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THE ANIMAL FARM TASK: IMPLICIT AND EXPLICIT LANGUAGE LEARNING IN YOUNG AND ELDERLY ADULTS

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ABSTRACT

The aim of this research was to investigate which aspects of language can be successfully mastered at the beginning of language learning. The study used digitized cartoon drawings of animals performing different actions in dyads. The animals and actions could be combined freely to create a large number of different scenes corresponding to independent clauses. Young and elderly participants learned novel names and two morphosyntactic rules embedded in the new language. Vocabulary learning was examined using a picture-word matching task, grammatical learning using either a sentence-picture matching task or a grammaticality judgment task, as well as an interview. Although young participants were more successful in each task, learning the grammar proved to be more difficult than lexical learning for all age groups. The results suggest that effective word learning mechanisms are available at older age, too, as long as the material is of right proportions and the conditions of learning are simplified. Findings suggest that, compared to explicit memory, implicit memory is more resistant to the negative aspects of aging. In sum, implicit learning processes seem to prevail mostly in relation to word learning, yet providing specific explanations is likely to be more beneficial in the beginning of the learning process. Based on the results of this study, the Animal Farm task can be of use in educational programs at all ages and different student groups.

KEYWORDS: foreign language teaching, lexical learning, grammatical learning, young and elderly adults

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Several studies have focused on foreign language learning, most of which have concerned the younger age group. Very few studies have concentrated on the elderly. Exceptional is the work of de Bot and Makoni (2005) in this regard, who consider language and aging as part of lifelong development. In their interpretation, this progress includes not only development, but also decrement, with biological, psychological, and social dimensions changing over time, and the effects of these changes differing among individuals.

With age, work performance only decreases in areas where rapid responses to uncertain and various stimuli are required, or in occupations involving high physical workloads. In other areas, knowledge and experience may offset cognitive impairment occurring at elderly age (Czigler, 2000). During aging the size of nerve cells diminishes, the number of dendrites and synapses decreases, and the degeneration of the myelin sheath can also be observed. Decline is more significant in the frontal region (Salat et al., 2005) and the association cortices are also sensitive to aging (Raz, 2000). As a function of these alterations, information processing capacity is subject to change. The most affected cognitive functions are working memory (Salthouse, 1990), attention and cognitive control (Bialystok, Craik, & Ruocco, 2006), planning (Sorel & Pennequin, 2008), fluid intelligence (Bugg, Zook, Delosh, Davalos, & Davis, 2006), or inhibitory processes (Hasher, Stoltzhus, Zacks, & Rypma, 1991).

Performance degradation occurs when another task which also needs processing, has to be done in parallel. However, performance may improve in the presence of promoting stimuli. Implicit memory is quite well preserved, but its functioning depends on the type of task used to measure it (Baddeley, Eysenck, & Anderson, 2010). One of the most well-known methods of testing implicit learning is artificial language learning (Reber, 1989), which is similar to language acquisition: subjects implicitly acquire the grammar of a new language, then their sensitivity to grammatically correct and incorrect sentences is tested. Artificial language learning activates similar brain areas as the natural language learning processes (Friederici, Steinhauer, Pfeifer, 2002). Regarding language learning and grammar learning in particular, it is important to emphasize age-related changes in the thinking process as performance deteriorates in inferential tasks involving multiple premises.

Age-related performance decline is not inevitable, at least not in all areas (Czigler, 2012). Basic skills (e.g., cycling), which we learn implicitly, manifest quite strong resistance to decline with age, but the more complex skills (e.g., use of a foreign language) must be practiced, otherwise they fade. Research shows that the brain retains its plasticity to some extent even at old age (Greenwood, 2007) such that, with training, the functional reorganization of neural networks involved in certain tasks can be achieved (Doidge, 2010). As a result of practice, improvements were found in tasks involving working memory (Buschkuehl et al., 2008) and episodic memory (Verhaeghen, Marco, & Goossens, 1992). However, in these
studies, training only improved performance on practiced tasks and no actual transfer occurred (Li et al., 2008). Many skills and environmental factors can serve as resources to hinder cognitive decline in old age: working memory and long term-memory capacity, attentional processing and its speed, education, learning, social and linguistic environment, and multilingualism (de Bot & Makoni, 2005). Intellectual activity (be it crosswords, active learning, or language learning) plays a crucial role in the compensation of age-related deterioration (Compton, Bachman, Brad, & Avet, 2000). According to several studies (Bialystok, Craik, Klein, & Viswanathan, 2004, Bialystok, Craik, & Freedman, 2007), negative changes due to aging could be delayed by language learning experience as well. Compensatory efforts to counteract functional impairments were found to increase up to the age of 70 years, contributing to the experience of successful aging (Rothermund & Brandstädter, 2003).

**Current study.** Our research aim was to explore which aspects of a language can be mastered successfully in the case of the elderly at the beginning of the language learning process. Our previous results revealed that young adults are successful and fast in learning words at the initial phase of foreign language learning, but grasping grammar starts off with difficulty, especially if a rule in the novel language is not of the same complexity as in the first language (Polonyi, Abari, Nagy, Sántha, & Gnandt, 2014). Learning in older age may be hindered by decrease in interest, fear of change, lack of adaptability and other personality factors, or by the deterioration of short-term memory and biological functions (sensory and motor organs; Bajusz, 2008). Accordingly, we hypothesized that the efficiency of learning the artificial language would exhibit differences between young and elderly subjects, the young generally performing better than the old participants (Hypothesis 1).

Newport’s results (2002) suggest that language learners achieve greater success in acquiring the lexicon, compared to grasping grammar and phonology. Accordingly, we hypothesized that word-learning would be more effective than grammar learning in all groups. However, we expect the elderly to be as successful as the young participants in learning words (Hypothesis 2), but less successful in learning grammar (Hypothesis 3).

Researchers generally agree that implicit processes play a crucial role when learning the first language (at least its grammar), while when learning a foreign language, both explicit and implicit processes are required (Brown & Robertson, 2007). However, implicit memory is more resistant to negative aspects of aging than explicit memory: learning and conscious recollection of new information are more problematic in the elderly (O’Hanlon, Wilcox, & Kemper, 2001). Hence, our next assumption was that the elderly would perform better in language testing, than when asked in the interview to name novel words and formulate rules (Hypothesis 4). Regarding the reaction time results, compared to the young participants, we expected the elderly to be slower on the implicit tasks (Hypothesis
Lastly, we expected the more active elderly participants to exert superior performances on the language tests, both explicit and implicit (Hypothesis 6).

METHOD

Participants

Four groups participated in our study, three elderly groups and a group consisting of young adults. Participants gave their written informed consent before taking part in the study. None of them reported neurological illnesses or reading difficulties, and all had normal or corrected-to-normal vision.

Twenty-five university students formed the young adult group (17 females, 8 males, $M_{age} = 19.32$, range 18-24 years, $SD = 2.16$).

The first elderly group (Group 1) comprised 14 participants (9 females, 5 males, $M_{age} = 67$, range 56-80 years, $SD = 7.2$), who lived in a public nursing home, most having a sedentary lifestyle. As the performance of Group 1 was very poor, other elderly groups were included in the study. The participants in the second elderly group (Group 2) were inhabitants of a private nursing home, where the elderly led a very active life, taking part in activities, performances, in editing a newspaper etc. This group consisted of 9 participants (6 females, 3 males, $M_{age} = 67.5$, range 58-84 years, $SD = 9$). The third elderly group (Group 3) was recruited via the local newspaper and comprised 19 participants (14 females, 5 males, $M_{age} = 61$, range 56-67 years, $SD = 3.5$). They were all actively working, some having their own business. Hence, we had three groups of elderly participants: Group 1 – nursing home and passive lifestyle, Group 2 – nursing home and a quite active life, Group 3 – living with their family and having a very active lifestyle.

The selection of the elderly participants in each group was aided by the objective psychological instrument, the Mini–Mental State Examination (MMSE). The MMSE (Folstein, Folstein, & Mchugh, 1975) is used by psychologists and physicians to identify dementia and its severity. The results of the MMSE were: $M = 26.7$, range: 18-30, $SD = 3.89$ (Group 1); $M = 27$, range: 23-30, $SD = 2$ (Group 2); $M = 28.5$, range: 22-30. $SD = 1.9$ (Group 3). Hence, the three groups did not differ in terms of mental state scores.

All participants were native Hungarian speakers. They filled out a language background questionnaire tapping their foreign language proficiency and the number of languages they speak. All university students had learnt at least one foreign language in primary and secondary school. They knew minimum two - maximum three foreign languages. The languages most commonly spoken by the elderly participants were Russian, German and English. Participants were asked to rate their talking, writing, listening, and reading comprehension in everyday context in the languages they knew by using a 6-point scale (1 = deficient, 6 = excellent).
This yielded a summative score for each language. The results for the experimental groups were as follows: young adults: $M = 32, SD = 8.8$, Group 1: $M = 11.2, SD = 7.1$; Group 2: $M = 15.1, SD = 10.9$; Group 3: $M = 14.5, SD = 8.8$.

**Measures**

The study was realized using an artificial language task (see also Polonyi, 2012, short description in the Appendix). During task unfolding, participants were familiarized with the language in a training session followed by testing. During the training session, images were displayed on the screen accompanied by an appropriate descriptive sentence. Participants observed the novel language and the pictures along with reading aloud the sentences below the images. The training session was followed by several tasks tapping language learning: picture-word matching task, picture-sentence matching task (young adults), grammaticality judgment tasks (elderly), all implicit tasks, and an interview about the words and rules of the language (explicit test).

Regarding the picture-word matching task, we aimed to investigate whether the participants correctly associated the animal or action appearing on the screen with its equivalent in the novel language. Correct responses in this case: (a) when participants could mark that the picture and the word are matched (correct matches), (b) when participants realized that the picture and the word are mismatched (incorrect matches). With regards to the picture-sentence matching task, participants had to state whether the sentences are matched with the picture shown. Correct responses in this task were: (a) when participants realized that the picture and the sentence are matched (correct matches), (b) when participants realized that the picture and the word are mismatched (incorrect matches: gender rule mismatch or object marking rule mismatch). The construction of the test tasks for the young adults and the elderly Group 1 is described in Figure 1.

![Figure 1. The construction of the testing tasks.](image_url)
As for the picture-sentence matching task, half of the correctly matched sentences previously appeared in the training material, while the other half were unfamiliar to the participants. Feminine and masculine nouns were evenly represented. Every verb appeared four times in the sentences, and the nouns four times in each subject and object form.

In the case of elderly Group 2 and Group 3, we used a simplified version of the original tests. The rationale behind this was that the results of the Group 1 were scarcely interpretable. Instead of the picture-sentence task, we used a grammaticality judgment task (sentences without pictures). In this task, every noun appeared two times as an object and two times as a subject, whereas every verb appeared four times. In these two groups the picture-word matching task used only 30 matches, the picture-sentence matching task consisted of only 80 sentences.

Tasks were supplemented by a short interview (explicit test) that explored whether the participants noticed grammatical rules and if so, whether they were able to formulate them. During the interviews, the participants also listed the learned words.

Procedure

Training and testing were run on a computer using Inquisit (version 3.0.6.0, Millisecond Software), which recorded the participants’ reaction times in milliseconds and the correctness of their responses. Participants were tested individually in a quiet room. The experiment consisted of three sessions run on three different days.

RESULTS

Statistical tests were run on the percentage of correct answers and reaction time (RT) data obtained on the two test days. In determining the average RT of subjects for each task, wrong answers and RT data more than 3 standard deviations away from the average individual RT were excluded from the analyses. Similarly, results with extreme RTs were omitted from the proportion of correct responses. A two-way mixed ANOVA was performed with the following factors: between-group variable, groups (4), repeated-measure variable, assessment (implicit and explicit) (Figure 2). Word learning and grammar learning tasks were treated separately. The results of the picture-sentence matching task (young adults) and grammaticality judgment tasks (elderly) are referred to as grammar learning in this section.
Table 1

Results of word learning as a function of groups and type of assessment

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>young adults</td>
<td>89.47</td>
<td>10.53</td>
</tr>
<tr>
<td>elderly adults 1</td>
<td>29.98</td>
<td>25.64</td>
</tr>
<tr>
<td>elderly adults 2</td>
<td>48.70</td>
<td>27.81</td>
</tr>
<tr>
<td>elderly adults 3</td>
<td>46.87</td>
<td>27.67</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implicit</td>
<td>70.27</td>
<td>20.44</td>
</tr>
<tr>
<td>Explicit</td>
<td>48.69</td>
<td>38.72</td>
</tr>
</tbody>
</table>

With regards to word learning performance, both main effects were significant (Groups: $F(3, 63) = 52.97$, $p < .001$; Assessment: $F(1, 63) = 112.11$, $p < .001$). The Group × Assessment interaction is significant as well, $F(3, 63) = 3.91$, $p = .013$, mainly due to the almost identical performance of the young subjects on implicit and explicit tests. Post-hoc tests did not reveal any significant difference between elderly Groups 2 and 3, but in all other cases the difference was significant (Bonferroni test: $p < .037$). Means and standard deviations are shown in Table 1. Post-hoc tests regarding the assessment type revealed a significant difference between implicit and explicit performance ($p < .001$).

Table 2

Results of grammar learning as a function of groups and type of assessment

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>young adults</td>
<td>40.25</td>
<td>21.28</td>
</tr>
<tr>
<td>elderly adults 1</td>
<td>24.86</td>
<td>22.48</td>
</tr>
<tr>
<td>elderly adults 2</td>
<td>29.41</td>
<td>22.71</td>
</tr>
<tr>
<td>elderly adults 3</td>
<td>35.26</td>
<td>24.48</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>implicit</td>
<td>48.92</td>
<td>19.40</td>
</tr>
<tr>
<td>explicit</td>
<td>7.63</td>
<td>24.14</td>
</tr>
</tbody>
</table>

Concerning grammar learning, both main effects were significant (Groups: $F(3, 63) = 467.60$, $p = .005$; Assessment: $F(1, 63) = 140.64$, $p < .001$). Groups × Assessment interaction was also significant ($F(3, 63) = 5.49$, $p = .002$). Post-hoc tests showed significant difference between the young (better performance) and the elderly Group 1 (Bonferroni test: $p = .028$), in other cases no difference was found. Means and standard deviations are shown in Table 2. An additional result was that subjects were better in learning words than learning grammar (Repeated-measures ANOVA: $F(1, 66) = 406.03$, $p < .001$). Post-hoc tests revealed a significant difference between implicit and explicit performance ($p < .001$) (Table 2).
In case of the elderly, in both word learning and grammar learning there was significant difference between explicit and implicit performance, the latter being superior (Repeated-measures ANOVA: $F(1, 41) = 111.54, p < .001; F(1, 41) = 135.33, p < .001$). In the case of picture-word matching, only the young group reached significantly higher performance compared to all other groups ($p < .001$ in all three cases). In the interview regarding the learned words, Group 2 and 3 did not differ. Regarding implicit learning of grammar, we found no significant differences between groups, but on the interview on discovered grammar rules, the young differed significantly from the elderly Group 1 ($p = .002$). Figure 2 depicts the proportion of correct responses as a function of each group, type of task, and type of assessment.

![Figure 2](image.jpg)

*Figure 2.* Proportion of correct responses as a function of each group, type of task, and type of assessment.

**Participants’ response times.** A two-way mixed ANOVA was performed with the following factors: between-group variable, groups (4), repeated-measure variable and test (1 and 2). Picture-word matching and grammar learning tasks were treated separately (see Figure 3). With regards to picture-word matching, both main effects were significant (Groups: $F(3, 63) = 16.94, p < .001$; Test: $F(1, 63) = 27.23, p < .001$). Groups × Test interaction was also significant ($F(3, 63) = 3.91, p = .013$), mainly due to the almost identical reaction time of elderly group 1 on test days. The post-hoc test did not reveal significant differences between the young and elderly Group 2, and between Group 2 and 3; in all other cases the difference was
significant (Bonferroni test: \( p < .012 \) in the other four cases). Means and standard deviations are shown in **Table 3**.

**Table 3**

*Reaction times of picture-word matching as a function of groups and tests.*

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>young adults</td>
<td>2205.76</td>
<td>672.26</td>
</tr>
<tr>
<td>elderly adults 1</td>
<td>4156.23</td>
<td>1277.65</td>
</tr>
<tr>
<td>elderly adults 2</td>
<td>2703.30</td>
<td>833.80</td>
</tr>
<tr>
<td>elderly adults 3</td>
<td>3385.19</td>
<td>1138.93</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tests</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>test 1</td>
<td>3265.65</td>
<td>1141.67</td>
</tr>
<tr>
<td>test 2</td>
<td>2763.62</td>
<td>1277.62</td>
</tr>
</tbody>
</table>

Post-hoc tests of test days showed significant difference between performance on test 1 and 2 (\( p < .001 \)) (see **Table 3**).

Regarding grammar learning, both main effects were significant (Groups: \( F(3, 63) = 5.91, \ p < .001 \); Test: \( F(1, 63) = 6.80, \ p = .001 \)). The Groups \( \times \) Test interaction was not significant, as RTs were almost identical on test 1 and 2. Post-hoc tests did not reveal significant differences between young and elderly Group 2, and between young and elderly Group 3 (Bonferroni test: \( p = .54, \ p = .63 \)), in all other cases the difference was significant (\( p < .039 \) in the other four cases). Means and standard deviations are shown in **Table 4**. Post-hoc test of test days showed significant difference (decrease in RTs) between performance on test day 1 and performance on test day 2 (\( p < .011 \)) (**Table 4**).

**Table 4**

*Reaction times of grammar learning as a function of groups and tests.*

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>young adults</td>
<td>3481.56</td>
<td>998.79</td>
</tr>
<tr>
<td>elderly adults 1</td>
<td>4736.03</td>
<td>1350.18</td>
</tr>
<tr>
<td>elderly adults 2</td>
<td>2914.11</td>
<td>1127.01</td>
</tr>
<tr>
<td>elderly adults 3</td>
<td>3905.31</td>
<td>1369.17</td>
</tr>
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<table>
<thead>
<tr>
<th>Tests</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>test 1</td>
<td>3939.00</td>
<td>3636.26</td>
</tr>
<tr>
<td>test 2</td>
<td>1243.67</td>
<td>1392.80</td>
</tr>
</tbody>
</table>

Post-hoc test of test days showed significant difference (decrease in RTs) between performance on test 1 and 2 (\( p < .011 \)) (**Table 4**).
DISCUSSIONS

Our analysis focused on three aspects of foreign language learning: the expansion of passive vocabulary, rule learning on sentence level, and the relationship between implicit grammar learning and its reporting (recognition and recall). In addition, our research aimed to explore what aspects of a language can be mastered successfully by the elderly, relative to young people, at the beginning of the language learning process and the role played by active life in the cognitive performance of the elderly.

First, we expected a difference between young and elderly groups in learning the artificial language, the young group being more successful. Results suggested that young people were superior in almost all tasks compared to the elderly groups. This supports the earlier conclusion that with aging, performance gradually decreases on the level of the cognitive processing systems (Czigler, 2012).

Incidental learning of novel words is an under-researched area. Previous studies (Polonyi, Abari, & Nótin, 2009; Laine, Polonyi, & Abari, 2013) showed that adults are able to generalize word features based on two representatives of a language and can develop orthographic representations of words. Current results showed that the young group learned more words based on both recognition (picture-word matching) and recall tasks (interview). In these tasks, performance

![Figure 3. Reaction times of word learning and grammar learning as a function of groups, tasks (picture-word matching and grammar learning) and test days (1 and 2).](image-url)
accuracy approached 90%. The results of the elderly groups suggested that effective word learning mechanisms are available at older age, too, as long as the material to be learnt is of right proportions and the conditions of learning are simplified (training material is not only read but also listened to, distracting factors are reduced to minimal).

The results of the current study showed that in certain cases, the semantic content of the words can easily and quickly evolve in young and elderly alike. A short-term passive observation of a simple language should suffice to acquire a small set of vocabulary, thus allowing for understanding a novel language if words are carefully chosen (Hazenberg & Hulstijn, 1996).

Compared to learning words, learning grammar turned out to be a greater challenge for all participants, as it was equally unsuccessful in all age groups. Participants did not recognize the rules in the implicit tests in general. On the other hand, the interviews revealed that some were able to recall word endings, and some even learned the rules. One explanation would be that the knowledge of rules had not manifested itself during the implicit tests because the first (poor) strategy developed was abandoned too late and, by the time they figured out the accurate rules, there were no more test stimuli to confirm them.

Our results also showed that implicit memory was more resistant to the negative aspects of aging than explicit memory: the elderly performed better in language testing, compared to when asked in the interview to name novel words and formulate rules. This finding is also supported by the study of O’Hanlon, Wilcox, and Kemper (2001), where learning and conscious recollection of new information were more problematic in the elderly.

We also assumed that the elderly’s reaction time for several tasks will be longer than that of younger adults. Our results partly supported this assumption: the elderly who lived in a nursing home where very few activities were organized, were slower than those who led an active life. Moreover, they weren’t quicker on the second day of testing. Previous research examining the abilities of the elderly assert that the deterioration of cognitive performance is far from being universal within or between individuals (Czigler, 2000). The latter is mainly due to different external influences (e.g., lifestyle, fitness, social status, the presence of various risk factors).

A typical assumption is that decline in performance is due to the deceleration of cognitive processes. Our results, however, suggest that physical and psychological symptoms of aging are not related primarily to bodily and neurological degeneration, but rather to the abandonment of activities preserving different skills and functions. Seniors who have activities and responsibilities are more likely to lead a healthy, harmonious elder life compared to those who do not have this opportunity. However, such activities exert a protective effect only if they involve sufficient physical and/or mental activity, involve human relationships, and are not of compulsive nature (Szemán, Hegyi, Bakó, & Molnár, 2007).
Future studies should examine a larger sample size, limiting the influence of extreme observations or outliers. Likewise, further information regarding participants (e.g., IQ score) would allow for more comprehensive conclusions. Further methods could involve noninvasive functional brain measurements, such as Electroencephalography (EEG), Magnetoencephalography (MEG) or functional Magnetic Resonance Imaging (fMRI) to attain more data on the neurological processes involved in language acquisition using our study design. This study focused on the elderly, however a wider range regarding participants’ age could be of interest. Such samples could derive from super-agers with great accomplishments in a given field that retain their mental-fitness or the young population – the latter to support educational programme planning.

In conclusion, the results of the current study showed that there are certain implicit (unconscious) learning processes, but they may prevail mostly in relation to word learning. Incidental learning is not effective in grammar learning, not even in case of young adults. Providing specific explanations is likely to be more beneficial for the learner at the beginning of the learning process. Our explicit knowledge can later be transformed into implicit knowledge through practice.

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APPENDIX

Description of the artificial language used in the study

The language task uses a set of digitized drawings in which 20 animals (in dyads) perform 10 actions. The names of the animals and the actions can be freely combined, generating a large number of scenes (for example: "The dog hugs a lion."). The description of the image in the artificial language is displayed below the images (see Figure A). Thus, participants learn the words and grammar of this novel language at the same time, alike in a foreign language learning situation.

Figure A. The equivalent of this sentence: "The dog pushes the cow."

The language consists of 20 nouns and 10 verbs. All words are randomly generated and none of them resemble Hungarian words. Nouns are names of people-like drawn animals like a frog or an elephant, the verbs are transitive verbs that can be used to describe the interactions among the animals in the pictures (e.g. chases someone, kisses someone). Every noun is of CVCVCV (C - consonant, V - vowel) structure, every verb has CVCV structure. Verbs and objects in the test sentences are defined by a grammatical system based on two rules: grammatical gender rule and object-marking rule. The object-marking rule is as follows: if the word ends with "-o" or "-u", the subject in the sentence will get the suffix "-m" (e.g. dosudu - dosudum). If the noun ends with "-e " or "-i" the suffix is "-r" (e.g. tuvipi - tuvipir). The grammatical gender rule is: if the subject ends with "-u" or "-i" ("feminine"), the verb ending is "-a" (e.g. poha). If the subject end with "-o" or "-e" ("masculine"), the suffix of the verb is "-i" (e.g. pohi). The male and female roles were assigned to the nouns arbitrarily, so half of the nouns (10) are masculine, and the other half (10) are feminine.

The training material consists of 80 sentences: 50 SVO (subject-verb-object) sentences, 10 SOV (subject-object-verb) sentences, and 20 SV (subject-verb) sentences. Each noun appears four times as subject, and three times as objects, every verb appears eight times in two forms (e.g. poha, pohi), four with masculine and four with feminine ending.