A Tale of Two Mouses: The Acquisition of Irregular English Plural Nouns

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Field of Study: The current research paper was written as an assignment for the module "EAP: Research Reports" as taught by T. Kassenberg, MA, at the University of Groningen. It was also a follow-up study to a previous assignment for the module "English Words" that was taught by prof. dr. W.M. Lowie at the University of Groningen. During the module of English Words, a mini-study had to be conducted on English morphology, either on corpora on the English language or on self-acquired data. I coupled up with a friend and together we assessed 26 children at my former secondary school, but the data proved to be inconclusive due to flaws in the methodology. The current study addressed the main shortcomings (participant group homogeneity and size on the one hand, and heterogeneity of test items on the other) and found conclusive results.

*In an earlier study, Kisjes & Manning (2017) set out to find if congruity of language irregularities influenced the acquisition of second language (L2) word formation irregularities, i.e. for English, the plural of man is men instead of *mans. The results of the previous study were promising but limited: significant results were found for both congruity of irregularity and L2 irregularity, yet the results were inconclusive due to a small participant group and various opaque test items. The current study is based on this premise, adapting a similar method, but using more transparent test items, testing a larger heterogeneous group of participants and analysing the data with more appropriate statistical tests. The results provide strong evidence for the influence of congruity of irregularity on the acquisition of L2 pluralization irregularities.*

Keywords: L1 interference, grammatical irregularities, pluralization, congruity between languages

1 Introduction

Learning a new language successfully is dependent on many factors, of which most are related to the learners themselves. The influence of the learner's native language (L1) has been investigated countless times by now and has been found to influence the learner's second language (L2) skills in many linguistic domains, of which phonology and grammar are the most noticeable. Nowadays, language teaching methodologies facilitate the learning of L2 phonology by exposing the learner to many hours of language input as spoken by native speakers and focussing on stress and intonation (Moyer, 1999), rather than teaching the 'foreign' sounds of the L2. Teaching grammar, on the other hand, is done in various ways, but ultimately even the communicative-based methods will resort to teaching (some) grammar formally through rules at higher proficiency levels. On the one hand, these rules can be beneficial to learner's by providing productive ways to create new words (i.e., affixation & compounding). On the other hand, the numerous exceptions that some rules have raise the question whether it is more productive to learn words individually, or to learn the skewed rule and all its exceptions. The question even remains if such rules and exceptions can be learned successfully through instruction, or if it is something slowly acquired over time through exposure to the language. Some studies have already looked at the influence of the L1 when acquiring the irregularities of English verb morphology (Birdsong & Flege, 2001). Yet apart from the pilot study (Kisjes & Manning, 2017), no other studies have looked

at the influence of the learner's L1 on the acquisition of L2 pluralization irregularities. Because of several methodological flaws in the earlier study, the current study too set out to find whether or not the learner's native language (L1) influences the acquisition of the irregularities of l2 pluralization.

2 Background

2.1 The lexicon

Knowing how second language irregularities are acquired requires knowing how languages are stored in the brain. The mental representation of the meaning of words is the so-called lexicon, and it contains both words as a whole and word formation rules. Plag (2014) sketches a theoretically perfect lexicon: "[...] no information should be listed more than once in the mental lexicon, and everything that is predictable by rule need not be listed" (p. 48). If we look at the adjective 'empowered' as an example, we can see how this works in practice. By taking this adjective apart down to the root 'power', together with the affixes em- and –ed, a viable system for storing meaningful units is created. There seems to be no need for separate storage units for power, powered, empower and empowered, and both em- and -ed can be used as affixes on many other roots (for a full overview on affix productivity, see Plag, 2014, p. 44-71). Nevertheless, even though the meaning of the word is 'predictable by rule', the adjective may very well be stored as a whole unit: retrieving the meaning of several segments every time a word is retrieved is a laborious process as compared to retrieving just one unit of meaning if the word is stored as a whole. Moreover, if the word is relatively frequent, this extra processing time would really add up. The lexicon then needs a healthy balance between economic storage and fast retrieval (Lowie, 1998; Plag, 2014). To conclude, there are two ways of retrieving the meaning of a word: either by stripping all its affixes and combining their meaning with that of the root — the so-called decomposition route — or by retrieving the item itself, if it is stored as a whole in the lexicon — the so-called whole-word route (see figure 1). But before the meaning of a word can be retrieved from the lexicon, it must be acquired.

Assessing new words and productivity constraints

Interpreting new words differs from reading known words only in that it cannot be done through the whole-word route: new words simply are not yet in the lexicon. To be able to retrieve a morphologically complex word as a whole from the lexicon, a minimum of sixteen encounters is required (Lightbown & Spada, 2013, p. 62). Once it is established as a unit on its own, more recent encounters with a word increase the likelihood of the whole-word interpretation due to a higher resting activation of the lexical item (Plag, 2014). Nevertheless, when assessing new words, the reader then relies on their knowledge of the productivity of affixes and their general lexical knowledge. We know that *cower [i.e. someone who *cows] is not an actual word in English, and maybe more importantly, not a possible word in English, as –er suffixes attach to verbs, not to nouns. Our knowledge of the word cow being exclusively a noun allows us to reject *cower as a possible word. Moreover, one's general lexical knowledge can block otherwise potential words: *childs is blocked by children and *stealer is blocked by thief; thus, word formation rules can be limited in a variety

of ways. Now that both the whole-word route and decomposition route are clear from a monolingual perspective, the focus will shift to the bilingual perspective.

2.2 Two languages at once: a bilingual lexicon

The bilingual variant of the lexicon too has been a topic of debate. Weinreich (1968) has proposed three types of storage in a bilingual's mind: coordinate, subordinate and compound storage. Coordinate storage refers to a separate lexicon for each language. Subordinate storage refers to the main type of storage in early stages of language learning, where the new language is only stored through the L1 counterparts, and compound storage is when items from both languages are stored in a shared lexicon without any inherent hierarchies. De Groot (1993) summarizes several studies on the organization of the lexicon, many of which assume "either one or the other pure bilingual representational system" (p. 46). However, she concludes that "lexical memories of individual bilinguals may contain a mixture of different representational forms" (p. 46), partly determined by one's L2 proficiency and L2 learning history. This conclusion is further supported by the nature of word access in the lexicon.

Non-selective access to the lexicon

Lexical retrieval from the lexicon is, counter-intuitively, non-selective: when a word is activated in one language, the equivalent in (an)other language(s) is activated as well. Dijkstra (2005) summarizes empirical studies on selective access of interlingual homographs and cognates and concludes that "[...] the recognition process of isolated words is basically language nonselective in nature" (p. 198). Thus far there has been evidence supporting non-selective access for whole items — and thus a bilingual whole-word route as well — yet the question remains if affixes are accessed non-selectively as well. The next section will cover the decomposition route from a bilingual perspective.

Bilingual morphological processing

Affixes in morphologically complex words can co-activate a translation equivalent in other languages, similarly to how whole words co-activate forms of other languages. Lowie (1998) suggests a bilingual model where i.e. the retrieval of stretchable co-activates the Dutch -baar affix, because they have much syntactic and semantic information in common, but are distinguished by their orthographic & phonological form on one hand and by language subset on the other hand. After three experiments, he concluded that affixes are more likely to be accessed non-selectively depending on their similarities — and by contrast, affix translation pairs may barely co-activate one another if the orthographic & phonological forms are completely different. Thus, the activation of the English -s affix for pluralization may co-activate the Dutch -en and -s, as all have the same syntactic and semantic information — turning singular into plural. In turn, this could result in excitatory or inhibiting brain activity on the L2 processing as a result of the L1 irregularities. Moreover, even though the affixes belong to distinct language subsets, there is a partial overlap in form, as Dutch too has plural -s.

2.3 Research question and hypotheses

The aim of the current study is thus to find out if L1 irregularities influence the acquisition of L2 irregularities in (semi-)similar affix translation pairs — such as English plural –s for Dutch learners of English. Based on the features of the (bilingual) lexicon, we can expect a strong influence of item frequency. Weinreich's (1953) model of subordinate storage in early L2 learning would suggest a strong influence on items with L1 irregularity. For the older students, de Groot's (1993) summary would suggest that congruity of irregularity will have a strong influence on the students' judgements on the presented items — further emphasized by Dijkstra's (2005) conclusion on the influence of the L1 on a single-item judgement task. Based on Lowie's (1998) findings, it is to be expected that congruity of affix irregularities between languages plays a role in the acquisition of the irregularities of plural -s in English, and thus incongruently formed English plurals (i.e., regular in L1 and irregular in L2 and vice versa) would have higher error rates than congruently formed plurals. To verify these hypotheses, over 200 Dutch secondary school students from different ages and educational levels were tested using a lexical decision task.

3 Method

3.1 Participants

202 Dutch secondary school students from three different educational levels were tested: Havo-2, Havo-5 and VWO-6. These three groups differ in age and/or educational level. All participants were screened for age, gender and English — see Table 1 for the exact numbers. The results of 4 students have been omitted because they failed on 2 or more of the 4 control items.

3.2 Design and materials

Design

This is a cross-sectional study with a complex lexical decision task — where participants have to judge words on both their spelling and their meaning — using a 2x2x2 design for the test items, combining the conditions of L1 regularity, L2 regularity (both either regular or irregular) and test item type (real word / non-word). Congruity of irregularity is thus not a design factor on its own, but a logical result from the interaction between L1 and L2 regularity.

Corpora

Word frequency on a logarithmic scale is a strong indication of word familiarity (Tanaka-Ishii & Terada, 2011). In order to focus on the effects of congruity and L2 irregularity, the Dutch CGN (Oostdijk, Reynaert, Hoste, & Schuurman, 2013) and English COCA (Davies, 2008) corpora were used to filter out the effect of word frequency. The relative frequency (per million words in the corpus) for each test item and their translations were converted

to a log scale, i.e., a relative frequency of 50 per 1 million would be converted to the value of log (50).

Experimental task

A complex lexical decision task with 48 items (4 introductory items, 5 items per condition and 4 control items — the order of the 44 test items was completely randomized; see appendix 1) was used and administered using Google Forms. Each item had the same question: "Is this an English word and does it actually mean what is on the picture?" Students then had to assess the word and accompanying image on the spelling and meaning of the word and select the corresponding answer.

3.3 Procedure

The students took the test individually and started with filling in a questionnaire about themselves (age, gender etc.), after which they were explicitly encouraged to pay special attention to the way the word was spelled and whether or not that was a word in English, but also to look at gender or number differences (i.e. the word could be 'boy' but show a girl on the picture: the word is indeed an English word, but the meaning then would differ in terms of gender (as it overlaps in terms of "a young child", but not on gender)). A tutorial was done together in class on a projector, to ensure that every student would understand when to use which answer based on the peculiarities that they had to focus on. After this tutorial, students had up to half an hour to complete the 44 test items, although only 2 students took longer than 20 minutes and both had finished their test within the time limit.

4 Results

4.1 Dependent variables

To test the hypotheses on the influence of both logarithmic word frequency and language-specific irregularities, a linear regression analysis was run. For word frequency, the log-values of the relative frequencies of both singular and plural forms in both corpora of both languages were used. For congruity of irregularity, the three design factors for test items were used (real -/ non-word, L1 regularity and L2 regularity), as well as an explicit factor for congruity of irregularity. Table 2 shows the results of all significant predictor factors. The overall model fit was $R^2 = 0.764$.

4.2 Independent variables

To control for background effects, age, gender, level of education and proficiency levels were also tested with a one-way ANOVA analysis. No main or interaction effects were found for the independent variables.

5 Discussion & Conclusion

The results provide support for all of the three hypotheses, but to different degrees. L1 regularity itself was not a significant predictor variable, regardless of age, but the logarithmic word frequencies of both singular and plural forms in the L1 were. L1 regularity may thus only play a role in the acquisition of L2 irregular plurals if the L1 plural form is fully acquired. This explanation is further supported by the relatively low tolerance of the L1 corpus frequency predictor variables. Moreover, the insignificant influence of L1 irregularity in general could be explained by the size of the effect and the design of the study: the effect was expected to be rather small compared to the other factors at play (congruity and L2 regularity) and the study was designed to distinguish the influences of L2 regularity and congruity of it with L1 regularity.

L2 regularity was once again a significant influence on the recognition of L2 irregular plurals, yet this time congruity of irregularity was clearly too, and both effects showed a high tolerance in the regression model, whereas it was unclear in the former study if there was an interaction at play or not. By taking into account the shortcomings of that study — the small number of participant and the heterogeneity of the test items — the current results succeeded in distinguishing the influence of both factors: congruity of irregularity did show a statistically significant result on its own, regardless of the influence of L2 irregularity. Yet this study knows its own shortcomings: only written forms were assessed, and the tasks only tested perception. Future studies could take into account the possible effects of assessing written forms as compared to auditory items, or perhaps look into the productional side of pluralisation and compare the different strategies students of English employ when they would have to create plurals themselves.

Figure 1: Both word processing routes visualised, taken from Plag (2014)

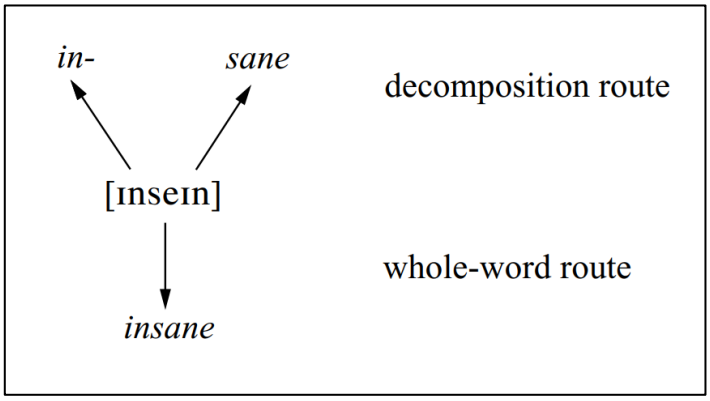

Table 1: Participants

Level of education	Students (#)	Age (Mean age ± SD)	Gender	English Proficiency (Mean grade [1-10] ± SD)	English Proficiency (Mean self-estimate [1-5] ± SD)
Havo-2	83	(M: 13.11 years ± 0.383)	38 men, 45 women	(M: 7.4 ± SD 1.06)	(M: 3.01 ± SD 1.09)
Havo-5	68	(M: 16.6 years ± 0.74)	32 men, 40 women	(M: 6.9 ± SD 1.2)	(M: 3.125 ± 1.16)
VWO-6	47	(M: 16.7 years ± 0.57)	22 men, 25 women	(M: 7 ± SD 1)	(M: 2.3 ± SD 1.15)

Table 2: Results of linear regression analysis

Predictor variable	Beta	p-value	Tolerance	VIF
L2 regularity	0.521	< .001	.876	1.142
Congruity of (ir)regularity	0.392	< .001	.991	1.009
Word frequency of plural form in English corpus	0.615	< .001	.378	2.649
Word frequency of singular form in Dutch corpus	-0.450	0.002	.354	2.824
Word frequency of plural form in Dutch corpus	0.243	0.048	.438	2.284

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7 Appendix

This is a public link to the test used in this study:

https://docs.google.com/forms/d/e/1FAIpQLSdNu8n7Py7IpaMuibzxRIYSvwCgw6-EVmr_rplxEs1sHbS4EQ/viewform?usp=sf_link