Procedural and Declarative Knowledge: The Swedish and Vietnamese learners' acquisition of knowledge in English grammar, and Pedagogical Implications

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ABSTRACT

Keywords: English language teaching, procedural knowledge, declarative knowledge, second language acquisition

In this study, the L2 acquisition of English third person-s in different settings is examined. Two types of knowledge are declarative knowledge as the knowledge about a grammatical rule, and procedural knowledge as the ability to use these rules in spoken production. Data on procedural and declarative knowledge was collected from 32 young L2 learners in Sweden and 44 in Vietnam. The learners' acquisition of English grammar was assessed using elicitation instruments that captured procedural and declarative knowledge of English subject-verb agreement on third person singular *s* (3-sg-s). Procedural knowledge was tested using communicative tasks where the participants were asked to describe a boy's habitual action orally in a picture series. Declarative knowledge of grammar was investigated by means of a metalinguistic task. The learners were asked to correct the sentences and explain the reasons for their choices by referring to grammatical rules. The average scores on procedural and declarative tests within each group were statistically analyzed. The results show differences in learner outcomes, in that the Swedish learners are better at procedural knowledge and the Vietnamese learners are better at declarative knowledge. It is suggested the two types of knowledge are independent of each other. Implications for language learning and teaching for young learners will be further discussed based on the teaching practices as found in Son (2018).

Introduction

The two kinds of declarative and procedural knowledge are different. This paper addresses a crucial point in second language acquisition (SLA) and in foreign language teaching: the relationship between a declarative concept that is typically taught and procedural knowledge as the ability to produce the target language in speech. The two kinds of linguistic knowledge: declarative versus procedural knowledge, have been discussed within SLA research for

decades, and it has a clear pedagogical significance. Can declarative knowledge lead to procedural knowledge? Should grammar rules be taught? This paper aims to examine the declarative and procedural knowledge in young language learners at Grade 5 in two contexts; Sweden, where there is a communicative approach to English teaching for young learners while focus on form is dominant in some Vietnamese classrooms of English (Son, 2018). 32 Swedish learners and 44 Vietnamese learners at the age of 11-12 years old took part in the two tasks: a declarative knowledge task and a procedural knowledge task. The findings will discuss the two types of knowledge and the implication for English language teaching for young learners.

Literature review

Declarative and procedural knowledge

The difference found in many second language classrooms, between on the one side, a metalinguistic knowledge of a grammar rule, and on the other hand, its actual use in L2 speech production has been discussed as a difference between two types of knowledge, declarative and procedural knowledge. These concepts go back to two memory systems to store information: declarative and procedural memory. Declarative memory refers to conscious memories that can be talked about (facts, names, telephone numbers). In contrast, procedural memory is about how to do things without conscious awareness (ride a bicycle, play the piano by ear). What is important for SLA is the interaction between the two. A telephone number (declarative memory) can be used so many times that it becomes automatic and thus be part of procedural memory. Does this happen to the third person present singular -s? Does knowing a grammar rule from declarative memory result in procedural (or implicit) knowledge? The critical point is, in that case, how teachers can optimize second language learning in the classroom. There are three theoretical positions; the strong interface position (e.g., DeKeyser 1995, 1997), the weak interface position (e.g., Doughty & Williams 1998, Pienemann 1998; Hulstijn 1995), and the non-interface position (e.g., Krashen 1982, Paradis 2004). These positions ascribe different effects of grammar rule teaching – the strong position claiming that declarative knowledge will be transformed into procedural knowledge, the weak position assuming that this is possible only under certain conditions, and the non-interface position saying that there will be no effect and that there is no connection between the two.

According to Anderson's (1983) ACT model (Adaptive Control of Thought), the learner moves from declarative to procedural knowledge in three phases: 1) a cognitive phase, where the declarative rule is learned; 2) an associative phase where the learner processes the rule; and 3) the autonomous phase, where production becomes automatic. This makes sense to teachers since it can explain why learners do not use the descriptive rule in the same moment that it is given by the teacher – it takes time, and there are certain phases to go through. Sorace (1985)'s study could be exemplifying phase 2 in Anderson's ACT, where learners are processing the rule. The partly "backwards development" leads us over to the other kind in the knowledge dichotomy, the possibility of having only procedural knowledge. Procedural knowledge differs

from declarative knowledge. Bialystok (2001) defines metalinguistic ability as "the capacity to use knowledge about language as opposed to the capacity to use language" (Bialystok, 2001, p.124). Paradis (2004) refers to procedural memory as the more fundamental memory and as what young children use during the onset of language acquisition. The declarative memory becomes stronger during development, but children still rely on procedural knowledge around the age of three years. Children are able to create grammatical rules without declarative and metalinguistic knowledge. This was shown by Berko (1958) in an experimental study on noun plural formation, where children generated plural forms of non-words (*wug->wugs*).

Studies of L2 acquisition suggest that, like L1 learners, also L2 learners can use their procedural memory in language acquisition and acquire grammar without declarative rules (Krashen, 1982; Meisel, Clahsen & Pienemann, 1981). Processability Theory (PT; Pienemann 1998, 2015) predicts L2 development of grammar in developmental stages by gradually accessing the processing procedures needed for production. A key concept in the description of the learner's grammar is the "unification of features" operationalized in Lexical-Functional Grammar (Bresnan, 2001). For the L2 acquisition of English morpho-syntax, five stages have been identified (Pienemann, 1998). The stages are: Stage 1 with no morphology, Stage 2 with lexical morphology (dogs$_{PL}$), Stage 3 with the unification of features within a phrase (many$_{PL}$ dogs$_{PL}$), Stage 4 with the interphrasal information Yes/No inversion, Stage 5 with the unification of features across phrases, lexical verbs (she$_{3pSGpres}$ likes$_{3pSGpres}$ dogs), and finally Stage 6 with the unification of features across clause borders in the subordinate clause procedure, realized in the difference between direct and indirect questions. The order of emergence of these stages has been supported by data in a number of empirical studies of L2 English (Di Biase, Kawaguchi & Yamaguchi, 2015; Dyson, 2009; Itani-Adams, 2007; Lenzing, 2013; Pienemann, 1998, 2005; Pienemann & Keßler, 2011; Yamaguchi, 2009) and also in a number of other languages (see Dyson & Håkansson, 2017). The late appearance of third-person singular -s in the PT hierarchy of stages could be one explanation of the problem found in L2 studies of English (Son, 2018; Ellis, 2006; Källkvist & Peterson, 2006; Larsen-Freeman, 2003; Lenzing, 2013; Lightbown, 1983; Siemund & Lechner, 2015). It could also explain why other late structures, such as Dutch subclause word order (Hulstijn, 1995) and Spanish subjunctive (Gutiérrez, 2017) belong to stage 5 are found to be problematic to teach.

Earlier research on the relationship between declarative and procedural knowledge in SLA
The terms declarative and procedural knowledge are often used interchangeably with explicit and implicit knowledge (Ellis, 2008). Empirical studies comparing knowledge of the rules and usage of the rules in production give mixed results (e.g., DeKeyser, 1995, 1997; Goldschneider & DeKeyser, 2001; Green & Hecht 1992; Gutierrez, 2017; Ellis, 2005; Hulstijn & Hulstijn, 1984; Roehr & Gánem-Gutiérrez, 2009; Robinson, 1996; Seliger, 1979; Sorace, 1985). One explanation for the contradictory results is the differences between the scope and methodologies used in these studies. Some studies use artificial language (e.g., DeKeyser, 1995, 1997, DeGraaf, 1997; Reber et al., 1980), and others use natural languages (e.g., Hulstijn, 1995; Seliger, 1979; Sorace, 1985). Some investigate the value of language instruction in general,

whereas others compare different types of instruction or focus on the benefit of teaching a specific grammar rule. In a meta-study of publications between 1980 and 1998, Norris & Ortega (2000) summarized 49 studies of explicit and implicit types of instruction. The general finding from this meta-study is that explicit teaching is successful for L2 acquisition. However, the heterogeneity is problematic for generalizing. There were different types of instruction (e.g., Focus on form, Focus on forms, Focus on meaning) and also different ways of measuring the outcome, language proficiency. Proficiency was often measured by tasks with a focus on forms, such as metalinguistic judgments and sentence completion exercises, and just a minority of the studies used tasks with a focus on communication (i.e., procedural knowledge in the sense of Pienemann, 1998). Furthermore, the studies show a predominance of studies of adult university students taking foreign language classes, and only a minority (21%) were younger learners.

Studies focusing on declarative-procedural teaching have not found clear differences between the outcomes. A problem with studies comparing declarative and procedural knowledge is that the results tend to be written tests for both kinds of knowledge (Ellis, 2012, p.56). It is possible that this kind of data only taps into the explicit knowledge. In a study comparing different elicitation methods, Ellis (2008) found that grammatical judgment data and metalinguistic data did not follow the same incremental stages of acquisition that Processability Theory predicts, but that the oral data followed the stages. This demonstrates that the same data cannot measure procedural and declarative knowledge. It is possible that using free oral speech to measure procedural knowledge would have given clearer differences between declarative and procedural knowledge in the studies presented above.

Research Aim and Question

The aim of this paper is to examine the declarative and procedural knowledge in two contexts; Sweden, where there is a communicative approach to English teaching for young learners while focus on form is dominant in some Vietnamese classrooms for English (Son, 2018). To fill in the gaps of previous studies, two different kinds of tasks were used to measure procedural and declarative knowledge on the third person singular -s.

   1. What is the declarative and procedural knowledge of English third-person singular *s* for Swedish and Vietnamese young learners after the same amount of classroom instruction?

Methods

Pedagogical Setting & Participants

The participants come from two urban schools in Sweden (No: 32, 12 females) and three urban schools in Vietnam (No: 44, 28 females) (see Table 1). The children at 11-12 years old were nearing the end of Grade 5 and had studied English for 3 years. They have received two weekly English lessons, approximately 70 hours in each grade (for Grades 3, 4 and 5). Each participant was presented with two tasks: a declarative knowledge task and a procedural knowledge task.

Table 1. Swedish and Vietnamese learner data (Adapted from Son, 2018, p.96)

Learner Data	Swedish group		Vietnamese group		
	School 1	School 2	School 1	School 2	School 3
	Class 1	Class 2	Class 1	Class 2	Class 3
Children	20	21	35	36	38
Participants	18	14	15	15	14

Data collection & analysis

Specific elicitation instruments were used to tap into declarative and procedural knowledge of the learners' English. Procedural knowledge was tested using communicative tasks on the habitual action of the same type as described in Pienemann (1998, p. 280). The participants were asked to describe Peter's daily activities as shown in a picture series. This task was designed to allow learners to describe the habitual actions of a person and elicit the responses needed for producing third-person-s (Son, 2018).

The children were individually audio-recorded. The learners were recorded one at a time in a separate room. The recordings were transcribed by the author using the CHAT standard (Codes for the Human Analysis of Transcripts) as used in the Child Language Data Exchange System (MacWhinney, 2000). In the recordings, there are very few terms produced by the researcher, for example, short back-channeling cues (i.e., 'yes', 'that is right', 'ok', 'that is good') and nodding, meaning yes, to keep the conversation going and for the children to continue their speech.

Different criteria for acquisition as procedural knowledge are used in various SLA theories. This study applied PT emergence criterion as the "first systematic use" of a morphosyntactic structure (Pienemann, 1984, p. 191). A distributional analysis was applied to support the emergence criterion in order to avoid memorized chunks, e.g., all verbs with – *s* in the context of 3-sg-s- were counted. So, two productive uses of 3-sg-s with two different verb types (with lexical variation: *eats, sleeps* and morphological variation: *goes, go*) in the oral picture-description task of the habitual actions were considered as the evidence of acquisition of the target structure in spoken production as procedural knowledge.

Declarative knowledge of grammar was tested by means of a metalinguistic task. A test with four questions about 3-sg-*s* in English was administered to the participants. The participants were asked to correct the sentences and explain the reasons for their choices by referring to grammatical rules. The grammatical rule for subject-verb agreement defined by Pienemann (1998) and Hasselgård, Johansson, & Lysvåg (1998) as the standard explanation is the

agreement in number, person, and tense between the subject and lexical verb. 3-sg-*s* was considered part of declarative knowledge when the learner got the correct answers (compared to the standard definition) for two of the four questions. The same procedures of the same task type were used in earlier studies (cf. Cohen & Robbins, 1976; Källkvist &Peterson, 2006; Malmberg et al., 2000; Sorace, 1985).

Scoring

For scoring of the declarative knowledge, the schema from Roehr & Gánem-Gitiérrez (2009) was used. A correct answer gets 1 point. The correct and satisfying explanation gets 2 points (Son, 2018, p. 100). As for the production of the grammatical rule, the frequency of use of the linguistic context for the third-person-s structure was counted. The procedural knowledge was measured using the methodology in Processability Theory (Pienemann 1998), and the emergence criteria were used; i.e., examples of the structure third-person singular present -*s*, with two different lexical verbs in two obligatory contexts. Regarding the correlation between the learners' linguistic knowledge, the average scores on procedural and declarative tests within each group were calculated and statistically analyzed.

Results

The analyses reveal different profiles for the Swedish and Vietnamese learners on declarative and procedural knowledge. The Swedish learners performed better than the Vietnamese on the procedural tasks. Twenty-one of the Swedish learners (62%) used third-person singular present -s at least on two occasions with different verbs (according to the emergence criterion (Pienemann, 1998)). e.g., *he plays, he eats*. For the Vietnamese learners, only sixteen learners (36%) scored high on the procedural task. Below are some samples of the transcripts that show the learners' spoken production of 3Sg-s at least with two different lexical verbs in two obligatory contexts.

Learner 11

> *CHI11 and the books [//] the book Peter reads is called the moon

> *CHI11 and then he plays football after school (.) with his friend

> *CHI11 and there he goes in the school bus to school because ye(a)h

>> his parents working and they can't drive him

Learner 18

> *CHI18 he eats sandwiches.

> *CHI18 on the break, he plays soccer with his friends

Learner 20

> *CHI20 after &er that he likes to play footballs [//] football &er with his friends

    *CHI20   after the lunch, he [/] (.) he reads books.

Learner 29

    *CHI29   sunshine is up , and (.) ye(a)h

    *CHI29   and (.) then he goes up and takes a shower

    *CHI29   hmm and (.) then later &er (.) he eats his breakfast with (...) the corn

    *CHI29   then he needs to go to school and waits for the bus

Learner 30

    *CHI30   Peter, first he wakes up in his bed .

    *CHI30   and he takes a shower

    *CHI30   and after the shower, he eats (.) breakfast

Regarding the declarative knowledge test, sixteen Vietnamese learners (out of 44; 36%) were able to rule for third-person singular -s in all four examples, which none of the Swedish learners could do. Eight of the Vietnamese learners (18%) gave an appropriate rule for three examples, while 13 learners (30%) gave no correct explanations. On the other hand, few of the Swedish learners were able to verbalize a rule; one learner (3%) described a rule for three examples, six learners (19%) gave a rule for one example each, while 24 learners (75%) gave incorrect explanations. Some of the learners in both groups replied that 'it sounds good or wrong'.

Furthermore, the correlation between declarative knowledge and procedural knowledge is not significant for either group (See Figure 1); neither for the Swedish learners ($r = 0.20$, $p = 0.185$) nor for the Vietnamese learners ($r = 0.22$, $p = 0.220$). This suggests that there is no relationship between the children's ability to explain the rule and their use of the rule in oral production.

Relation between declarative knowledge and procedural knowledge on 3SG.s
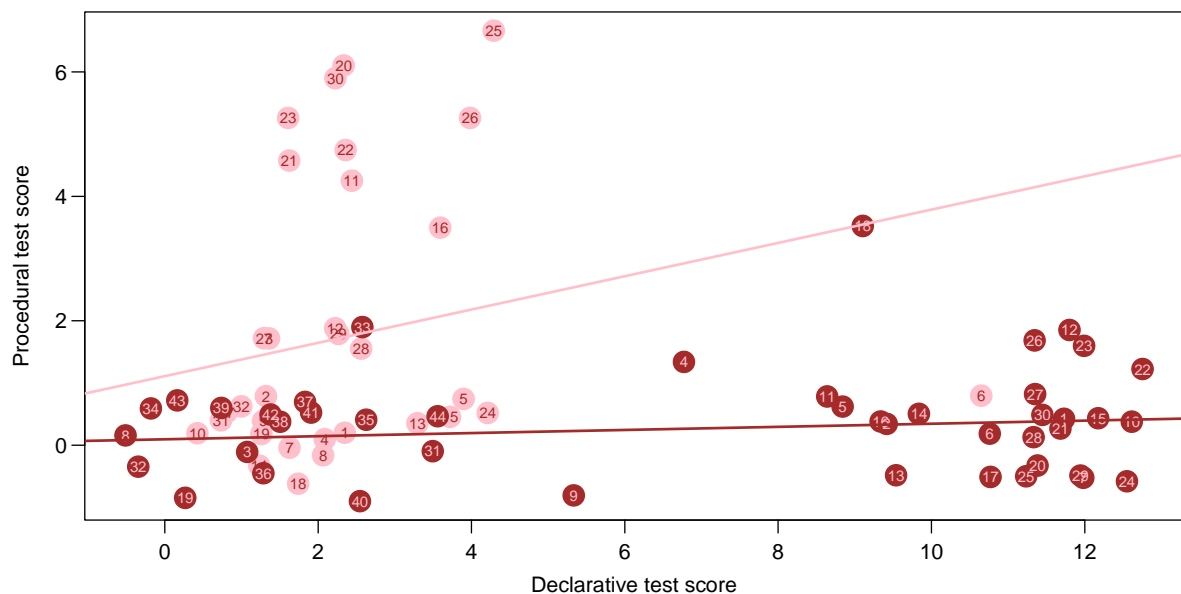

Figure 1: Relation between declarative and procedural knowledge in the two groups (Son, 2018, p.176)

Figure 1 shows the procedural and declarative test scores on 3 SG-s for the Vietnamese children (the dark circles) and the Swedish children (the light circles). The participant ID numbers are placed inside the circles. As demonstrated in the figure, the learners' cluster in three corners; the Swedish learners are found at the top left; high in procedural and low on declarative knowledge. The Vietnamese learners are in the bottom right corner; high on declarative and low on procedural knowledge. In the bottom left, we find children that score low on both declarative and procedural knowledge, both Swedish and Vietnamese learners.

Discussion and Conclusion

The results of this study demonstrate differences between the L2 learners of English in Sweden and Vietnam. It is important to remember that the results only represent the classes and individual learners involved in the study. The Swedish learners have better procedural knowledge, and the Vietnamese learners have better declarative knowledge. As found in some classroom observations of English lessons in these two contexts (Son, 2018), there was the prevalence of the form practice on grammatical structures and vocabulary in two Vietnamese classrooms while two Swedish classrooms focused on meaning and communication in two Swedish classrooms. This is probably an effect of the teaching traditions; the communicative teaching situation promotes procedural knowledge, whereas grammatical teaching promotes declarative knowledge. This could also be due to the method of teaching- if teachers do not use metalanguage as is the case of communicative methods, the learners might not be able to

verbalize rules. Additionally, some learners in both groups gave incorrect explanations since they were confused between the number ending on nouns with the verb ending on the third-person singular present. The third-person singular present non-progressive -*s is h*omophonous with plural -s (Goldschneider & DeKeyser, 2001). This is in line with earlier studies for Swedish learners (e.g. Källkvist & Petersson, 2006, Malmberg et al., 2000).

Additionally, there was no correlation between declarative and procedural knowledge of third-person singular -*s* in either group for young language learners, as was confirmed in previous studies (Ellis, 2008; Macrory & Stone, 2000; Seliger, 1979). When such a correlation has been found in earlier studies, it usually concerns adult learners and measures general proficiency (DeKeyser, 1995, 1997; DeGraaf, 1997; Green & Hecht, 1992; Goldschneider & DeKeyser, 2001; Gutierrez, 2017; Hulstijn & Hulstijn, 1984; Ellis, 2005, 2006, 2008; Robinson, 1996; Roehr & Gánem-Gutiérrez, 2009; see also Norris & Ortega, 2000). This has implications for teaching EFL to young learners. Declarative rules can be taught in a formal setting, not procedural knowledge. The practice and communication in the target language with high frequency and the exposure to the language may transform declarative knowledge into procedural knowledge. Declarative knowledge cannot serve as the basis for practice and proceduralization if it is at a low level.

There are no "miracle methods" in language teaching. It is necessary to consider the contexts of language learning for young learners and the tasks used by the teacher. If the tasks come as natural within the context and motivating atmosphere for young learners, this may affect acquisition and from conscious to unconscious. It is also essential to start from the level of language learners and keep in mind that there are many dimensions involved in language: linguistic, psychological, and social factors in language learning. Additionally, when making the lesson plan, the teacher should ask what the goal is in this lesson - Procedural or declarative knowledge? Nevertheless, linguistics features should be considered to be introduced as an operational base to promote communicative competence and make communication functional, as young language learners are not expected to analyze all grammatical rules. To facilitate the learning process of grammatical structures in the Vietnamese setting, one can use the inductive approach where the learners could make sense of grammatical features from being exposed to examples, contexts, and stories, as suggested by Nguyen (2021) and Tran et al. (2021). Most importantly, we do not stress language learners since language learning takes time. Young language learners might need to go through different learning stages and language learning processes from input to output; as German philosopher Alexander von Humboldt has said, 'A language cannot be taught. One can only create conditions for learning to take place.'

The data sample in the study is inevitably limited in scope. For further research, it would be interesting to undertake a longitudinal study in a larger sample size in order to see how different types of knowledge in both similar and different classroom settings are acquired.

Acknowledgments

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Biodata

Dr. Son is a senior lecturer/ assistant professor in English language education with the focus on learning and linguistics, University of Gothenburg, Sweden. She teaches different courses in English linguistics and the English teaching education program and supervises and examines degree projects (BA and Master theses in English and Education). As a linguist specialising in the teaching and learning of English, she is interested in English language learning and teaching from different contexts, a cross-linguistic perspective as well as from teachers' and learners' perceptions. Other research interests are grammatical aspects of second language acquisition (SLA), instructed SLA, form-focused instruction and language didactics, TESOL. She has presented her research at many international conferences and given guest lectures to different universities inside and outside Sweden.