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The effects of knowledge and word type on second language vocabulary learning: An exploratory study

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Abstract

Background: Research on second language vocabulary learning has begun to investigate the acquisition of different types of knowledge (form, grammar, semantic) and words (noun, verb, adjectival emotive). However, most studies have focused on 'incidental' learning which is not commonplace in languages classrooms so consequently there is limited pedagogical application of the findings.

Method: In the present study, the effects of both knowledge and word type on the 'intentional' vocabulary learning of an unspoken second language (German) was examined. English-speaking university students (N = 30) completed a German word learning phase (which included nouns, verbs, and adjectival emotive words) and were then given three tasks devised to examine vocabulary learning of different knowledge types (form, grammar, and semantic). These tasks were also completed one week later.

Results: It was found that both knowledge (form>grammar>semantic) and word type (noun>verb>adjectival emotive) had a significant main effect on vocabulary learning with gradients in the expected direction. An interaction between knowledge and word type was also found.

Conclusions: Conclusions are made regarding the need for future research to examine the processes, and the pedagogical practices, that might best facilitate successful vocabulary learning of different knowledge and word types. Such research would be of great value to educators and second language learners.

Keywords: Vocabulary; Second Language Learning; Pedagogy; Education.

Introduction

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The acquisition of vocabulary is of paramount importance when learning a second language. Second language vocabulary knowledge supports both the learners' understanding of that language and their ability to be understood. A lack of second language vocabulary knowledge hinders effective communication as "lexical items carry the basic meaning that learners want to comprehend and express" (Read, 2004, p. 146). Consequently, the conditions that best facilitate successful vocabulary learning are a prominent research area in second language acquisition.

Research adopting a multidimensional conceptualisation of vocabulary knowledge acquisition (e.g., Nation, 1990, 2001) has begun to consider the different knowledge types (dimensions) such as form (recognition of a word in its spoken and written form), grammar (word class), and semantics (a word's meaning); but few studies have utilised this approach and focus mainly on semantic acquisition, rather than other knowledge types (e.g., form and grammar). Other research examines differences between acquisition of nouns and verbs or nouns and emotive words to establish whether 'noun bias' exists in second language learning (e.g., Altarriba & Basnight-Brown, 2011; Gentner & Boroditsky, 2009); yet no study has examined the relative importance of all three word types. Furthermore, most research has focused on an incidental mode of learning (unintentional language acquisition that occurs in the process of completing a task with a different focus), rather than an intentional mode of learning (primary focus of a task is language acquisition), which is of less use to educators in language classrooms (Pachler, Barnes, & Field, 2009). The present study explores the effects both of knowledge (form, grammar, semantic) and word types (noun, verb, adjectival emotive) on the 'intentional' vocabulary learning of an unspoken second language (German) using a sample of university students. This research may have important educational implications about how best to support second language vocabulary acquisition.

Second Language Vocabulary Acquisition

In an attempt to define acquisition, researchers have distinguished between 'vocabulary learning' and 'vocabulary acquisition' (see Krashen, 1989, for example): the former refers to context specific knowledge such as a test, whereas the latter reflects real, authentic language use. This distinction then alludes to vocabulary knowledge being multi-dimensional, whereby a learner needs to know most, if not all, dimensions to acquire a word. Although this idea has been present in the literature for many years (e.g., Henriksen, 1999; Meara, 1996; Nation, 1990, 2001), most research has focused on the acquisition of semantic knowledge. This is unsurprising given that a word's meaning is essential for effective communication in a given language. However, an explicit focus on this dimension offers no empirical indication as to the process of acquisition and if knowledge has been gained but remains undetected.

Moreover, the limited research that has examined different dimensions of vocabulary knowledge has focused on usage-based incidental learning; that is, tasks such as reading a foreign-language book where vocabulary is acquired through the need to understand it in order to make sense of that context (e.g., Pigada & Schmitt, 2006; van Zeeland & Schmitt, 2013), despite it rarely being used in language classrooms (Pachler, Barnes, & Field, 2009). In contrast form-focused deliberate learning; that is, tasks such as vocabulary list learning that focus explicitly on acquiring specific words (Elgort & Nation, 2010) is viewed as being more effective in a classroom as it utilises students' limited exposure to the language (Pachler, *et al.*, 2009) and, unlike incidental learning, is not overly reliant on their ability to infer meaning from context. Hu Hsueh-chao and Nation (2000) report that to

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infer the meaning of a vocabulary item a learner needs to have prior knowledge of the meaning of 98% of the other words in that context (e.g., a text).

However, one criticism of the exclusive use of deliberate vocabulary learning is that new lexical items are often presented to learners out of context. Groot (2000) argues that context provision is necessary to best facilitate acquisition. This argument rests on the premise that not all aspects of vocabulary knowledge are activated by exposure to a word out of context and, as such, different types of learning are needed to develop a more stable lexical representation (Elgort, 2011). Any examination of deliberate learning's efficacy in facilitating acquisition must therefore consider these different dimensions of vocabulary knowledge.

Acquisition of Dimensions of Vocabulary Knowledge

Several frameworks exist regarding the nature of vocabulary knowledge dimensions. Nation (1990, 2001) conceptualises it in terms of three dimensions: form, meaning, and use, the latter being defined as knowledge of both grammar collocation and constraints on word use. Meara (1996) distinguishes between breadth of lexicon, depth of specific word knowledge, and accessibility and organisation. Henriksen (1999) distinguishes partial to precise knowledge, depth of knowledge, and receptive to productive knowledge.

The current study uses Nation's (1990, 2001) conceptualisation for three reasons. First, Nation's dimensions are clearly defined and orthogonal, which increases their measurability. Second, Nation's dimensions are explicitly word-specific. Meara's (1996) framework situates vocabulary acquisition in the context of a learner's entire lexicon so an examination from this perspective would offer little insight into the process of acquiring a single word, particularly when assessing the acquisition of beginner language learners who do not have an established lexicon. Third, there is strong empirical evidence for the theoretical basis on which Nation's framework is founded. Nation drew on Ellis's (1994) distinction between implicit and explicit processes involved in learning, which itself was based on experimental research (for example, Hulstijn & Hulstijn, 1984, and Green & Hecht, 1992). Ellis suggested that implicit learning processes occur in the recognition and production of a word's form which require attention to the stimulus but no other conscious processes. Conversely, semantic and grammatical aspects of word knowledge rely on explicit processes as a learner consciously searches for and applies rules. There is no evidence that distinction is present during deliberate learning as form, grammar, and semantic aspects arguably all rely on conscious processes within this context.

Depth of knowledge, a feature common to all three aforementioned frameworks, refers to the proposal that different word features are processed and stored at different levels. In line with Craik and Lockhart's (1972) Depth of Processing Hypothesis sensory features, such as orthographic and phonological word characteristics, are analysed at a shallow level, whereas semantic and conceptual input features are analysed at a deeper level. It follows that if depth of processing affects retention and recall then a word is more likely to be retained and recalled if it is processed at a deeper level. This suggests then that semantic word features are more likely to be retained and recalled than orthographic and phonological features. Views on this hypothesis vary: Krashen (1989) supports it, whereas De la Fuente (2006) opposes it arguing that form-focused learning facilitates more effective acquisition than meaning-focused learning.

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Evidence from a recent body of research supports Nation's (1990, 2001) framework of multidimensional word knowledge to examine acquisition (for examples, see Pigada & Schmitt, 2006, Pellicer-Sánchez & Schmitt, 2010, and Van Zeeland & Schmitt, 2013). However, all but one of these studies focused on incidental learning, which is not commonplace in language classrooms (Pachler, *et al.*, 2009) so consequently there is limited pedagogical application of these findings. Furthermore, they have not always controlled for semantic word category, word valence or the equal representation of different word types in the test word battery and so do not elucidate how the acquisition of dimensions may vary between word types.

Acquisition of Different Word Types

Research has examined acquisition of three types of the same part of speech (concrete, abstract, and emotive nouns, see Altarriba & Basnight-Brown, 2011) but research that has considered 'word types' in terms of different parts of speech is limited. The current study examines the acquisition of three parts of speech (concrete nouns, verbs, adjectival emotive words). They have been selected first, because existing research has explored their acquisition, and second because they perform different functions within language.

The acquisition of a word is linked to the ability to create a representation and Paivio's (1971) Dual Coding Theory proposes one way in which word representations may be acquired. According to this theory, two independent, interconnected verbal and non-verbal representational systems allow concrete words to be represented using both systems thereby making acquisition easier than non-concrete/abstract words as the latter rely on a single linguistic system. Schwanenflugel, Akin, and Luh (1992) also suggest concrete words are represented better than abstract words. Research provides support for both of the above theories: an examination of the acquisition of concrete, abstract, and emotive words showed that concrete words are acquired more easily (based on RTs for automaticity of response) than abstract words (Altarriba & Basnight-Brown, 2011).

Other research has highlighted the importance of context in vocabulary acquisition. For example it has been shown that with adequate contextual support, abstract words can be learned as well as concrete words (Schwanenflugel, *et al.,* 1992). Furthermore, on consideration of the acquisition of emotive words in bilinguals, Altarriba (2003) theorised that emotive words in the first language are heard, used, and experienced in multiple contexts, which strengthens semantic representations and constructs multiple memory traces. However, this study examined bilingualism as the acquisition of two languages consecutively and so was unable to explore what recall bias might exist if two languages were acquired simultaneously, as this may introduce additional variables other than the early use of language to express emotional experience, such as the context (e.g., home or school) in which each language is used.

The research mentioned thus far has focused on the acquisition of concrete nouns relative to emotive words. Although some studies examine this, very little research has investigated the acquisition of verbs relative to other word types. One study that examined the acquisition of early first language nouns and verbs in Navajo showed that nouns, particularly terms for animates, were acquired early and that nouns per se predominated early vocabulary (Gentner & Boroditsky, 2009). Saxton (2010) has argued that first language noun bias is due to whole-object bias and shared intentionality (the human compulsion to share attention with others by selecting objects of interest to talk about). Gentner (1982) also proposed the natural partitions hypothesis (concrete objects or entities are easier to individuate in the world), as well as the relational relativity hypothesis (verbs cannot be

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learned from word-to-world mapping as they are relational terms and need to be experienced with the semantic patterns of a language to understand and acquire them). The acquisition of emotive words, however, may partially rely on prior knowledge of nouns and verbs. Emotive words differentiate between aspects of an individual's subjective emotional experience and as such require that he has developed an awareness of this. However, they also differentiate between aspects of subjective emotional experience as this is interpreted by another person. This interpretation is facilitated by an assessment of behaviours, which is itself dependent on prior knowledge of nouns and verbs (e.g., the boy is crying – he is sad). `

The theory and research available suggests then that there is a difference between the acquisition of nouns, verbs, and emotive words that may be accounted for by imageability, richness of context, and the ability to individuate the referent. Although studies have shown differences both between the acquisition of concrete nouns and nominal emotive words, and nouns and verbs, no study to date has examined the acquisition of all three word types relative to each other. It is important to ascertain whether the noun bias in first language acquisition is still present in this context, and whether the perception of environment may be organised through language. It may also inform pedagogical practice regarding the presentation and instruction of unknown vocabulary.

The Current Study

Although previous research supports the existence of a multidimensional conceptualisation of vocabulary knowledge (e.g., Nation, 1990, 2001) few studies have utilised this perspective. As such, 'non-semantic' knowledge gains (i.e., form and grammar knowledge) may have gone undetected, limiting understanding of the process of vocabulary acquisition. Moreover, the effects of word type (nouns, verbs, adjectival emotive words) on vocabulary acquisition and the possible existence of the 'noun bias' in second languages has not been studied sufficiently. It is also the case that most research has focused on incidental learning and therefore it remains unknown whether the same findings would be observed using intentional modes of learning as they are more commonly used in language classrooms and would therefore be of greater value to educators.

In the current study the effects (at both immediate, and delayed post-test) of both knowledge (form, grammar, semantic) and word types (noun, verb, adjectival emotive) on the 'intentional' vocabulary learning of an unspoken second language (German) was examined using a sample of university students. Based on available research evidence and theory, the following three hypotheses are made:

1. There will be a significant main effect of knowledge type on vocabulary acquisition; specifically, form knowledge will be highest and semantic knowledge will be lowest.
2. There will be a significant main effect of word type on vocabulary acquisition; specifically, nouns will be highest and adjectival emotive words will be lowest.
3. There will be a significant main effect of time on vocabulary acquisition; specifically, there will be higher acquisition at the immediate, rather than delayed post-test.

Further, although the interactions between the three variables (knowledge type, word type, and time) will be examined, no hypothesis is made regarding these interactions, reflecting the exploratory nature of the research.

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Method

Participants

All of the students who took part in this research (N = 30, 11 males) were recruited from a single university in the West Midlands, UK. Students were aged between 18 and 48 years (M = 28.67, SD = 8.21) and were enrolled on one of the university's psychology programmes, which require a minimum IELTS score of 6.5. The vast majority of students were monolingual (n = 25) and spoke English as their first language (n = 27). Only those students who declared that they did not speak a single word of German were invited to participate in this research.

Measures

Due to the novel, exploratory nature of this research it was necessary to develop a new English-German vocabulary task that would elicit the intentional learning of different types of knowledge (i.e., form, grammar, semantic) and words (i.e., noun, verb, adjectival emotive). The newly developed task was carefully designed to maximise its credibility and drew inspiration from other available measures in the literature such as those used to measure word knowledge dimensions of form, grammar, and meaning in Van Zeeland and Schmitt's (2013) study in vocabulary acquisition through incidental listening.

Target items selected by 'word type'.

English words (N = 24) were selected from semantic categories as defined by the relevant word class norms (Francis & Kucera, 1982, and Planter, Webster, & Whitworth, 2011) to represent the three different word types to be examined in this study (nouns, verbs, adjectival emotive). There were eight concrete nouns (e.g., duck), eight verbs in the infinitive form (e.g., to build), and eight adjectival emotive words (e.g., lonely); these word types were matched on word length and frequency in English (Francis & Kucera, 1982) and translated forms of these words (in German) were a maximum of one syllable shorter or longer than the equivalent word in English.

The concrete nouns were all members of the same semantic category – animals – and were selected using Francis and Kucera's (1982) frequency analysis of English usage (mean frequency = 9.13)[1]. The verbs were also members of the same semantic category 'making' (Plant, Webster, & Whitworth, 2011) and had a mean frequency of English usage (Francis & Kucera, 1982) of 8. The emotive words also had a similar mean frequency of English usage (8.38, Francis & Kucera, 1982) and, according to the Bradley and Lang (1999) norms, were negatively valenced (M = 2.39 on a 9-point scale, mean SD = 1.47) and moderate in arousal (M = 5.01 on a 9-point scale, mean SD = 2.43). All emotive stimuli were adjectives that labelled emotional states (i.e., adjectival emotive), rather than emotion-laden words such as cancer or prisoner.

Vocabulary tasks devised by 'knowledge type'.

[1] The mean frequency of occurrence is taken from the Francis and Kucera (1982) norms, which count the number of written occurrences in the 1,014,000 graphic words of running text in the Brown Corpus (Standard Corpus of Present-Day American English). Those words come from 500 samples (roughly 2000 words in each) and the samples were assigned to one of 15 categories/genres. All of the samples were first published in 1961. It should be noted here that the Brown Corpus reflects American rather than English usage and thus represents an approximation to our target concept frequency.

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Tasks were devised to examine the vocabulary of three different knowledge types (form, grammar, semantic). Tasks used in previous studies were considered inappropriate for this study for one or more of the following reasons: target items were in a different language; the study focused on incidental learning; the study focused on learning in a specific modality; or the study measured acquisition only in terms of semantic knowledge. Consequently, three new tasks (one for each type of knowledge) were developed each of which used the same nouns, verbs, and adjectival emotive words that were described earlier. These words were presented in a randomised order (www.random.org) to avoid any order effects by word type. This item order was then preserved during the presentation of words and in all three tasks.

Form recognition.

Word form knowledge was measured using a written multiple choice recognition task (see Appendix 1A). A receptive task format was used as it measures a type of knowledge needed for both reading and listening: to understand a word in either modality, a learner needs to be able to distinguish it from other word forms. For each item, participants were presented with 5 options; 3 non-words, 1 target item and an *I don't know* choice if none of the words were familiar. Non-words rather than word neighbours were used in line with related work in this area (e.g., Van Zeeland & Schmitt, 2013). The non-words that were generated (www.wordconstructor.com) changed by 5% (i.e., were deemed close to that of the target item) and the order of the three non-words and target item in each trial was randomised (www.random.org). Participants received one point for each correct answer and obtained a total score out of 24 (or out of 8 for each word type). Cronbach's α reliability coefficient for this subtest was .85.

Grammar recognition.

Word grammar knowledge was also measured using a written multiple choice recognition test (see Appendix 1B). This format was used as part of speech is a closed system and, as such, there are only a limited number of possibilities to choose from. Participants were presented with all 24 target items (words) and for each one a choice of the three different word types were used (noun, verb, adjectival emotive). There was also an *I don't know* option if the participant was unsure. At the top of the task there were brief definitions of each part of speech (word type) followed by examples that were not target items. Participants received one point for each correct answer and obtained a total score out of 24 (or out of 8 for each word type). Cronbach's α reliability coefficient for this subtest was .92.

Semantic recall.

Unlike the other tasks, semantic knowledge was measured using a written recall test (see Appendix 1C). As Van Zeeland and Schmitt (2013) have argued in the case of learning through incidental listening, once the form of a word has been recognised a word's meaning needs to be recalled, rather than merely recognised. Participants were presented with all 24 target items (words) and for each one were asked to recall anything they could about the word's meaning by way of an English translation, an explanation, or a picture. Participants received one point for each correct answer and obtained a total score out of 24 (or out of 8 for each word type). Cronbach's α reliability coefficient for this subtest was .92.

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Procedure

Information sheets and informed consent forms were provided to students who were opportunity sampled from the participating university. These forms outlined the aims and nature of the research, what was involved in participation, and made students fully aware of their rights. Consenting students were then assessed individually (using the aforementioned vocabulary tasks) in a quiet room. Participating students were instructed to watch and listen to the learning material, before completing two multiple choice questionnaires and a recall task. They were informed they would be presented with each word twice in the learning material. Each assessment session began with a 'learning phase' where each of the 24 words were presented one at a time in both visual and auditory form to avoid a learning style bias (Tight, 2010). The procedure for presenting items was similar to that of Altarriba and Basnight-Brown (2011). Before each trial, a '+' fixation appeared on the screen for 500ms. The German word then appeared on the screen by itself for 500ms. Following this, the English translation appeared one line below the German word. The word pair remained on the screen for a further 7500ms and during this time the participant heard the word-pairs repeated twice. Words had been recorded by a native German speaker and a native English speaker. The inter-trial interval was 1 second. Words were presented to participants in three groups of eight and participants studied each set of eight twice in a row.

Once the learning phase was complete, participants were given the three vocabulary tasks. They completed the form recognition test first to avoid any enhancement of knowledge from the other two tests, and then completed the grammar recognition task, followed by the semantic recall task. One week later participants completed the three tasks again without the learning phase.

Results

Table 1 shows the mean and standard deviation scores for the number of correct responses (vocabulary) by knowledge type (form, grammar, semantic), word type (noun, verb, adjectival emotive), and time (immediate, delayed post-test).

Table 1

Correct responses (vocabulary) by knowledge type (form, grammar, semantic), word type (noun, verb, adjectival emotive), and time (immediate, delayed post-test)

		Immediate Post-Test		Delayed Post-Test	
Knowledge Type	Word Type	Mean	SD	Mean	SD
Form	Noun (/8)	6.27	1.53	5.90	1.75
	Verb (/8)	5.33	1.79	5.90	1.69
	Emotive (/8)	4.93	1.91	4.77	2.08
Grammar	Noun (/8)	5.60	1.71	5.07	1.80
	Verb (/8)	5.27	2.15	5.43	2.54
	Emotive (/8)	4.47	2.03	4.47	2.13
Semantic	Noun (/8)	4.50	1.87	3.97	2.04
	Verb (/8)	3.77	2.13	3.20	2.04
	Emotive (/8)	2.47	1.53	1.87	1.38

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It can be seen in Table 1 that the mean vocabulary scores for form knowledge were generally higher than those for grammar knowledge, which were generally higher than those for semantic knowledge (i.e., form>grammar>semantic). It can also be seen, with some exceptions in the delayed post-test, that the mean vocabulary scores for nouns were generally higher than those for verbs, which were generally higher than those for adjectival emotive words (i.e., nouns>verbs>emotive). Moreover, the mean vocabulary scores were generally higher at the immediate, rather than delayed post-test.

To investigate whether any of the main or interaction effects were statistically significant a 3x3x2 within-subject analysis of variance (ANOVA) was performed, with knowledge type (3), word type (3), and time (2) entered as the repeated-measures within-subject variables (see Table 2). Data were inspected to ensure they met parametric assumptions. The assumption of sphericity had been violated for the main effect of knowledge and for the interaction effect between knowledge and word type; therefore, degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity for these effects.

Table 2
Summary of the main and interaction (within-subjects) effects

Effect	*df*	*F*	*p*	*Partial* η^2
Knowledge Type	1.62, 46.98	47.40	<.001	.62
Word Type	2, 58	21.43	<.001	.43
Time	1, 29	3.49	.072	.11
Knowledge*Word	3.04, 88.28	3.91	.011	.12
Knowledge*Time	2, 58	3.07	.054	.10
Word*Time	2, 58	2.87	.065	.10
Knowledge*Word*Time	4, 116	1.53	.199	.05

Note. Greenhouse-Geisser estimates were used for Knowledge and Knowledge*Word due to violation of the sphericity assumption.

It can be seen in Table 2 that there was a significant main effect of knowledge type on the number of correct responses (vocabulary), $F_{(1.62,\ 46.98)} = 47.40$, $p < .001$, *Partial* $\eta^2 = .62$. Contrasts showed that, in line with Hypothesis 1, form knowledge, $F_{(1,\ 29)} = 103.757$, $p < .001$, *partial* $\eta^2 = .78$, and grammar knowledge, $F_{(1,\ 29)} = 35.971$, $p < .001$, *partial* $\eta^2 = .55$, were significantly higher than semantic knowledge. Moreover, form knowledge was significantly higher than grammar knowledge, $F_{(1,\ 29)} = 5.376$, $p = .028$, *partial* $\eta^2 = .16$. A significant main effect of word type was also observed, $F_{(2,\ 58)} = 21.43$, $p < .001$, *partial* $\eta^2 = .43$. Contrasts showed that, in line with Hypothesis 2, nouns, $F_{(1,\ 29)} = 38.962$, $p < .001$, *partial* $\eta^2 = .57$, and verbs, $F_{(1,\ 29)} = 17.344$, $p < .001$, *partial* $\eta^2 = .37$, were significantly higher than adjectival emotive words. Moreover, nouns were significantly higher than verbs, $F_{(1,\ 29)} = 4.301$, $p = .047$, *partial* $\eta^2 = .13$. Lastly, the main effect of time on the number of correct responses (vocabulary) was found to be marginally non-significant, $F_{(1,\ 29)} = 3.489$, $p = .072$, *partial* $\eta^2 = .11$.

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A significant knowledge x word type interaction was observed, $F_{(3.04, 88.28)} = 3.91$, $p = .011$, *partial* $\eta^2 = .12$. This indicates that the effects of word type were different depending on the knowledge type (see Figure 1).

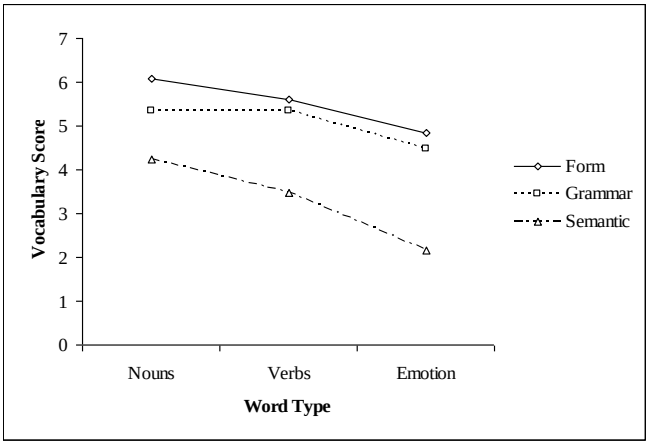

Figure 1. Interaction graph between knowledge type (form, grammar, semantic) and word type (noun, verb, adjectival emotive)

Contrasts revealed significant interactions when comparing nouns to verbs for grammar compared to semantic knowledge, $F_{(1, 29)} = 8.687$, $p = .006$, *partial* $\eta^2 = .23$. Specifically, the difference between nouns ($M = 4.23$, $SE = .335$) and verbs ($M = 3.48$, $SE = .362$) for semantic knowledge was greater than it was for grammar knowledge (nouns $M = 5.33$, $SE = .294$; verbs $M = 5.35$, $SE = .397$). Contrasts also revealed significant interactions when comparing nouns to emotive words for grammar compared to semantic knowledge, $F_{(1, 29)} = 20.605$, $p < .001$, *partial* $\eta^2 = .42$. Specifically, the difference between nouns ($M = 4.23$, $SE = .335$) and emotive words ($M = 2.17$, $SE = .250$) for semantic knowledge was greater than it was for grammar knowledge (nouns $M = 5.33$, $SE = .294$; emotive words $M = 4.47$, $SE = .353$). Lastly, contrasts revealed significant interactions when comparing nouns to emotive words for form compared to semantic knowledge, $F_{(1, 29)} = 5.484$, $p = .026$, *partial* $\eta^2 = .16$. Specifically, the difference between nouns ($M = 4.23$, $SE = .335$) and emotive words ($M = 2.17$, $SE = .250$) for semantic knowledge was greater than it was for form knowledge (nouns $M = 6.08$, $SE = .264$; emotive words $M = 4.85$, $SE = .324$

Discussion

This study set out to examine the effects of both knowledge (form, grammar, semantic) and word type (nouns, verbs, adjectival emotive) on the 'intentional' vocabulary learning of an unspoken second language (German). It was predicted that there would be a gradient in the vocabulary acquisition of knowledge dimensions (form>grammar>semantic) and word types (noun>verb>adjectival emotive) and that acquisition would be greater at the immediate, rather than delayed post-test. Results showed that both knowledge and word type had a significant main effect on second language vocabulary learning. A significant interaction between knowledge and word type was also found. These results will now be considered in turn.

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First, knowledge type was found to have a significant effect on second language vocabulary learning in the direction predicted by Hypothesis 1. There was greatest acquisition of form knowledge and least acquisition of semantic knowledge. This not only provides support for a multidimensional conceptualisation of vocabulary (e.g., Nation, 1990, 2001), but also suggests that vocabulary acquisition is an incremental process. This is consistent with other research using 'incidental' modes of learning (e.g., Van Zeeland & Schmitt, 2013). That this effect has been replicated in the present study using 'intentional' models of learning is important as this mode of learning is most commonly utilised in language classrooms. The results of this and aforementioned previous studies thus suggest that both incidental and intentional models of learning are effective in facilitating vocabulary acquisition and, consequently, are both of use in languages classrooms. However, as it has been reported that to infer the meaning of a vocabulary item a learner needs to have prior knowledge of the meaning of 98% of other words (Hu Hsueh-chao & Nation, 2000), incidental learning models may be used most effectively with intermediate and advanced language learners. Moreover, the results provide further support for the argument that more sensitive tests are required to measure vocabulary acquisition as those that consider semantic knowledge alone do not detect other knowledge types such as form and grammar (Gentner & Boroditsky, 2009).

Second, word type was also found to have a significant effect on second language vocabulary learning in the direction predicted by Hypothesis 2. There was greatest acquisition of nouns and least acquisition of adjectival emotive words; this indicates that a noun bias exists in second, as well as first language acquisition. This finding is consistent with Gentner's (1982) natural partitions hypothesis, which posits that concrete objects or entities (nouns) are easier to individuate. It also suggests that there is consistency between how first and second languages are acquired, despite the fact second language acquisition is generally a more conscious process. Moreover, it is interesting that greater acquisition of verbs than adjectival emotive words occurred despite the fact that verbs are arguably more complex. This adds support to Altarriba's (2003) assertion that context has a key role in the acquisition of emotive words due to the emotional experience that becomes linked to the memory of the context. Findings here may suggest that the role of context is more important in the acquisition of emotive words than gaining an understanding of relational frameworks is to the acquisition of verbs, or that gaining this understanding is easier to acquire than context. Further research is required to resolve this issue.

Third, time was not found to have a significant effect on second language vocabulary learning (Hypothesis 3), although results were in the expected direction (greatest acquisition in the immediate, rather than delayed post-test). Time also did not interact significantly with either knowledge or word type. These null findings were inconsistent with other research in this area (e.g., van Zeeland & Schmitt, 2013). Indeed, in accordance with the depth of processing hypothesis (Craik & Lockhart, 1972) that states semantic information is more likely to be retained as it is processed on a deeper level, we might have expected the difference between semantic knowledge and the other types (form and grammar) to be greater at the delayed, rather than immediate post-test. However, this was not the case. This might, in part, be due to methodological differences between this study and others in this area (e.g., van Zeeland & Schmitt, 2013) which focused on incidental learning with a longer delay between the learning phase and the delayed post-test.

Lastly, a significant interaction was found between knowledge and word type. This interaction had not previously been studied and therefore no predictions were made *a priori* in relation to this. We found that the

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magnitude of difference between the acquisition of nouns relative to both verbs and emotive words was significantly greater for semantic knowledge when compared to grammar knowledge. Moreover, the magnitude of difference between the acquisition of nouns relative to emotive words was also significantly greater for semantic knowledge when compared to form knowledge. These preliminary findings indicate that the observed effects of word type (nouns, verbs, adjectival emotive) on vocabulary learning are somewhat dependent on the knowledge type (form, grammar, semantic) and, conversely, that effects of knowledge type on vocabulary learning and somewhat dependent on word type. This is likely to be of value to educators (and second language learners) in terms of how best to facilitate successful vocabulary learning of the different types of knowledge and words in a second language.

Limitations of the Present Study

There were several limitations to the present study. First, while it was necessary to develop a novel English-German vocabulary task that would elicit the intentional learning of different types of knowledge (i.e., form, grammar, semantic) and words (i.e., noun, verb, adjectival emotive), there are potential issues with the target words especially those selected to represent nouns and adjectives. For instance, the nouns used were animates, which Gentner and Boroditsky (2009) have found to be acquired particularly early and as such acquisition of these may have been greater than concrete nouns from other semantic categories. Additionally, the adjectives used in the present study referred to emotive (adjectival emotive words), which Altarriba and Basnight-Brown (2011) have theorised as being particularly reliant on context to facilitate acquisition. Consequently, they may not be representative of how adjectives without an emotional reference are acquired.

Another limitation is the use of German as the unspoken second language, which has some orthographic regularities by word type; for example, all of the verbs used in this study end in –en. This may have provided certain advantages in the grammar recognition task, for example, as participants were able to use orthographic clues.

Thirdly, the composition of tasks posed limitations. In the semantic recall task participants could respond with a translation, an explanation, or a picture and it cannot be said that these response types demand the same level of knowledge. Furthermore, some of the non-words used in the form recognition task do not follow pronounceable letter strings, which may have aided participants in rejecting these in favour of the target item.

Finally, data were collected from 30 participants all of whom were university students (aged >18 years). Due to the limited sample size and subsequent lack of statistical power the findings reported here must be treated with a degree of caution. Furthermore, as five participants were bilingual and three did not have English as their first language it is also necessary to consider whether bilinguals may be better equipped to acquire new vocabulary than monolinguals: this may be explored further in future studies. It also remains unknown whether these findings would extend to other age groups at different educational levels. Therefore, further research might investigate the effects of knowledge and word type on second language vocabulary learning using larger sample of students at different stages of education (e.g., primary and secondary).

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Conclusion

The current study offers unique insights into the effects of both knowledge and word type on the intentional vocabulary learning of an unspoken second language (German). It provides evidence that vocabulary knowledge is multidimensional and that there is a gradient in acquisition (form>grammar>semantic) which adds support to the argument that more sensitive measures are required to investigate other types of knowledge that are gained (i.e., form and grammar). The findings also indicate that the noun bias is present in second language acquisition and that there is a gradient in the ease with which other parts of speech are acquired (nouns>verbs>adjectival emotive). Word type also interacts with knowledge types to influence vocabulary acquisition – a finding which requires more attention from future studies in this area. It is clear that in spite of the progress made in this study, further research is required in order to gain a fuller understanding into what processes take place during vocabulary acquisition. Such findings would have important implications for pedagogy, which might give greater consideration to the different types of knowledge and words when it comes to vocabulary instruction.

Practical Implications

- Intentional vocabulary learning of different types of knowledge (form>grammar>semantic) and different word types (noun>verb>adjectival emotive) in a second language (German) is an incremental process therefore, educators might consider the order in which learners are exposed to the different knowledge/word types and develop a greater understanding of how the difficulty level varies across each dimension.
- More sensitive assessments are required to enable educators to measure different knowledge and word types in second language vocabulary acquisition (e.g., semantic knowledge alone is insufficient in detecting other types of knowledge such as form and grammar).
- More research is required that informs educators (and second language learners) how best to facilitate successful vocabulary learning of the different types of knowledge and words in a second language.

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Appendix 1A. Recognising form knowledge.

Instructions: For each group of 4, tick the word you've just seen.

1. pirsch horsch hirsce hirsch I don't know	2. schwait schwein schweit echwein I don't know	3. bauer tauen baier bauen I don't know
4. seunruhigt beunruhige buunruhigt beunruhigt I don't know	5. instabil enstabil instobit instabit I don't know	6. ante enti ente elti I don't know
7. kochen sochen kachen kochel I don't know	8. halen fauen hauen hauer I don't know	9. ubgeschlagen abguschlagen abgeschlagen abgeschlagel I don't know
10. planem clanen plinen planen I don't know	11. einsal ainsam einsum einsam I don't know	12. malet falen malen malit I don't know
13. verzweifeld berzweifelt verzwaifelt verzweifelt I don't know	14. icharf schorf scharf scharn I don't know	15. stucken steckel stecken etecken I don't know
16. ziega ziege riege ziage I don't know	17. kur koh kuh tuh I don't know	18. hilflop hilflos tilflos halflos I don't know
19. kleben klebin klebed dleben I don't know	20. schnecki achnecke schnecke schnacke I don't know	21. furchtban rurchtbar furchtbur furchtbar I don't know
22. kaninchen laninchen kininchen kaninchet I don't know	23. virlegen verlegel berlegen verlegen I don't know	24. maschen misches mischen dischen I don't know

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Appendix 1B. Recognising grammar knowledge.

Instructions: Ticking as appropriate, identify if each word is a 'concrete noun' (an object e.g., foot, book, table), 'adjective' (a description word e.g., nice, horrible), or 'verb' (action word e.g., to go, to walk, to talk).

Word: hirsch	**Word: schwein**	**Word: bauen**
Noun	Noun	Noun
Adjective	Adjective	Adjective
Verb	Verb	Verb
I don't know	I don't know	I don't know
Word: beunruhigt	**Word: instabil**	**Word: ente**
Noun	Noun	Noun
Adjective	Adjective	Adjective
Verb	Verb	Verb
I don't know	I don't know	I don't know
Word: kochen	**Word: hauen**	**Word: abgeschlagen**
Noun	Noun	Noun
Adjective	Adjective	Adjective
Verb	Verb	Verb
I don't know	I don't know	I don't know
Word: planen	**Word: einsam**	**Word: malen**
Noun	Noun	Noun
Adjective	Adjective	Adjective
Verb	Verb	Verb
I don't know	I don't know	I don't know
Word: verzweifelt	**Word: scharf**	**Word: stecken**
Noun	Noun	Noun
Adjective	Adjective	Adjective
Verb	Verb	Verb
I don't know	I don't know	I don't know
Word: ziege	**Word: kuh**	**Word: hilflos**
Noun	Noun	Noun
Adjective	Adjective	Adjective
Verb	Verb	Verb
I don't know	I don't know	I don't know
Word: kleben	**Word: schnecke**	**Word: furchtbar**
Noun	Noun	Noun
Adjective	Adjective	Adjective
Verb	Verb	Verb
I don't know	I don't know	I don't know
Word: kaninchen	**Word: verlegen**	**Word: mischen**
Noun	Noun	Noun
Adjective	Adjective	Adjective
Verb	Verb	Verb
I don't know	I don't know	I don't know

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Appendix 1C. Recognising semantic knowledge.

Instructions: Please write or draw anything you can remember about what these words mean in English.

Word: hirsch	**Word: schwein**	**Word: bauen**
Word: beunruhigt	**Word: instabil**	**Word: ente**
Word: kochen	**Word: hauen**	**Word: abgeschlagen**
Word: planen	**Word: einsam**	**Word: malen**
Word: verzweifelt	**Word: scharf**	**Word: stecken**
Word: ziege	**Word: kuh**	**Word: hilflos**
Word: kleben	**Word: schnecke**	**Word: furchtbar**
Word: kaninchen	**Word: verlegen**	**Word: mischen**

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