaracaws	bochbuwchjar	traethpabellolwynffenestr	6
ffamaescar	croenffarmplascosi	melysorenhen	9
babifforcstorimab	anifailpenglud	rhawllecrib	12
sgertdawnswedi	diodchwithbuwchbloc	pincpaisawel	15
gyrrubwydplantwal	llwybwthynlamp	moronbrogadiod	18
acerfffrwythnaibach	torthtracffair	setmyndtorri	21
melynciniocael	mochsnactywydd	haulhonmodrybger	24
siopfforddte	saladnyrsbabanderwen	bwcedbricglaw	27
desgpiwsfforc	dadciniostorm	sialcpramhances	30
fflamtuatref	cwestiwnacenllyfr	agorcadachpapurpaent	33
oernosbath	pamagosiawndinas	angortrycpen	36
wythbancmanwl	sbectolgairmiliwn	cloctebothapuscap	39
iardniwlgwairtop	priddllythyrhalen	mochhaulclawr	42
tiwnabwlbmis	nithllaethmop	trwmrowndmawrdant	45
noswaithcornpiano	siwgrllewlamp	caercaetrwncwal	48
clawrwythgrawn	pengwinbachtren	sgertlledrpoen	51
stampdegcar	gludcaprhifaudyfn	byseddcwchblew	54
hoffnaideichmunud	cwsgpincmiliwn	teigrbysglas	57
rhaglenbysfel	teiarlwctraffigswil	llyfnllewtroed	60
ristpumphwyleli	wedifflagneis	siopdausut	63

cnocbatcaws	salpeipowdr	croenblaiddcapcaled	66
taltewffarm	blinfflatnaidnofio	hamadaresgid	69
rowndcoestapllawr	sychbudrwrth	pabellplaslwc	72
bachgwallthanner	gwyntdaufforddcalon	treftrwynwedi	75
plasnaturceg	ifanctynnugofal	llonganferthdolffin	78
mochynbancysgol	dalluwchbeic	siocberwillobrawd	81
orenbodpelldol	rashelpcoch	ebolffinffair	84
lwcsachcaws	craigniwltridyn	chwaerdaupasta	87
llaigwyntmwnci	topcegprypaent	gafrplantci	90
hafrhewidu	oerugainrhewdydd	bwrddllawtroed	93
hwylhyliftri	pencathcylchcigydd	dalffrindgweld	96
setcaeltagucwrw	hirhwyrgaircoes	arafllwchlluniau	99
tafodgitarbrown	gwynplwgpedair	elicriosyrcasdail	102
doctoryfedllais	amsermelynhaulwardrob	batbethdynes	105
setpalasbwrw	sychchwaerdafadnoson	ticarianrhad	108
glashydrefcerdd	gwyntcribmorondu	craigblincroes	111
llawnhosandoctor	pincsychplas	sgertllaethrhadtal	114
wedisetdydd	stamprhesrhaffbrawd	siopsebonplaen	117
hauljamtri	lawrnaidmerch	santcartrefgwynt	120

Appendix 19

Spelling 50 word-items in Albanian, English and Welsh

	Albanian	English	Welsh
1	ju	no	lle
2	saj	other	mi
3	ti	because	mwy
4	tani	have	rhoi
5	ditë	down	iaith
6	kam	never	oes
7	atyre	much	arbennig
8	tepër	work	blaen
9	mënyrë	though	doedd
10	duket	fact	cyrraedd
11	shqipëri	night	golwg
12	milionë	important	dilyn
13	erdhi	enough	adran
14	thanë	upon	torri
15	bë	less	draw
16	shqipëria	rest	roeddwn
17	pesë	came	llwybr
18	dhjetë	simple	nodi
19	ndodhet	knows	ganddi
20	zyrtare	department	geni
21	prokurori	sorry	dieithr
22	pastër	bottle	sioe
23	opozita	benefit	cynrychioli
24	pësuar	actual	blwydd
25	fshatrat	airport	safodd
26	njërit	painting	rheilffyrdd
27	parlamentit	self	amheus
28	vullnetit	owner	camgymeriad
29	nënvizoi	inspector	hyn
30	studimit	necessity	almaeneg
31	qëlloi	via	bygythiol
32	ndanë	Victoria	brysiodd
33	jetojmë	admission	syniadaeth
34	guxonte	trips	ffasiynau
35	shpinës	outward	lampau
36	minoritetit	exams	sloganau
37	afron	comprehension	ysbwriel
38	avokatin	triumphant	petryal
39	reagime	booklet	lawntiau
40	kurs	boulders	llogi
41	kufizime	dreaded	tocio
42	mirënjohjeje	thanking	esgyrnog
43	tabelën	saga	ceisiant
44	nishan	semantic	cyfrannol
45	eliminohej	discretionary	hysbysebwr
46	quash	crimson	goddefgar
47	botanikën	tithe	ymaddasu
48	pijes	perilously	mathemategwr
49	gjëmime	remarriage	ymatebol
50	bojkotojnë	horseman	brafiach