Age effects on the acquisition of nominal and verbal inflections in an instructed setting

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Abstract

This study examines evidence for the hypothesis (e.g., Muñoz, 2006) that an early starting age is not necessarily more beneficial to the successful learning of L2 inflectional morphology in strictly formal instructional settings. The present author investigated the quantitative and qualitative differences in the production and reception of 5 selected inflectional morphemes in English written performance and competence tasks by 100 early classroom learners and 100 late classroom learners of the same age. While an earlier age of first exposure and a longer instructional period was not associated with higher accuracy scores, the findings suggest distinct patterns in the productive and receptive knowledge abilities of inflectional morphology; the late classroom learners' superiority seems to be rooted in their greater reliance upon memory-based item-by-item associative learning, as they are significantly stronger on tasks that might cause semantic difficulties, whereas the early classroom learners are marginally better on pattern-based processes for certain morphemes. This finding possibly supports Ullman's (2005) proposal that, as procedural memory declines with age, older starters have difficulty in discovering regularities in the input and thus over-rely on the declarative memory system in L2 learning.

Keywords: English morphology, second language learning, second language teaching, age effects, instructional setting

Based on Lenneberg's (1967) idea of a *critical period* and its implications for second language learning in a naturalistic setting, dozens of governments all over Europe have introduced policies to accelerate the exposure to second language (L2) English of school children in recent years, including Switzerland. In 2004, the Swiss Conference of Cantonal Ministers of Education decided to introduce L2 English into the primary school curriculum in order to foster multilingualism in future generations and to ensure more proficient L2 speakers. However, there has been considerable controversy about the effectiveness of early L2 learning in an instructional setting, particularly in light of the recent findings that different aspects of language have different critical periods and are more sensitive to variables such as age of first exposure (AoE), length of instruction (LoI), and biological age (BA) (DeKeyser, Alfi-Shabtay, & Ravid, 2010). For instance, L2 learners' difficulty with inflectional morphemes is well-documented in immigrant as well as classroom studies (Jia & Fuse, 2007; Jjang, 2004; Larson-Hall, 2008; McDonald & Roussel, 2010; Muñoz, 2006; among many others). In an input-poor environment such as the classroom, it is particularly difficult for the learners to engage in the phonological, morphosyntactic, and lexicosemantic processes involved in L2 morphology acquisition.

Despite a relatively high number of existing morpheme studies that examine age-related effects, many of them are conducted in naturalistic learning situations or immersion/CLIL[1] programs, while those that actually provide evidence from foreign language learning settings focus on the L2 morpheme acquisition order and/or the rate of acquisition of grammatical functors and therefore primarily test different-aged learners. There are also particularly few studies to date with a respectable number of participants. Furthermore, while a number of researchers (e.g., Kempe, Brooks, & Kharkhurin, 2010) have demonstrated that there is a large variety of mechanisms and processes operating in L2 learning, research is still incipient on the role of explicit versus implicit learning and early versus late learning in strictly formal instructional settings. This calls out for detailed analyses such as the present study, which examines inter-learner variation (early CLIL learners vs. late non-CLIL learners of the same age), with a good sampling of one (age-sensitive) aspect of language. The main aims of this study are: (a) to examine whether early classroom learning and late classroom learning yield different levels of proficiency in inflectional morphology, and (b) to analyze whether the two kinds of learning are possibly different in nature, that is, if the two groups exhibit different difficulties with producing inflectional morphology and detecting violations of the latter in receptive tasks.

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[1] CLIL = content and language integrated learning.

Previous Research on Age and L2 Morpheme Acquisition

The explanations for possible age effects on the acquisition of morphology in the literature are manifold and intimately connected with the question as to whether L1 acquisition and L2 acquisition/learning are subserved by one and the same system or by two separate mechanisms (see Bird, Lambon Ralph, Seidenberg, McClelland, & Patterson, 2003). In many naturalistic studies that postulate a single system connectionist model (e.g., Clahsen & Felser, 2006; McDonald, 2006, 2008), it is pointed out that L2 morphosyntax seems to be more vulnerable to processing difficulties than L2 lexico-semantics (independent of the L1) and therefore more susceptible to age. Such difficulties have been linked to resource limitations that might lead to the inability (a) to access and retrieve stored L2 knowledge (semantically-related difficulties) and/or (b) to detect phonological discriminations in the input (phonologically-related difficulties), similar to the difficulties of native speakers under specific types of stress manipulation (McDonald, 2006, 2008; McDonald & Roussel 2010). For instance, McDonald & Roussel (2010) compared the performance and competence of 15 native speakers and 23 nonnative immigrants in a series of tests (phonological ability tasks, lexical access tasks, past tense grammaticality judgment [GJ] tasks, and past tense production tasks). They suggested that late starters have poor vocabulary and slow lexical access compared to early starters or native speakers, possibly due to less practice, or, in connectionist terms, less strengthening of the connection between the phonological and the semantic representations (Gollan, Montoya, Fennema-Notestine, & Morris, 2005), and/or due to "interference from having two phonological representations, one from each language, active at the same time" (McDonald & Roussel, 2010, p. 431). This is reflected in their problems with irregular past tense forms, for example, the production of overregularization errors. As regards point (b), the significant role of sound perception in the acquisition of morphemes has been well-documented in recent years (see, e.g., Collins, Trofimovich, White, Cardoso, & Horst, 2009; Ellis, 2006; Ellis & Larsen-Freeman, 2006; Goldschneider & DeKeyser, 2001). As DeKeyser (2005) rightly points out, "the meaning of morphemes and the distribution of their allomorphs cannot be acquired without the phonological capacity to extricate them from the flood of sounds in every sentence" (p. 2). Many naturalistic studies (e.g., McDonald, 2006, 2008) suggest that since (particularly late) L2 learners have difficulty with decoding surface form information, it makes it harder for them to recognize L2 nonsalient inflections and they thus tend to produce unmarked forms or forms with phonological errors and struggle with the detection of those forms in GJ tasks.

Late learners' phonological and semantic difficulties with L2 inflectional morphology have also been explained in terms of Pinker's (1999) dual-mechanism account, according to which there is not a single system connectionist model underlying L1 and L2 processing, but there are two separate systems, one of which draws on phonological knowledge and the other one on semantic knowledge. Famously, Ullman's declarative-procedural model posits that the procedural system, which underlies the (implicit) processing of aspects of grammar, is less involved in L2 than in L1 processing, possibly due to maturational (hormonal) changes after the onset of puberty, which makes late learners overrely on the declarative system during L2 morphosyntactic processing. For instance, in order to process morphologically complex words, late learners mainly rely on full-form storage, while morphological parsing is underused or even absent (Ullman, 2005, p. 143; compare also the shallow structure hypothesis by Clahsen & Felser, 2006). Evidence for this has been provided by studies that showed that computation of irregular forms is increasingly deficient as age of arrival (AoA) increases (e.g., Birdsong & Flege, 2001).

Attempting to define the temporal boundaries of a sensitive period for morphosyntactic processing in a naturalistic setting, a number of scholars (e.g., Ionin & Wexler, 2002) suggest that the decline begins very early. Typically, age 6 is described as one of the stages of life when the cognitive decline is particularly accentuated for morphosyntax, that is, when children start following an adult path of morpheme acquisition (DeKeyser, Alfi-Shabtay, & Ravid, 2010, p. 414), even though the opposite (that is, no critical period for morphosyntax) has also been suggested (cf. Flege, Yeni-Komshian, & Liu, 1999). As concerns the offset point of a sensitive period for morphosyntax, numerous researchers (e.g., DeKeyser, Alfi-Shabtay, & Ravid, 2010; Johnson & Newport, 1989) suggest that the acquisition of L2 morphosyntax is constrained by the completion of brain maturation at about the age of 15-17 years. Other immigrant studies have shown that AoA effects exist but take years to emerge. For instance, Jia & Fuse (2007), who investigated the acquisition of a similar range of morphemes by 10 native Mandarin-speaking children and adolescents with different ages of arrival in the United States, found that AoA was not a great predictor of L2 morphological proficiency. Only with the third person agreement (3PS) and the regular past morpheme did the early arrivals achieve greater proficiency, and this AoA effect only appeared after "several years" (p. 1280) in the immigrant setting. Generally, even after having lived in an English-speaking country for 5 years, only one morphological structure investigated (progressive aspect -*ing*) was mastered by all the participants (defined as over 80% accuracy). Likewise, Paradis' (2005) study with L2 child learners (mean age: 5.7, mean number of years of exposure to English: 9.5 months) yielded that "although ESL children will eventually

achieve native-speaker levels of accuracy with grammatical morphology, it is unknown how long it takes, and large individual differences in rates of development may persist past the early stages" (p. 183). It should be noted that 9.5 months of exposure to English in the target country would mean several years of input in the L2 classroom.

In most classroom studies, there is the consensus view that there should be no advantage for an earlier start. Concerning the perception of L2 sounds, Fullana (2006) emphasizes the importance of the learners' L1 phonological system and their stage of L1 phonological development when they start learning the L2, rather than the neurophysiological maturation. Following Flege (1991), she suggests that the L1 phonetic inventory is established at the age of 5-7 so that the L2 learning success in phonology by learners that start after that age is not dependent upon the starting age anymore. Furthermore, since the learners "maintain their phonetic learning ability" (Fullana, 2006, p. 42), they should be able to attain native-like phonological skills with increasing exposure to the L2. In testing the perceptual discrimination skills (e.g., detecting word-final consonant voicing and consonant clusters) of 281 different-aged learners (ages 8, 11, 14 and 18+) who were part of the Barcelona Age Factor (BAF) project, Fullana (2006) found that the youngest starters (8-year-olds) obtained significantly lower correct discrimination scores than the other starting age groups (e.g., the 14-year-olds) after 200 and 416 hours of instruction. Only after 726 hours did the early starters catch up with the other groups (see also García-Lecumberri & Gallardo, 2003). As concerns age-related effects on the development of morphological features, Muñoz (2006) tested the same group of different-aged learners of the BAF project. She observed that older learners are superior in morphological acquisition "even after a number of years of instruction" (p. 107); they learn the use of the grammatical functors faster and show more accurate use (higher suppliance in obligatory context percentages), which is in line with prior descriptions of the initial short-term advantage and the initial fast rate of late learners in the areas of morphosyntax, vocabulary and metalinguistic knowledge, that is, skills that strongly depend on rule acquisition (Singleton & Ryan, 2004; Snow & Hofnagel-Höhle, 1978). However, it has often been suggested (e.g., Birdsong, 2006) that this was probably due to the late learners' cognitive advantages at testing. For instance, Muñoz (2006) found that in both early and late learners, "morphosyntactic learning seems to boost at around age 12, coinciding with the cognitive growth associated with puberty" (p. 32).

Larson-Hall's (2008) study is similar to the present one in that she tested the receptive knowledge of L2 morphosyntactic and phonological mastery of 200 L2 English learners (L1 Japanese) divided by ages of onset (the early

clasrooom learners [ECLs] starting in primary school at the age of 9, the late classroom learners [LCLs] starting in middle school at the age of 13) and length of instruction but with a similar age at testing time (age range 18-21). Larson-Hall only found some modest statistical advantages on the phonemic discrimination task, but not on the morpheme task, for the early starters. She concluded that "no clear advantages for a younger starting age among the earlier starters was seen" (p. 56), since the ECLs' phonological advantage could probably be attributed to the larger amounts of total input; when the total hours of input were controlled, age was not entirely separate from amount of input but interacted with it. One major drawback of her study, however, is that her early starters were integrated in the same classes as the late (beginning) learners, which might have had a leveling-down effect on the early starters.

German vs. English Inflectional Morphology

The learners in the present study speak a Swiss German dialect (see discussion below). In both Swiss German and English, there is no obvious semantic difference to guide the choice between regular and irregular past tense forms, and both languages use nominal and verbal inflections to mark tenses, plurals, and subject-verb agreement, albeit not exactly to the same extent. The most noteworthy difference is that in contrast to English and High German, there is no form of the simple past or preterite in the Swiss German dialects (Reese, 2007); the Swiss only make use of the present perfect, which corresponds to the English simple past and present perfect. Consequently, the use of verbal and nominal inflections by the Swiss learners is expected to show L1 transfer as an accelerator (owing to the learners' familiarity with a similar inflectional system) as well as an inhibitor (due to the L1-L2 discrepancies just outlined). Interestingly, DeKeyser, Alfi-Shabtay, & Ravid (2010) suggest that if the L1 and the L2 are "relatively closely related" (p. 432), the decline as a function of age in learners below the age of 18 is less marked than if the two languages are not related.

Research Questions

In this study, I will analyze the learning outcome of five selected English bound morphemes in the L2 production and perception of 100 ECLs and 100 LCLs 6 months into L2 English learning at middle school. The five morphemes are: past regular, past irregular, plural regular, plural irregular, and 3PS. The preceding discussion motivates the following research questions (RQs):

1. Are there any significant between-group discrepancies in the accuracy scores?
2. Are there any age-related differences in terms of relative difficulty (tense-related vs. nontense-related morphemes, regular vs. irregular morphemes, salient vs. nonsalient morphemes)?

It must be noted that the present study is not intended to gauge the relative strength of the various features of saliency reported to influence acquisition of morphology. Neither do I analyze the sequential mastering of the L2 morphemes; the sole emphasis is on the accuracy scores of same-aged learners with differing ages of first L2 exposure in a classroom. Thus, the question that is at stake here is not whether older learners experience a faster learning rate (a hypothesis which has been firmly established), but rather whether their learning rate is fast enough for them to catch up with (and possibly even surpass) the ECLs within 6 months of L2 English learning at middle school.

Method

Participants

One hundred ECLs (52 females and 48 males) and 100 LCLs (51 females and 49 males) participated in this study. They differed in age of first exposure (AoE of ECLs: 8, AoE of LCLs: 13) and length of instruction (LoI of ECLs: 5 years and 6 moths, LoI of LCLs: 6 months), but had the same BA at testing (13 years and 6 moths). Note that since the first Early English learners in Switzerland began middle school in summer 2010, this was the most mature age group in the Swiss educational system that had previously attended an official Early English program. It is important to mention that the Swiss Conference of Cantonal Ministers of Education promotes an implicit (CLIL[2]) learning approach at primary school level, that is, they officially declare that it is one of the main goals of Early English learning in Switzerland to focus on spoken English, particularly vocabulary (formulaic language), leaving formal grammatical instruction to teaching at secondary school level. In the CLIL program that they attended, students received on average 90 min of Early English per week in two 45-min classes.

None of the participants had stayed outside of Switzerland for longer than one month. The learners spoke the Zurich standard dialect, which is one

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[2] Note that in Switzerland, the term CLIL refers to a situation where English may be the central focus of the lesson, but the teacher is free to incorporate it into, or combine it with, other subjects or conduct classroom business in the L2.

of the largest in Switzerland. Besides Standard German as the first L2,[3] all of the participants had had French as a school subject for 2.5 years, with two years in primary school (two 45-min classes per week) and six months in middle school (three 45-min classes per week). This means that for the ECLs, English represented the second foreign language (or L3) to be learned at school, while for the LCLs, it was the third L2 (or L4). Since the participants all attended the same school in the state system (a typical middle school in the canton of Zurich), it is hoped that the type and amount of English input the groups received did not differ significantly. All the learners knew the rules for English past tense, plural and 3PS formation. The classes of the participants were intact but not mixed, since at the school where the learners were tested, ECLs and LCLs do not come together in the same L2 class.

The control group included 20 native speakers that attended the same school at grade level 6. It should be emphasized that the control group was not included to compare the learners with native speakers, but to ensure the validity of the tests. The testing session took place 6 months after the learners had entered middle school. Depending on the size of the classes, at least five testing sessions of 45 min each were conducted with each class.

Materials

In this paper, written production as well as grammaticality judgment data are examined. The production tasks were supposed to elicit different structures: An argumentative essay on the pros and cons of casting shows and an oral spot-the-difference task elicited 3PS and plural markers, while oral and written narratives elicited past morphemes, encouraging students to narrate "what happened in the silent movie 'The Triplets of Belleville.'" As was the case with an earlier analysis of mine that investigated the L2 article system (Pfenninger, 2011), the retelling task proved to be a reliable instrument in this analysis as well, since the learners had to use a certain set of verbs and nouns in order to describe the sequence of events in the silent film. Every participant produced between 450 and 900 written words, of which the first 200 of each essay were selected, thus amounting to 400 written words per student.

The GJ task, which tested regular morphology, was presented in written form to the learners, which has the advantage over an auditory GJ task in that it avoids the problem of phonological decoding, which is difficult for many L2 learn-

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[3] Most German Swiss become bilingual between dialect and standard German during the first few years of elementary schooling at the latest, but Standard German is primarily a literary and written language and rarely spoken.

ers in an instructed setting (Jiang, 2004, p. 608). In order for the participants not to draw on their explicit L2 knowledge, the task was timed; the students had a maximum of 15 minutes to make their judgments (approx. 10 s per sentence), which, for their age, was necessary in order for them to read and understand the sentences. Of the 82 items of the GJ task, 18 were relevant to the discussion of the mastery of L2 morphology. They were partly adopted from McDonald's (2006) GJ task; the sentences were made ungrammatical in that regular past, plural and 3PS endings were omitted, and sentence contexts, verb/noun endings and salience of the tested inflections were carefully controlled.

Data Scoring and Procedures

Following McDonald & Roussel (2010), morpheme productions in obligatory contexts were coded as correct, irregularized, regularized, omitted, misformed, overused, substituted, or 'other' forms. In keeping with Ionin & Wexler (2002), I counted as irregular any verb or noun form that involved a change to the stem, as opposed to simple affixation; thus, *cried* was counted as irregular. No difference was made between the so-called irregular no change verbs with zero vowel change (e.g., *cut-cut*) and irregular change verbs with internal vowel change (e.g., *swim-swam*). Unmarked forms were regarded as either present (omission of 3PS) or past (omission of regular or irregular past tense) depending on the tense used on other verbs in the sentence. If the target word was the only verb in the sentence, the tense of the previous sentence was considered. Agreement errors (such as *was* for *were* or vice versa), as in *But when they was in New York* (Quagmire, LCL, NARRw), were included in the category 'other'. Overgeneralizations such as *taked* and *childs* counted as regularized past and plural morphemes respectively. In those cases where a (regular or irregular) past tense form was additionally marked for 3PS, as in *Other peoples* <u>*cames*</u> (Janey, LCL, NARRw), the error was counted as a misformation of an irregular past morpheme as well as an overuse of the 3PS.

After each context was scored, the score values were added applying Pica's (1983) famous suppliance in obligatory context (SOC) analysis, according to which learners can score 1 point for the correct form, half a point for a morpheme misformation and 0 points for no morpheme, that is, the unmarked form. Since connectionist theories have established that while token frequency promotes the retention of irregular forms, it is type rather than token frequency that facilitates learning of regular morphology (Ellis & Larsen-Freeman, 2006, p. 565), I also counted and analyzed the different lexical items as data. Furthermore, since SOC analyses have been criticized for focusing too strongly on the grammatical aspects of L2 acquisition and thus ignoring func-

tional use of the L2 (Muñoz, 2006, p. 109), I also analyzed the learners' production of each of the error types described above.

Results

Table 1 presents the percentage correct in obligatory contexts by token counts, while Table 2 presents the same by type counts. With the mastery of structure defined as over 80% accuracy (Jia and Fuse 2007, p. 1288), all structures but one (3PS) were mastered by the two learner groups, which is not surprising. As is described in various naturalistic and classroom studies (e.g. Zhang & Widyastuti, 2010), subject-verb agreement morphology is mastered late and is highly susceptible to error. Differences in percentage points between groups are small for all the morphemes, except for the correct suppliance of irregular past morphemes, where the ECLs scored 10 percentage points lower than the LCLs.

Table 1 Comparison of SOC percentage scores (tokens) for the two groups

Morpheme	ECLs ($n = 100$)	LCLs ($n = 100$)	Percentage difference	Control Group ($n = 20$)
Plural regular	.92	.91	-1	1.00
Plural irregular	.88	.91	+3	1.00
Past regular	.85	.84	-1	1.00
Past irregular	.85	.95	+10	1.00
3PS agreement	.72	.68	-4	1.00

Table 2 Comparison of SOC percentage scores (types) for the two groups

Morpheme	ECLs ($n = 100$)	LCLs ($n = 100$)	Percentage difference	Control Group ($n = 20$)
Plural regular	.93	.91	-2	1.00
Plural irregular	.84	.87	+3	1.00
Past regular	.86	.81	-5	1.00
Past irregular	.79	.93	+14	1.00
3PS agreement	.65	.67	+2	1.00

Table 3 sheds light on the distribution of the error types of past morphology produced by the two starting age groups, while Table 4 shows the results of the corresponding GJ items. In the written production data, the range in individual accuracy with past regular morphemes was 50% to 100%

(SOC scores) for both ECLs and LCLs; with past irregular morphemes it was 34% to 100% for the ECLs and 64% to 100% for the LCLs. While the ECLs produced significantly more overregularizations and misformations than the LCLs for irregular verbs (besides having significantly lower correct scores in general), the overall rate of unmarked regular and irregular past tense forms in the production tasks was similar for both groups. Interestingly, the perceptual salience of the 3 allomorphs of the regular *-ed* morpheme, namely the two nonsyllabic /t/ and /d/ and the syllabic /ɪd/, had an influence on the past tense marking in the LCL data: 42.86% of the unmarked forms showed a deletion of the final syllabic allomorph, while 57.14% were omitted nonsyllabic inflections. In other words, the LCLs seem to have had slightly more trouble producing the regular past morpheme across its 3 allomorphs than the ECLs, who did not omit missing syllabic forms at all. By contrast, in the GJ task, the LCLs performed significantly more accurately on detection of the absence of both the syllabic and the nonsyllabic allomorphs (see Table 4).

Table 3 Performance on past morphology by ECLs and LCLs

Morpheme	ECLs	LCLs	C/P	Chi-square (1*df*)	*p*
	(*n* = 62)	(*n* = 81)	(*n* = 20)		
PAST REGULAR (TOKENS)	%	%	%		
Correct	70.59	85.15	100	4.38	.036
Unmarked	5.88	3.96	0	n.s.	n.s.
Unmarked with /t/ or /d/	0	2.97	0	n.s.	n.s.
Participle	0	0	0	n.s.	n.s.
Misformation	23.53	7.92	0	7.76	.005
PAST IRREGULAR (TOKENS)	%	%	%		
Correct	60.38	89.31	100	66.9	< .0001
Regularized	13.21	5.12	0	11.0	.001
Unmarked	5.66	3.34	0	n.s.	n.s.
Participle	3.77	.22	0	20.1	< .0001
Misformation	9.43	1.56	0	25.2	< .0001
Other	7.55	.45	0	n.s.	n.s.

C/P = control group
n.s. = not significant
bold types = significantly higher scores (i.e., lower error rates)

It is important to mention here that the ECLs created a lot less contexts for using the past regular than the LCLs.[4] Even though the learners were explicitly encouraged to tell the story in the past, 38% of the ECLs avoided using past forms altogether (using the present simple and present perfect instead) and

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[4] Note that the data still yielded a sufficient number of tokens for the two types to be contrasted.

thus did not contribute any scores (compared to 9% of LCL 'avoiders'). The picture looks similar for the past irregular: While the LCLs produced a range of verbs besides *be*, which was used in 20.13% of the cases, the ECLs used inflected *be* to a greater extent (54.08% of all the irregular verbs, to be precise). This kind of avoidance might be in part due to the L1-L2 difference variable described above; however, the between-group difference is still striking and might be tentatively interpreted as a lack of knowledge on the part of the ECLs.

Table 4 Percentage scores of past tenses judged correctly by ECLs vs. LCLs

Sentence no.	ECLs ($n = 100$)	LCLs ($n = 100$)	t	p	C/P ($n = 20$)
52/44 (*walked*)	.95	.97	n.s.	n.s.	1.00
63/66 (*visited*)	.92	.97	n.s.	n.s.	1.00
74/78 (*cleaned*)	.95	.98	n.s.	n.s.	1.00
19/27 (*end*)	.26	.45*	2.825	< .01	1.00
35/23 (*taste*)	.13	.24*	2.007	< .05	1.00
77/77 (*cook*)	.26	.45*	2.825	< .01	1.00

n.s. = not significant
* significantly higher scores

Table 5 outlines the results for the production of the 3PS, regular and irregular plural, while Tables 6 and 7 include the results of the critical morphemes in the GJ task. Table 5 also reveals that the ECLs produced significantly more misformed 3PSs and irregular plurals than the LCLs, and they overused the 3PSs and irregular plurals significantly more often in contexts where these markers were not required. Langman & Bayley (2002), who analyzed the production data of English morphology by nine untutored Chinese learners of Hungarian in a naturalistic setting, were able to discern two main strategies of the use of inflectional morphology; while four learners attempted to inflect correctly only those verb forms whose inflections they knew (like my LCLs), the remaining three inflected "(nearly) everything as a strategy for getting the 'right form'" (p. 70), similar to my ECLs (see also Pica, 1983).

Table 5 Performance on 3PS agreement by ECLs and LCLs

Morpheme	ECLs ($n = 100$)	LCLs ($n = 100$)	C/P ($n = 20$)	Chi-square (1df)	p
THIRD PERSON SING. (TOKENS)	%	%	%		
Correct	67.86*	59.48	100	7.19	.007
Unmarked	19.69*	29.74	0	31.9	< .0001
Unmarked with /s/, /ʃ/ or /tʃ/	2.72	3.25	0	n.s.	n.s.
Overuse	7.81	5.64*	0	4.40	.036
Participle	0.68	0.51	0	n.s.	n.s.

Misformation	3.23	1.37*	0	9.02	.003
Other	1.02	0	0	n.s.	n.s.
PLURAL REGULAR (TOKENS)	%	%	%		
Correct	90.28	87.80	100	n.s.	n.s.
Overuse	1.04	0.48	0	n.s.	n.s.
Unmarked	4.76	5.02	0	n.s.	n.s.
Unmarked with /s/, /ʃ/ or /tʃ/	0.47	0.24	0	n.s.	n.s.
Misformation	5.47	6.46	0	n.s.	n.s.
PLURAL IRREGULAR (TOKENS)	%	%	%		
Correct	70.59	77.99*	100	8.60	.003
Overuse	9.69	5.18*	0	8.91	.003
Regularized	16.96	15.86	0	n.s.	n.s.
Unmarked	0.69	0.65	0	n.s.	n.s.
Misformation	2.08	0.32*	0	7.93	.005

C/P = control group
n.s. = not significant
* = significantly higher scores (i.e., lower error rates)

Table 6 Percentage scores of 3PS agreement judged correctly by ECLs vs. LCLs

Sentence no.	ECLs ($n = 100$)	LCLs ($n = 100$)	t	p	Control group ($n = 20$)
27/19 (*cries*)	1.00	.98	n.s.	n.s.	1.00
39/47 (*repairs*)	1.00	.98	n.s.	n.s.	1.00
66/63 (*watches*)	1.00	.95	n.s.	n.s.	1.00
49/49 (*brush*)	.05	.15*	2.341	.02	1.00
54/40 (*kiss*)	.16	.31*	2.541	.01	1.00
62/62 (*like*)	.21	.27	n.s.	n.s.	1.00

n.s. = not significant
* = significantly higher scores

Table 7 Percentage scores of regular plural markers judged correctly by ECLs vs. LCLs

Sentence no.	ECLs ($n = 100$)	LCLs ($n = 100$)	t	p	C/P ($n = 20$)
22/33 (*pigs*)	1.00	1.00	n.s.	n.s.	1.00
55/71 (*matches*)	.97	.94	n.s.	n.s.	1.00
67/67 (*houses*)	.95	.95	n.s.	n.s.	1.00
25/29 (*glass*)	.42	.37	n.s.	n.s.	1.00
30/30 (*player*)	.32	.31	n.s.	n.s.	1.00
53/43 (*park*)	.50	.47	n.s.	n.s.	1.00

n.s. = not significant

The results of the tested regular plural forms in the GJ task (Table 7) are in line with previous work (e.g., McDonald, 2008), where it was found that

plurals are not as susceptible to processing deficits as past regular or 3PS. The accuracy scores on regular and irregular plural morphemes are almost identical in the ECLs' and LCLs' written performance tasks. The range in individual accuracy with plural regular morphemes was 40% to 100% for the ECLs and 44% to 100% for the LCLs; with plural irregular morphemes it was 50% to 100% for the ECLs and 40% to 100% for the LCLs. Both groups omitted the nonsyllabic marker significantly more often than the syllabic allomorph: 100% of the forms omitted by the ECLs and 95.45% by the LCLs were nonsyllabic.

Table 8 Variable article usage in ECLs and LCLs (standard deviation/mean)

Age group	ECL	LCL
Past regular correct	100%	147%
Past irregular correct	137%	103%
3PS correct	64%	76%
Plural regular correct	47%	61%
Plural irregular correct	72%	76%

Finally, if we test for fluctuation within the ECL sample and the LCL sample by relating the mean scores to the standard deviations, it becomes obvious that variation among LCLs is slightly more marked than among ECLs (Table 8). It should be noted that if the measure *standard deviation/mean* approaches or exceeds 100%, then the fluctuation within the sample is greater for this value than any tendencies of the sample as a whole.

Discussion

My results lead to several conclusions. Unsurprisingly, both groups performed below the native speaker controls in their perception and production of the five morphemes, with the lowest accuracy scores for the 3PS for both LCLs and ECLs. Also, they all manifested variability in their use of bound morphology, with similarly high standard deviations in the area of 3PS and irregular plural, yet clearly higher standard deviations in the LCL data for the past regular and irregular and the plural regular marker. In the GJ task, the accuracy rates were highest across the plural morpheme and lowest across the 3PS marker. Interestingly, all the learners overwhelmingly accepted the forms with correct inflection as grammatical, whereas the rejection rate is never over 50% in the ungrammatical sentences, which reflects a general problem with detection in a receptive task and might point to a general morphological insensitivity (see DeKeyser, 2005; Jiang, 2004). I will take up this issue in a forthcoming article.

As regards the age factor (RQ 1), the ECLs did not seem to be stronger on L2 morphological production and detection despite their 5-year advance in L2 learning. With respect to RQ 2, the two AoE groups were found to perform differently: The LCLs' performance is characterized by

- an increased importance of salience (higher scores on the production and detection of salient inflections than the ECLs);
- a striking pattern of irregular > regular, that is, they are stronger on the production of irregular forms than the ECLs across all tasks; and
- more lexical variety for the past simple verbs, that is, they create many more contexts for the use of the irregular past morphemes than the ECLs.

By contrast, the ECLs overregularized more irregular past and irregular plural nouns (besides having a tendency to avoid using past forms altogether); they produced more misformations of the irregular past, irregular plural and 3PS; and they showed more difficulties in detecting omitted salient endings in verbs with a /s/, /ʃ/ or /tʃ/ final phoneme. All of these phenomena are semantically-related issues.

When it comes to phonological difficulties, we can observe some modest but inconsistent advantages for an early starting age: The LCLs' error rate on unmarked forms of the 3PS (nonsyllabic allomorph) was significantly higher than the one of the ECLs. However, in the GJ task, the two groups had similar scores in their judgment of (phonologically related) 3PS and plural morphemes; the LCLs even had significantly higher accuracy scores in the detection of regular past violations.

The findings can be tentatively interpreted as providing qualitative evidence for the different learning mechanisms involved at different ages, that is, how L2 learning takes place at different ages, as illustrated in Ullman's (2005) declarative-procedural model mentioned above. However, some of the findings also seem to support the single system view: In the production tasks, which by nature impose more processing demands on the learners, the ECLs outperform the LCLs. Third person agreement morphology is highly susceptible to age of onset of acquisition, as it is a structure "in which fine phonological discrimination is necessary for one to perform accurately" (McDonald, 2008, p. 983). Phonological ability, however, decreases with age and is also highly susceptible to processing load, which explains the observed task effect. Furthermore, it has to be borne in mind that the ECLs had attained a state of cognitive development that was similar to that of the older learners with whom they were being compared by the time they were tested; thus, their rate of learning of morphosyntactic structures in those 6 months at middle school should be similar. Also, both learner groups in this study began learning the L2 after the establishment of L1 phonetic categories (which is typically

defined as the age of 5-7, cf. the discussion above), which means that neither of the two groups was at an advantage in terms of starting age. Thus, since the evidence from all the bound morpheme categories tested here paints a somewhat mixed picture, a further investigation of the frequency effects for the regular and irregular verbs is in order (see Pfenninger, 2011).

Besides not being subject to the same linguistic constraints, the two groups do not seem to employ the same strategies either (cf. Langman & Bayley, 2002): ECLs have a greater tendency to inflect all possible forms (cf. their significantly higher overuse of irregular plural and 3PS morphemes and the proportionally more misformation and agreement errors on the 3PS), hoping some will match the target, while the LCLs are more selective, that is, they tend to omit inflections they do not know.

Conclusion

In conclusion, an earlier onset of L2 learning (and thus a greater amount of exposure and input) does not seem to be relevant for the accuracy of regular/irregular plural, regular/irregular past tense, and 3PS morphemes. While the findings indicate that rule-based mechanisms as well as memory-based item-by-item associative learning processes coexist in both groups, memory-based processes seem to be the predominant strategy in the LCL data: In most semantically-related areas the LCLs' performance was shown to be stronger, while the ELCs were marginally better in some phonologically-related areas.

If we try to explain why an earlier AoE does not seem to be advantageous in the field of bound morphology, we have to come back to the learning situation at the primary school level. One possible scenario is that after the 5-year period of learning English, the ECLs have not reached a proficiency level beyond the initial stage of beginners because of the amount and nature of the input they received. In a multitude of studies (e.g., Ellis, 2006; Goldschneider & DeKeyser, 2001), formal, explicit instruction of morphosyntactic structures has been found to be quite effective. Implicit learning processes, by contrast, are often doubted to be effective in instructed contexts, mainly due to a lack of massive input, a focus on fluency at the expense of accuracy, and/or cognitive disadvantages of learners beyond early childhood (e.g., DeKeyser, 2003; Ellis & Larsen-Freeman, 2006). Furthermore, it is well-known that the early elementary L2 language course typically progresses much more slowly than any high school course: With an average of two 45-min lessons of instruction per week it is perhaps not unusual for the ECLs to be still at the initial point of English morphology after 5 years (cf. also De Graaff & Housen, 2009).

It is also possible that since the primary teachers in Switzerland are advised not to engage in explicit grammatical instruction, the students might acquire and internalize erroneous forms over the years, which are then difficult to eradicate at middle school level afterwards. Furthermore, we cannot know for certain if the input that the ECLs received in primary school was native-like. The quality of input has been found to play an equally important role as the quantity, both in an instructed and naturalistic setting (see e.g., Flege's [1991] accented L1 input hypothesis). However, for practical reasons, the input that these students were exposed to could not be measured in this study.

Another explanation can be provided in terms of the language background of the two groups: The LCLs' superiority can be seen as a direct influence of their previous knowledge of French. Since the LCLs studied English as an L4, they might have profited from L2 learning strategies and cognitive learning mechanisms they developed while learning L3 French. Recent works on the influence of previous knowledge of foreign languages within a cognitive approach (e.g., Williams & Lovatt, 2003) found that learners who know many languages are more likely to exploit similarities between the items of new foreign languages and features in other languages that they know. Thus, the more languages with a rich inflectional system (such as High German and French) the learners know, the more this knowledge could contribute to their morphological sensitivity.

Finally, in Pfenninger (in press) I show that while the two starting age groups described in this paper do not differ in terms of their motivational intensity (quantitative difference), they differ in terms of the structure of their motivational profile (qualitative difference), which reveals that the crucial factors must lie in the kind of input the two populations received in the past, that is, different learning experiences (curricular vs. extracurricular L2 acquisition).

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