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Table of Contents

Perceptual Prominence and Morphological Processing in Initial Second Language Acquisition[1]

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Abstract

This paper discusses the role of perceptual prominence in the processing of case endings by initial learners of an L2. Within the VILLA project, 14 Italian L1 participants took a 14-hour Polish course, whose input was recorded and transcribed so as to correlate the development of the interlanguage with item frequency. The experimental data were elicited using a Sentence Imitation test aimed at measuring the accuracy of case ending processing. Target items were designed to isolate three parameters hypothesised to influence processing accuracy, namely 'target ending', 'constituent order' and 'lexical transparency'.

The results show that the nominative ending -/a/ is frequently overextended onto accusative -/e/, which is disfavoured because of its lower frequency in the input. Error rate is sensitive to all three parameters according to the hierarchy 'target ending' > 'constituent order' > 'lexical transparency'; however, processing accuracy increases from Time 1 to Time 2. The study focusses on the role of the parameter 'constituent order': it is argued that the syntactic structure of the target sentence may render case endings more or less prominent because of their position in the utterance. On the basis of these findings, it is argued that perceptual prominence may indeed be an important hint to the formation of inflectional paradigms.

1. Introduction: perceptual prominence in Second Language Acquisition (SLA)

In this paper we mean to examine a crucial prerequisite to comprehension and ultimately acquisition, namely perception: as Gaonac'h (1991) concludes after a review of the available psycho-linguistic literature, perception is a level of crucial importance for all subsequent stages, namely noticing, storing, and ultimately productive use. This level of input processing, however, is more often postulated than explicitly addressed: this paper aims to provide some insights and help to fill this gap.

Questions of perception are closely related to questions of saliency, however understood: as a preliminary operationalization, we may adhere to Peters' (1985:1030) interpretation that only salient stretches of sound constitute reasonable candidates for extraction, defined in turn as the recognising and remembering of language elements. This view is then projected against the wider picture of child language acquisition by Slobin (1985:1164): in his own words,

> "on the most basic level, accessibility of linguistic material can be defined in terms of 'perceptibility'. That is to say, the only linguistic material that can figure in language making are stretches of speech that attract the child's 'attention' to a sufficient degree to be noticed and held in memory".

This is achieved through the 'extract' operational principle which Peters (1985:1065) formulates as "extract whatever salient chunk of speech you can".

On a higher level, reflection on the prominence of elements of the speech stream fits in the debate on the processing of input, namely the conditions affecting the chances of specific chunks of it of being converted into intake (Ellis 2006). Chaudron (1985) refers to 'preliminary intake' as to the initial stage of input perception; conversely, 'final intake' is understood as the series of stages by which learners fully integrate and incorporate the linguistic information extracted from the input into their developing grammars.

Against such theoretical background, in this study we set out to identify those factors affecting the prominence of inflectional morphemes in the very first hours of exposure to a new language.

2. *Methodology: the VILLA project*

SLA research is often complicated by the interaction of a huge number of variables related to each participant's personal learning experience, which one cannot realistically control outside a thorough experimental setting. One way to avoid such hurdles is to focus on the very initial stages of acquisition, preferably from the very first moment of exposure to the target language. In order to focus on particular structures without worrying about the idiosyncrasies of natural languages and to isolate input quantity and quality, numerous first exposure studies have employed artificial languages. This, however, may pose doubts as to the ecologic validity of the results obtained, as well as to their generalizability to real learning contexts (see papers in Hulstijn & Dekeyser 1997). Aiming to avoid this additional obstacle, other studies conceived their experiments on the basis of natural languages (Singleton & Little 1984, Rast 2008, Gullberg *et alii* 2012). Among these, the VILLA[2] (Varieties of Initial Learners in Language

Acquisition) project summarises the experience gathered so far in the relatively new-born field of first exposure studies. Its ambitious goal is to explore the very initial stages of adult SLA over a conspicuous period of exposure (14 hours) while at the same time retaining full control over the input (Dimroth *et alii* 2013). To this purpose, learners with different native languages (German, Dutch, French, English and Italian) were exposed to a 14-hour Polish L2 course taught by a professional teacher and took several tests tackling various aspects of the target morphosyntax. Teacher input was digitally recorded throughout the course and subsequently transcribed and coded using a combination of ELAN (Brugman & Russell 2004) and CHAT/CLAN (MacWhinney 2000). It is thus possible to retrieve the context and frequency of occurrence of any linguistic item, such as inflectional endings, lexical entries and syntactic structures.

Polish was chosen as the target language for various reasons. First, it is not particularly widespread outside its native community, which makes it easier to find participants who were never exposed to it. In order to take part in the VILLA project, participants should have no previous experience of Polish nor of any other Slavic language. Efforts were also made to exclude candidates with other highly inflected languages, including Greek, Latin and German. Such requirement was deemed necessary to make sure that grammatical features and categories would be learned solely on the basis of the input received during the experiment, rather than transferred from previously known languages.

Secondly, Polish differs from the participants' native languages in several respects: what is of interest here is its rich and complex nominal morphology, contrasting two numbers, three genders in the singular and two in the plural, and crucially as many as seven cases. This last category is particularly interesting from a contrastive point of view. Italian only inflects nouns with respect to number, traces of case opposition only appearing in the pronominal paradigm.

This paper presents the results of a sub-group of 14 learners within the Italian edition of the VILLA project. These learners were exposed to 'meaning-based' input, comprising no such teaching techniques as focus-on-form (Doughty & Williams 1998) and corrective feedback. Input was entirely monolingual and avoided metalanguage as well as any kind of explicit grammatical explanation.

3. *Data collection – the Sentence Imitation test*

The role of percpetual prominence in the processing of case endings is analysed through a Sentence Imitation test. Learners would listen to a short Polish sentence on a computer and then

draw a simple geometrical figure: this distracting pause of a few seconds was included in order to inhibit working memory and holistic rote repetition. After that, learners would be asked to repeat the sentence heard. Learner output was digitally recorded and later transcribed in the CHAT format (MacWhinney 2000) using IPA. In this study we focus on the processing of two specific endings within the singular paradigm of feminine nouns in -/a/, namely -/a/ <a> itself, corresponding to the nominative case, and -/e/ <ę>, corresponding to the accusative case.

For each target item, responses were considered correct if the ending provided by the learner matched the expected target; underdetermined endings (typically -/ə/) were excluded. By "processing" therefore we mean the ability to notice and correctly reproduce the phonological segment corresponding to the target ending, but not necessarily to associate it with the target syntactic function. At this stage of analysis we have no way of knowing what principles of utterance organisation guide our learners in production: it may well be the case that syntactic functions are assigned on the basis of a default word order (say, SVO), or even that they are not assigned at all, if learners fail to retrieve the meaning of the target sentence. Whether an ending is correctly repeated or not, however, does tell us something about its perceptual prominence in the input stream. The prominence of an item in turn can be evaluated by measuring the likelihood of its being perceived by learners. We believe that the Sentence Imitation test is well suited to this purpose based on the assumption that if an item is perceived, learners will try to reproduce it in their output, in an attempt to perform the test to the best of their abilities. The purpose of this work then is to identify those parameters which might influence the prominence of our target items, i.e., of inflectional endings.

The Sentence Imitation test comprised 16 9-syllable target sentences and 19 distracting items. Target sentences were designed in order to isolate three parameters which were thought to be relevant, namely 'target ending', 'constituent order' and 'lexical transparency'.

The parameter 'target ending' refers to what form of the target paradigm learners are asked to repeat, namely nominative -/a/ or accusative -/e/. 'Constituent order' describes the syntactic structure in which the two nouns occur, either SVO or OVS. Finally, 'lexical transparency' refers to whether the noun to which the target ending is attached can be intuitively translated into the learner's native language. This factor is defined in terms of phonological proximity to the corresponding word in the learners' native language: a transparent (T) noun like *artystka* /arˈtistka/ "artist", for instance, is quite similar to the corrisponding word in the learners' L1, *artista* /arˈtista/, whereas a non-transparent (NT) item like *dziewczynka* /dʑevʧˌiŋka/ "little girl" is quite distant from its translation *bambina* /bamˈbina/. Lexical transparency was assessed prior to the beginning of the VILLA course using a specific test administered to a different

group of learners: participants were asked to translate a set of target words, which depending on their overall translation accuracy were classified as either "transparent" or "opaque" (see Valentini & Grassi forthcoming).

In order to isolate the three parameters in question for each occurrence of a case ending, target sentences included two nouns differing in lexical transparency. Each appeared in both the nominative and in the accusative form, and in both SVO and OVS sentences. As a result, each pair of nouns appears in 4 target sentences (Fig. 1). Altogether, the test comprised four such noun pairs.

Fig. 1: Sentence Imitation test, target items for the pair *dziewczynka - portugalka*

	SVO	OVS
NT - T	dziewczynk-/a/ woła portugalk-/e/ "the little girl calls the Portuguese woman"	dziewczynk-/e/ woła portugalk-/a/ "the Portuguese woman calls the little girl"
T - NT	portugalk-/a/ woła dziewczynk-/e/ "the Portuguese woman calls the little girl"	portugalk-/e/ woła dziewczynk-/a/ "the little girl calls the Portuguese woman"

Each target case ending may be described in terms of the values instantiating the three parameters 'target ending', 'constituent order' and 'lexical transparency', as exemplified schematically in (1). In this utterance the case ending of *kuchark-/e/* is instantiated by accusative -/e/ regarding 'target ending', OVS regarding 'constituent order', and 'non transparent' regarding 'lexical transparency'.

(1)   *Kuchark-*   /e/   *woła*   *Brazylijk-*   /a/
      cook   ACC   call 3SG   Brazilian woman NOM

      -/e/   -/a/   Target ending
      OVS   OVS   Constituent order
      NT   T   Lexical transparency

      "the Brazilian woman calls the cook"

The Sentence Imitation test thus distinguishes eight possible combinations of parameter values, represented schematically in Fig. 2. For each combination, four occurrences were required by the test, resulting in 32 occurrences for each learner. The study is therefore based on a total of 448 occurrences altogether.

Fig. 2: possible combinations of parameter values for each target item

'target ending'	-/a/	-/a/	-/a/	-/a/	-/e/	-/e/	-/e/	-/e/
'constituent order'	SVO	SVO	OVS	OVS	SVO	SVO	OVS	OVS
'lexical transparency'	T	NT	T	NT	T	NT	T	NT

All target nouns were classified as "frequent" in the input based on the criterion adopted in Rast & Dommergues (2003) and Rast (2008), where this rating indicates 20 occurrences or more[3]. We could suppose therefore that target lexical items should have been familiar to the learners. For this reason, item frequency will not be considered further in this paper. The test was administered twice, after 9 hours (Time 1) and 13:30 hours of input (Time 2). The same set of sentences was used on both occasions.

4. *The wider picture – target structures in the L1 and L2*

Polish is a highly inflected language whose strategies to express syntactic relations notably differ from those adopted by our learners' native language, Italian. Like most Slavic languages, Polish exhibits very rich and complex inflectional morphology. Nouns belong to four semantically-determined word-classes, namely neuter, feminine, animate masculine and inanimate masculine, and various inflectional classes.

Crucially for our study, nominals are inflected for case: alongside vocative, Polish distinguishes nominative, genitive, dative, accusative, instrumental and locative. Cases have the function of encoding syntactic functions: as a consequence, these can be expressed independently of word-order, which in turn is determined pragmatically. Studying case endings from the point of view of their prominence in the input stream appears as a fruitful undertaking in view of the contrast between their important communicative role and their limited prominence on the phonetic level: case endings are typically small stretches of sounds, rarely composed of more than a single segment, and always appear in post-tonic position.

The feminine paradigm was chosen as its endings are all clearly differentiated (with the exception of dative and locative, which however hardly appear in the input) and thus encode case quite univocally. The opposition between NOM and ACC in turn was considered as it appears in the input throughout the course and because of its interesting correlations with the parameter 'constituent order'. Thanks to its rich nominal morphology, Polish in principle allows for any possible word order. In fact, however, SVO word order is by far the most frequently encountered and pragmatically unmarked option (Dryer 2013a). Polish therefore

may be described as a language with free, but predominantly SVO word order (Dryer 2013b). For the purposes of the experiment, though, the teacher made sure that sufficient instances of OVS word-order would appear in the input throughout the course.

In Italian unmarked transitive sentences, in contrast to Polish, syntactic functions are mainly assigned on the basis of constituent order: items occurring in preverbal position are generally assigned the function of 'subject', whereas 'objects' occur in post-verbal position. Although function assignment is usually aided by semantics (e.g., animate referents might be more likely to be interpreted as agents, and inanimate ones as patients), constituent order remains the main factor. It must be noted however that VS order is the pragmatically unmarked option for a number of structures, notably inaccusative and pronominal and passive constructions.

Although the focus of this paper is on constituent order, this is not to suggest that other factors are not significant. For example, an important role in the expression of gender and number in Italian is played by articles, and this contrasting *locus* of marking may influence learners' strategies of L2 case ending processing. However, it is beyond the scope of this paper to consider factors other than those already outlined.

As mentioned earlier, the VILLA methodology makes it possible to compute the frequency of linguistic items in the input. Preliminary[4] figures at Time 1 (9 hours) show that the nominative ending -/a/ of the paradigm in question is roughly six times as common as the accusative -/e/, and almost twice as common as all other endings combined (non -/a/). As a result, -/a/ is by far the most frequent ending associated with feminine referents (Fig. 3).

Fig. 3: case ending relative frequency, Time 1

Ending	-/a/	-/e/	non -/a/
Approximate frequency	2050	330	1340
'-a/other ending' ratio		6:1	2:1

The same procedure can be applied to 'constituent order'. Fig. 4 displays the relevant figures at Time 1 (9 hours) for utterances in which both subject and object are instantiated by feminine nouns. These rather conservative criteria were deemed necessary because of widespread syncretism across nominal classes, so that the two cases at issue are not always as clearly distinguishable as in the feminine paradigm considered here. Specifically, the -/a/ ending is shared by the accusative and genitive case of animate masculine nouns, whereas inanimate masculine nouns and neuter nouns do not distuinguish the two direct cases. If one considers the distribution of syntactic structures indipendently of the nominal class that nouns belong to, then figures are indeed much more cospicuous. As can be seen, SVO is roughly twice as common as OVS if only full nouns are computed (e.g. *Klara lubi kawę*, "Klara likes coffee") and three

times as common if subject pronouns are also included (e.g. *ona lubi kawę*, "she likes coffee").
In general, however, bivalent verbs (and therefore transitive constructions) are only a minority
among the total verbs which appear in the VILLA input, which consists mostly of copular
constructions and monovalent verbs.

Fig. 4: constituent order relative frequency

Constituent order	SVO (full noun)	SVO (tot.)	OVS
Approximate frequency	30	40	15
SVO/OVS ratio	2:1	3:1	

5. *Hypotheses*

This work aims at determining what parameters may affect the perceptual prominence of case
endings in the input stream. The question is relevant for a theory of SLA insofar as we claim
that prominence might influence the probability that target elements are noticed, and perhaps,
eventually acquired. The initial assumption which needs to be posited postulates that Italian L1
speakers would generally find it difficult to process case marking, as this strategy of encoding
syntactic functions diverges from that adopted by their native language (Eckman 1996). In
addition, morphological case marking may be regarded as typologically marked on the basis of
its cross-linguistic distribution (Iggesen 2013).

We first consider the parameter 'target ending'. On the basis of the frequency data just shown,
combined with the learners' supposed difficulty with case marking, we can hypothesise that
feminine nouns will tend to assume a default, invariable form in -/a/. Indeed, it has been shown
that in the initial stages of untutored L2 acquisition, lexical items usually occur in a single
word-form, selected from the input thanks to its frequency and/or salience. If any apparent
morphological variation occurs, still it does not convey grammatical meaning (Klein & Perdue
1997, Broeder, Extra & Van Hout 1993, Giacalone Ramat 2003). The question whether our
VILLA participants go through the same stages of development as untutored learners is beyond
the scope of this paper; but even so, we would expect that if the contrast between the two
inflected word-forms considered should be neutralised, then the -/a/ form would emerge, thanks
to its higher frequency. We go on to argue that the presence of -/a/ where -/e/ would be required
witnesses to the insufficient prominence of the latter for processing. This assumption is
justified by the fact that the Sentence Imitation test is generally believed to probe learners'
implicit competence (Vinther 2002): participants are not simply required to repeat a string of
sounds, but rather to retrieve the meaning of the target sentence and re-encode it. Both
comprehension and production are performed on the basis of the grammar of the learner

variety: meaning, therefore, might well be interpreted and encoded in a non-target-like manner. It may be the case, for instance, that the interlanguage system does not include inflected word-forms yet, and that syntactic functions are assigned on the basis of other strategies (say, 'subject-first'). Case endings, therefore, do not necessarily play a role in comprehension or production. However, we can reasonably assume that learners would try to perform the task to the best of their abilities. As a result, one might expect that upon hearing an ending different from that of the basic word-form, learners would at least try to reproduce it in their output. It is unlikely that they would deliberately ignore it, even if to them it encodes little to no meaning. To summarise, if the non-default word form is repeated by learners, then it must have been so evident as to impose itself to their attention. In other words, the likelihood of a segment being repeated, hence noticed, can be regarded as a function of its perceptual prominence. In addition to this, of course, considerable inter-learner variability should be considered, resulting from such factors as attention, stress, and learning style.

The inclusion of 'lexical transparency' in the analysis is motivated by the claim that comprehension in initial SLA relies principally on the processing of lexical, rather than grammatical elements (Swain 1985). Givón's (1990) 'competition hypothesis' posits that in early L2 acquisition, vocabulary and grammar compete for attention, working memory allotment, and ultimately processing capacity. VanPatten (2004:14) proposes a Lexical Preference Principle, holding that "learners will tend to rely on lexical items as opposed to grammatical form to get meaning when both encode the same semantic information". In sum, these studies suggest that lexical meaning has priority over grammatical form. It could be argued that even in the presence of morphology, learners might be induced to ignore it and concentrate their processing resources on the lexical level. If, however, the meaning of a lexical item is easily accessible, its processing will impose a lighter cognitive load on the hearer. As a consequence, more resources could be dedicated to less urgent levels of the input, such as inflectional morphology.

With regard to 'constituent order', finally, it was hypothesised that SVO would facilitate target processing because it represents the dominant order in the target input. Learners, therefore, should be quite familiar with it. Conversely, OVS targets should result in more errors because they do not match the learner's expectations as to the structure of the L2. In addition, it should not be forgotten that SVO is the canonical constituent order of the learners' L1; and finally, a general tendency to rely on canonical SVO word order when interpreting target sentences has been repeatedly observed (Pléh 1990, MacWhinney & Bates 1987). It is worth noting here that we make no assumption as to pragmatic markedness. In native varieties, OVS is typically used

with object topics and subjects in focus. This was not the case in the VILLA input, in which the two constituent orders were often used rather interchangeably: OVS sentences were only presented to the learners in order to make them accustomed to the theoretically free word order of the target language. Moreover, the Sentence Imitation test provided learners with no context to rely on, so we feel that any role for pragmatic markedness may be safely excluded.

The arguments just stated presuppose that case endings should have been already associated with the corresponding syntactic functions. Unfortunately, in the absence of a translation or comprehension test to supplement our results, we cannot be sure whether this is indeed the case. Even if it is not, still the frequency data presented above inform us that learners should have heard case endings more often in the SVO order (-/a/ ... -/e/) than the reverse (-/e/ ... -/a/), provided only that they would be able to perceive and segment these elements. Consequently, even if the underlying syntactic structure was not retrieved (at least not on the basis of case marking), still learners should have grown more familiar with the surface realisation of SVO sentences, rather than OVS.

Again, this argument relies on an assumption, namely that learners are able to perceive and segment case endings. However, we have no conclusive proof for that, either. In fact, in this paper we argue that the key to understanding the role of constituent order is precisely perception. We go as far as to suggest that this parameter might affect the probability of perceiving the phonic segments corresponding to inflectional endings, independently of form-function associations and frequency alike. The very same ending (say, -/e/) should be more prominent in association with a particular value of 'constituent order' (say, SVO) than with the other one. The relationship between perceptual prominence and constituent order will be analysed more amply later on in the paper. As far as our hypotheses are concerned, for the time being we might say that we expect a very strong effect for the parameter 'constituent order' on repetition accuracy. Specifically, we will suppose that SVO should be favoured by learners at the expense of OVS, mainly on the basis of its higher frequency in the input.

Building on these considerations, our working hypothesis posits that for each parameter, one member of the opposition will aid learners in their processing of inflectional morphology, whereas the competing one will make the task harder (Table 3).

Table 3: facilitating and impeding parameter values

Parameter	Facilitating value	Impeding value
Target ending	-/a/	-/e/
Constituent order	SVO	OVS
Lexical transparency	T	NT

It is argued that the more hindering values cumulate in a single target item, the harder it will be to process it correctly. The target accusative represented in (4), for example, will be maximally hard to process as it only features hindering values, namely -/e/ target ending, OVS constituent order and non-transparent carrier word.

(4)   kuchark-/e/   woła   Brazylijk-/a/
        cook ACC   call 3SG   Brazilian woman NOM
        "the Brazilian woman calls the cook"

The target nominative, in contrast, may be regarded as fairly accessible because it features two facilitating values (-/a/ and T) and only one hindering value (OVS).
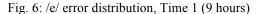
6. Results

Results at Time 1 (9 hours) are presented in Fig. 5 according to the combinations of the values instantiating the three parameters 'ending', 'constituent order' and 'lexical transparency'. For each value combination (es. {-/a/, SVO, T}), error rate is computed as the ratio between errors and target items (n. = 56). The two values corresponding to "Total -/a/" and "Total -/e/" provide a summary of overall error rate for the two endings independently of 'constituent order' and 'lexical transparency', and are calculated on the basis of the total number of target items for each ending (n. = 224). Percentage values account for omitted responses (n. = 4).
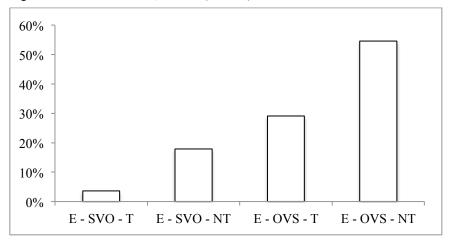
Fig. 5: overall error rate, Time 1 (9 hrs)

Value combination			errors	error %
-/a/	SVO	T	3	5%
		NT	1	2%
	OVS	T	2	4%
		NT	7	13%
	Total -/a/		13	6%
-/e/	SVO	T	2	4%
		NT	10	18%
	OVS	T	16	29%
		NT	30	54%
	Total -/e/		58	25%
Overall total			*71*	*16%*

The most striking observation highlighted by Fig. 5 is that errors concentrate in the occurrences of target accusative -/e/. Only 13 errors (6%) occur when the nominative case is required (n. = 224), as opposed to 58 (13%) found in occurrences of the accusative case (n. = 224).

If we focus on errors regarding target accusative, an interesting distribution pattern emerges (Fig. 6). As predicted, error rate appears to increase steadily as the hindering values of the three parameters cumulate together. When all three hindering values (/e/, OVS, NT) are found in the same occurrence, maximum error rate is registered (54%).

Fig. 6: /e/ error distribution, Time 1 (9 hours)

These figures point to a highly skewed distribution, confirmed by a Shapiro-Wilk normality test (p = 1.36e-06) carried out with R (R Core Team 2014), like all following analyses. As an exploratory analysis of our data, the effect of our three predictors on repetition accuracy was proofed by means of a non-parametric ANOVA test. First, a Kruskal-Wallis test revealed a significant influence of the factor 'ending' (p = 7,39e-06). No significant effect for the factors 'constituent order' and 'lexical transparency' were found in target occurences of -/a/ (p = 0,10 and 0,33 respectively). Conversely, in occurrences of target -/e/ there was a strong effect for both predictors (p = 2,34e-05 for 'constituent order' and p = 0,01 for 'transparency'). A Spearman correlation test was also run for target –/e/ to determine the relationship between errors and predictors at Time1. There was a strong positive correlation between errors and 'constituent order' (ρ = 0,57, p=4.61e-06) and a weaker, but still noteworthy correlation between errors and 'lexical transparency' (ρ = 0,34, p=0,01).

Such a preliminary analysis supports the hypothesis that our predictors indeed affect repetition accuracy, but is not yet quite satisfactory in view of the data at hand. First, we have no reason to assume that there is no interaction among our three parameters. Moreover, individual variability needs to be taken into account, as some learners may consistently produce the default, invariable word-form of the learner variety, while others may be influenced by the context in which a specific target ending occurs. For these reasons, a Generalised Mixed Linear Model was fitted for responses to target -/e/, with 'constituent order' and 'lexical transparency' as fixed effects and 'learner' as random effect. The model provided evidence in support of the

hypothesis that both predictors are significant at this stage (p = 0,005 and p = 0,01 respectively), while also accounting for between-subject variability. On the basis of these figures, Fig. 7 orders the various contexts of occurrence along a hierarchy reflecting their effect on repetition accuracy.
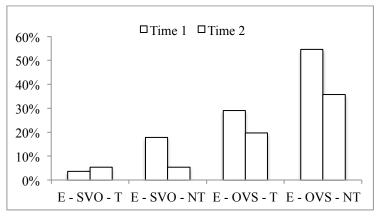
Fig. 7: context of occurrence hierarchy

	'target ending'	/a/	/e/			
more accurate	'constituent order'	All contexts	SVO		OVS	
	'lexical transparency'		T	NT	T	NT

more accurate → less accurate

The table reads as follows: the nominative case is processed quite accurately in all contexts. The accusative case, in contrast, is processed more accurately if the target sentence has SVO constituent order rather than OVS: and within sentences sharing the same constituent order, the accusative ending is processed more accurately if the word stem is lexically transparent.

A comparison between the results at Time 1 (9 hrs) and 2 (13:30 hrs) shows that the error distribution patterns are consistent in time, especially in OVS sentences (Fig. 8). Both factors however become less powerful predictors of accuracy, 'lexical transparency' in fact hardly reaching significance. It is worth noting that error rate at Time 2 decreases in nearly all contexts. The difference between the two data sets is statistically significant (Kruskal-Wallis test, p = 0,05), which points to a positive influence of further exposure to the input.

Fig. 8: /e/ error distribution, comparison between Time 1 and Time 2

7. *Discussion*

Our quantitative analysis has shown that most errors involve an overextension of the nominative ending -/a/ onto accusative -/e/. This is hardly surprising if one takes into account the frequency data presented earlier: as instances of -/a/ represent almost two thirds of the total occurrences of case endings on feminine nouns, it is no wonder that this ending should be selected as the basic word-form of the learner variety.

This observation is a first step towards an account of our results, as it predicts which ending is more likely to be selected when words are produced in their invariable form. On the other hand, there is still left to establish under what conditions such neutralisation contexts are more likely to arise. The data show that error rate steadily increases as the disfavoured values of the three parameters 'ending', 'constituent order' and 'transparency' cumulate in the same context of occurrence. Provisionally, therefore, we may state that it is this combination of disfavoured values that predicts the accessibility of a given target item and the expected error rate.

The role of the parameter 'constituent order' in determining error distribution is still not very clear, though. Before discussing this problem, it might be useful to briefly consider again the question of the cognitive abilities probed by the Sentence Imitation test. Although to a certain extent this is still an unresolved question, there is now widespread agreement as to its tackling learners' implicit competence in the interlanguage. It has been shown that accurate rote repetition of an utterance is possible within a short time from the presentation of the stimulus (Sachs 1967); however, some delay between the presentation of the stimuli and their repetition can inhibit exclusive reliance on phonological memory, the mechanism which makes rote repetition possible (Juffs & Harrington 2011). Under such conditions, the Sentence Imitation test becomes reconstructive in nature: rather than 'repeating' target sentences, learners 'reproduce' them according to their present interlanguage grammar. Discussing the results of a test similar to that employed in this study, Håkansson (1989) for instance reports of a three-year old Swedish child consistently reproducing a NEG-AUX structure instead of the required AUX-NEG of the target utterances.

If this is true in the case of our learners, too, then it is probable that due to its higher frequency, they should have assumed SVO as the default constituent order of their learner variety. If errors merely involved a substitution of the disfavoured value of the parameter with the facilitating one, as is the case with target endings, then one should expect OVS structures to be correctly understood, but reproduced as SVO, case endings simply swapping positions in the utterance (2b as opposed to 2a). If learners do this, then we can conclude with reasonable certainty that form-function associations must have been established between case endings and the corresponding syntactic functions, as meaning is correctly retrieved and re-encoded. Just like

the child described by Håkansson, learners simply adjust their output to the rules of the interlanguage grammar, which in our case only allows the SVO constituent order. In our data, however, this is not the case if not exceptionally. In most cases, the word-form in -/e/ is simply substituted with that in -/a/, so that in the resulting utterance two -/a/ endings are found (2c), a pattern which is ungrammatical in Polish.

(2)	a. target sentence (OVS)	tłumaczk-/**e**/	pozdrawia	artystk-/**a**/.
		translator-ACC	greet 3SG	artist-NOM
	b. hypothesized output (SVO)	tłumaczk-/**a**/	pozdrawia	artystk-/**e**/.
		translator-NOM	greet greet 3SG	artist-ACC
	c. actual output	tłumaczk-/**a**/	pozdrawia	artystk-/**a**/.
		translator	greet	artist

It is clear, then, that no constituent order is favoured over the other, as none emerges from learner utterances. Since both nouns take the -/a/ ending, it is impossible to distinguish between subject and object on the basis of inflectional morphology. Again, we make no assumption as to the underlying principles of utterance organisation in the learner variety: it is possible, for instance, that target utterances are interpreted and reproduced according to a default constituent order principle (say, 'subject first'), independently of morphology. Discussing this issue, however, would take us beyond the scope of this paper. It is a fact, though, that error rate does increase when the target sentence has OVS constituent order. Error distribution therefore must be a function of something more subtle than an opposition between the favoured and disfavoured values of a parameter. With this in mind, we focus now on the factors which seem to make case endings in OVS target sentences so much harder to process.

In our view, a key contribution to settling the issue is provided by data on speech perception and segmentation. Gallimore and Tharp (1981) state that in Sentence Imitation tests the accessibility of linguistic elements depends on their position in the utterance according to the hierarchy initial > final > medial. Peters (1985) claims that utterance-initial and utterance-final positions are maximally prominent and accessible for segmentation and storage, whereas utterance-internal positions are harder to access. Slobin (1985:1166) formulates for L1 acquisition the operating principles 'attention: end of unit' and 'attention: beginning of unit'. More recently, VanPatten (2000:300) proposed his operating principles P4 (learners first process elements in sentence/utterance initial position) and P4a (learners process elements in final position before elements in medial position). Finally, and most relevantly for the present work, Rast (2008:151) found that the accuracy of word repetitions in initial Polish L2 is

affected by word position (utterance initial and final vs. medial) independently of the time of exposure (0, 4 and 8 hrs).

The studies cited so far, however, typically considered the perceptual prominence of entire words or structures. If we apply this reasoning to inflectional morphemes, instead, it becomes evident that in SVO sentences the disfavoured accusative ending -/e/ occurs in utterance-final position, thus receiving maximal prominence (3a). In OVS sentences, in contrast, this element always occurs in utterance-medial position, which might make it harder to perceive and consequently reproduce (3b)

(3) a. nauczycielk-/a/ pcha   studentk-/e/.
         teacher-NOM   push 3SG   student-ACC

     b. studentk-/e/   pcha   nauczycielk-/a/.
         student-ACC   push 3SG   teacher-NOM

Thus, error distribution may be accounted for more accurately by hypothesising that learners are more successful at reproducing target structures if these are more retrievable from a perceptual point of view. In SVO sentences, the disfavoured infrequent ending is in the maximally prominent utterance-final position and stands the best chances of being noticed and processed. Higher error rate in OVS sentences, in contrast, is a consequence of the reduced perceptual prominence of the non-default case ending in utterance-internal position. In this condition, learners can only rely on very weak phonetic clues to retrieve and reproduce the correct target ending. Indeed, in such contexts the data show a significant tendency to provide the default word-form in -/a/.

How does this fit into a theory of SLA? If Sentence Imitation tests really probe learner's implicit competence in the interlanguage grammar, then we should conclude that in the present stage of acquisition, feminine nouns appear in a default word-form in -/a/ and are not normally inflected to encode syntactic functions. Since case marking is not consistently distinguished on the two nouns, this strategy does not seem to be involved in conveying grammatical meaning. Still we have the evidence that the non-default case ending -/e/ is sometimes reproduced, though with no apparent relation to the expression of syntactic functions. This is why we argue that case endings are repeated as a function of their perceptual prominence: since they are not part of the interlanguage grammar and are not needed to convey meaning, case endings need prompting from target items, and will only be repeated if they are prominent enough to be noticed in the speech stream. The decrease of error rate registered at Time 2, however, suggests

that with further exposure to the input the role of perceptual prominence may become less crucial, as learners develop other, perhaps more native-like strategies of input processing.

Before concluding, it is worth noting that learners had no context to rely on when performing the test. Further, target sentences were recorded in such a way as to avoid any particular intonation which might have helped learners to distinguish between subject and object. There is no doubt that context and intonation would provide very powerful hints as to sentence interpretation in a real communicative situation: the purpose of the test, however, was to isolate the role of inflectional morphology alone and verify whether learners at such initial stage of acquisition would be able to rely on it in order to retrieve meaning.

8. Conclusion

The Sentence Imitation test discussed in this paper shows that the accuracy of case marking repetition is influenced by all three factors considered, according to the hierarchy 'target ending' > 'constituent order' > 'lexical transparency'. Frequency in the input predicts which ending will instantiate the basic word-form of the learner variety; perceptual prominence determines the contexts in which this will be more likely to emerge instead of the target form. Our account of these results revolves around constituent order, which was shown to be a very strong predictor of accuracy. We have found that this factor is closely associated with the perceptual prominence of inflectional morphology. In SVO utterances, the disfavoured -/e/ value is found in the prominent utterance-final position, which facilitates its noticing and processing on purely perceptual grounds. In OVS utterances, on the contrary, it occurs in a poorly prominent utterance-internal position and therefore stands fewer chances of being noticed.

Perceptual prominence seems to be a factor affecting the most basic level of input processing, namely segmenting and identifying stretches of sound with grammatical meaning. Although on its own it is greatly insufficient to account for the development of a case system, perceptual prominence certainly constitutes a crucial step in the ability to notice, recognise and eventually acquire the different word-forms which constitute an inflectional paradigm.

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[3] Lemma frequencies at Time 1 (9hs) and Time 2 (13:30hs) respectively: *artystka* "artist" 47, 52; *brazylijka* "Brasilian woman" 51, 58; *dziewczynka* "little girl" 27, 33; *kucharka* "cook" 64, 78; *nauczycielka* "teacher" 83, 95; *portugalka* "Portuguese woman" 54, 59; *studentka* "student" 58, 68; *tłumaczka* "translator" 52, 64. All nouns are both semantically and grammatically feminine.

[4] Morpho-syntactic coding is presently being developed for the entire VILLA corpus. The data presented here are based on manual computation.