

# Effects of Language Learning Interventions in Pre-School Children: a Longitudinal Study

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## Abstract

The aim of the present contribution is to evaluate and discuss the impacts of language learning interventions in pre-school children with German as a first or a second language.

The sample consisted of 864 children in intervention groups and 294 children as a comparison group within two successive cohorts. The instruments used were the SSV (Grimm 2003) and the CPM (Bulheller and Häcker, 2002). Language related and cognitive skills as well as social abilities were assessed at the beginning and end of the intervention period. The intervention took place in a separate room of the kindergarten. Specially qualified pre-school teachers worked intensively in small groups with children who presented language learning difficulties.

The main results of this research are the following: there was a developmental growth in all of the participant children; differences in achievement were found between the two groups of children in the examined developmental domains. Teaching experience, age of the children and extent of language intervention showed to be the most significant factors to positively impact the learning experience.

Implications of those results for language learning interventions of children are therefore considered. Particularly, we will discuss the question of whether not only children who qualify to take part in the interventions but also pre-school children in general would benefit from such a program.

## Introduction

The aim of the present contribution is to evaluate and discuss the impacts of language learning interventions in pre-school children with German as a first or second language.

After the negative results of the PISA investigation (Baumert, Klieme, Neubrand et al., 2001) concerning the reading competencies of German adolescents, an intensive process of reflection in search of specific reasons for these negative findings was started. These results raised important questions to all persons interested in educational achievement throughout the whole nation. Subsequently different initiatives to improve and enhance the reading abilities of children were set out. As there is a strong interrelation between reading and language abilities (Hulme and Snowling 2009, Bowey 2005, Perfetti, Landi and Oakhill, 2005) fostering of language competencies became an important objective. In recent years almost every state, city and town in Germany has developed programmes to enhance children's language abilities. These programmes are financially supported by several different institutions: trusts, communities, provincial governments and federal ministries.

One of the largest statewide implemented programmes is „Sag' mal was – Language Skills Training for Pre-school Children“, funded by the LANDESSTIFTUNG Baden-Württemberg. The aim of this programme, which is carried out in daycare facilities and pre-schools, is to

help children - particularly (but not exclusively) those belonging to ethnic minorities - to learn German using intensive training methods. The training is performed in small groups of 6 to 12 children (average group size 8.23) for the period of one kindergarten year (on average 9 months) using different concepts and methods. The specific instructional arrangement depends on the kindergarten teachers. Most of them have attended a brief further training in language education.

Two teams of researchers, one from the University of Education Heidelberg, the other from the University of Education Weingarten were selected for the evaluation of the program. The Heidelberg-Group evaluated two special concepts implemented predominantly in the cities of Mannheim and Heidelberg, whereas the group from Weingarten evaluated a broader field of support programmes examining a representative sample throughout the whole country: children living in larger and smaller cities as well as in rural areas. For these longitudinal investigations with two successive cohorts, several research methods were used: tests and questionnaires, video recording and interviews.

## **Research Questions**

The aim of the evaluation was to find out the impact of this programme to enhance language abilities in pre-school children with German as a first or a second language.

Within this broader context, the current presentation will address the following research questions:

1. How do language competence abilities develop over the course of a year? Is it possible to statistically improve the linguistic abilities of children through the intervention program?
2. The second question concerns the validity of the results for all groups of children: Do the results remain statistically significant also if the children are divided into two groups according to their language abilities: children who need an intervention and those who do not need it?
3. Is there a difference between the first and second tested cohort and which assumptions can be made about the factors causing this difference?

## Method

### Quasi-experimental design

A longitudinal study was conducted using a cohort sequence design.

Table 1: The quasi-experimental design of the study

	Autumn 2005	Summer 2006	Autumn 2006	Summer 2007	Summer 2008
	Before the Training	After the Training		End of Class 1	
1st Cohort 458 Ig 148 Cg	SSV CPM Questionnaires	SSV CPM Questionnaires		SLS SLRT CPM	
			Before the Training	After the Training	End of Class 1
2nd Cohort 407 Ig 145 Cg			SSV CPM Questionnaires	SSV Questionnaires	SLS SLRT CPM

The following instruments were used:

- SSV – Language screening designed for pre-school children (Grimm 2003) including the sub-tests *Phonological Working Memory for Non-Words* (PMN □ Phonology) and *Sentence Memory* (SM □ Syntax and Morphology)
- Tests for reading and spelling as well as intelligence (SLRT – Salzburg Reading and Spelling Test (Landerl, Wimmer and Moser 2006)
- CPM - Coloured Progressive Matrices (Bulheller and Häcker 2002) (□ inductive reasoning)
- Questionnaires for care-takers and parents (□ language and social behaviour, family background)

### Participants

The sample consisted of 1159 children, of which 864 (74.5%) were intervention children and 295 (25.5%) comparison children. The intervention children were selected by their

kindergarten teachers for participation in the intervention program because of linguistic deficits.

Approximately half of the group were boys (633; 54.6%), the other 526 were girls (45.4%).

*Cohorts:* The cohort 1 sample consisted of 606 children, the cohort 2 sample (one year later) of 553 children.

*Age:* The average age of the children at the first data collection was 5.2 years (standard deviation 7 months) in cohort 1. The children of cohort 2 were a little younger, approximately 5 years and 1 month (standard deviation 7.45 months). The univariate analysis confirms a statistically significant difference in age between the two cohorts ( $F(1,1117)=10.73$ ,  $p=0.001$ ,  $\text{Etaquadrat} = .01$ ).

*Languages:* Participants were children with approximately 20 different first languages including: 633 German, 201 Turkish, 65 Russian.

*Mono/Multilinguality:* 467 (40.3%) of the children were monolingual; 685 children (59.1%) came from multilingual families.

In order to obtain a representative sample, the kindergartens were spread over various regions as follows: City 348 (30%), Towns 384 (33.1%), Countryside 427 (36.8%).

## **Results**

### **The children's progress over the training year: phonological memory for non-words and sentence memory**

*A covariance analysis with repeated measurements* was carried out for each subtest, in order to analyse the development of the children's language abilities through the year of intervention. The raw values from each type of language competence from both cohorts and both measurement times were used as dependent variables. Participation in the training programme served as an independent variable.

The time 1 test score is dependant on the age of the children in such a way that older children attain better results. Therefore the age of the children at first time of measurement was applied as a covariate.

A significant main effect of the development of both competencies over the training period showed itself in the analysis for phonological memory of non-words ( $F(1,870)=43.21$ ,  $p<.001$ ,  $\eta^2=.05$ ) as well as for sentence memory ( $F(1,868)=1.05$ ,  $p<.001$ ,  $\eta^2=.11$ ). This matched the expected development of both competencies over time.

The interaction between time and intervention was not statistically significant concerning the phonological memory of non-words, whereas this effect was significant for the sentence memory ( $F(1,868)=5.77$ ;  $p<0.05$ ,  $\eta^2=.01$ ). It suggests that the intervention was effective only for sentence memory, and not for phonological memory of non-words (Figure 1 and 2).

Figure 1

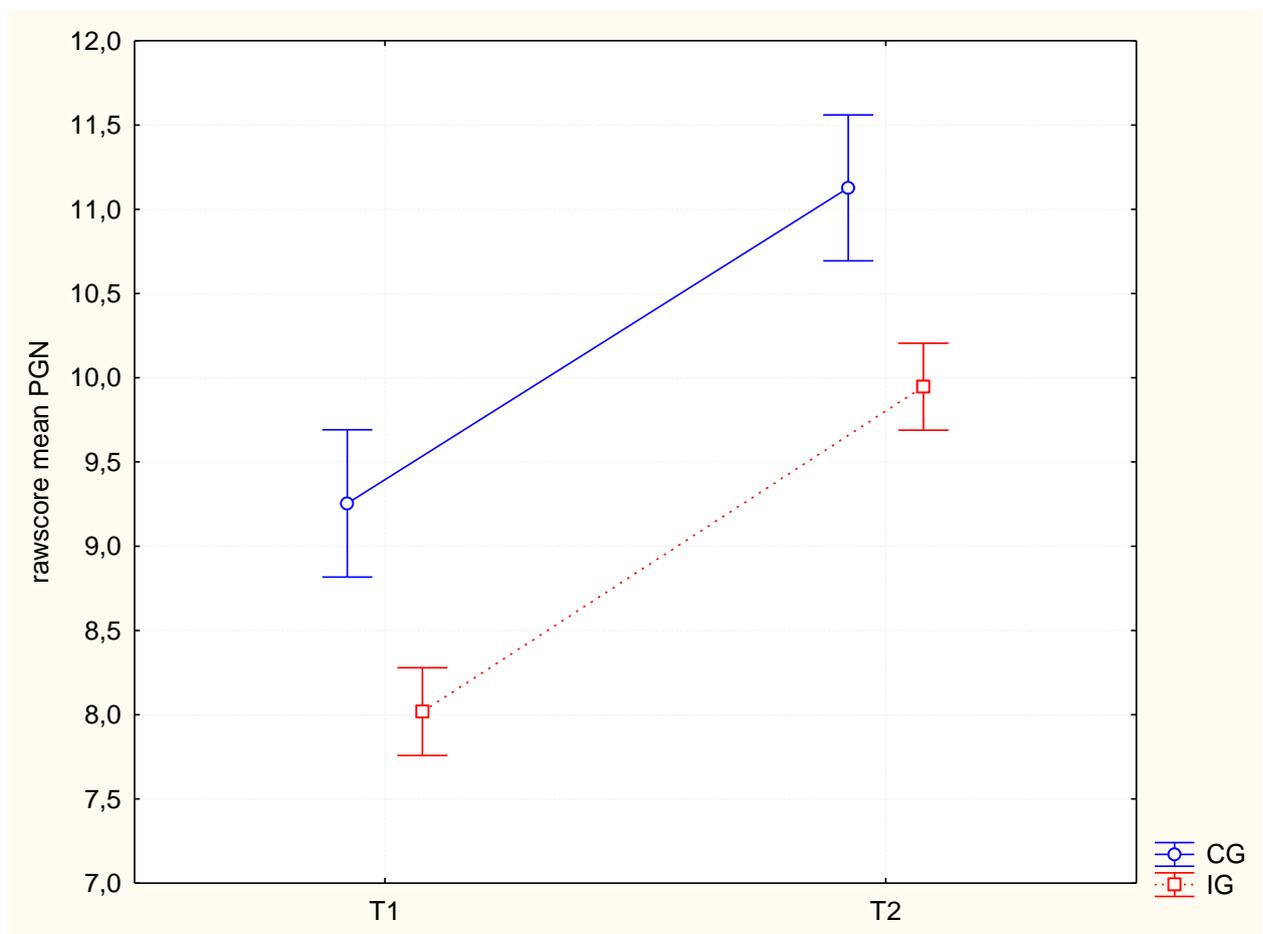


Figure 1: Achievement in the competence area Phonological Working Memory for Non-Words (PMN) at the beginning and the end of the training year

Figure 2

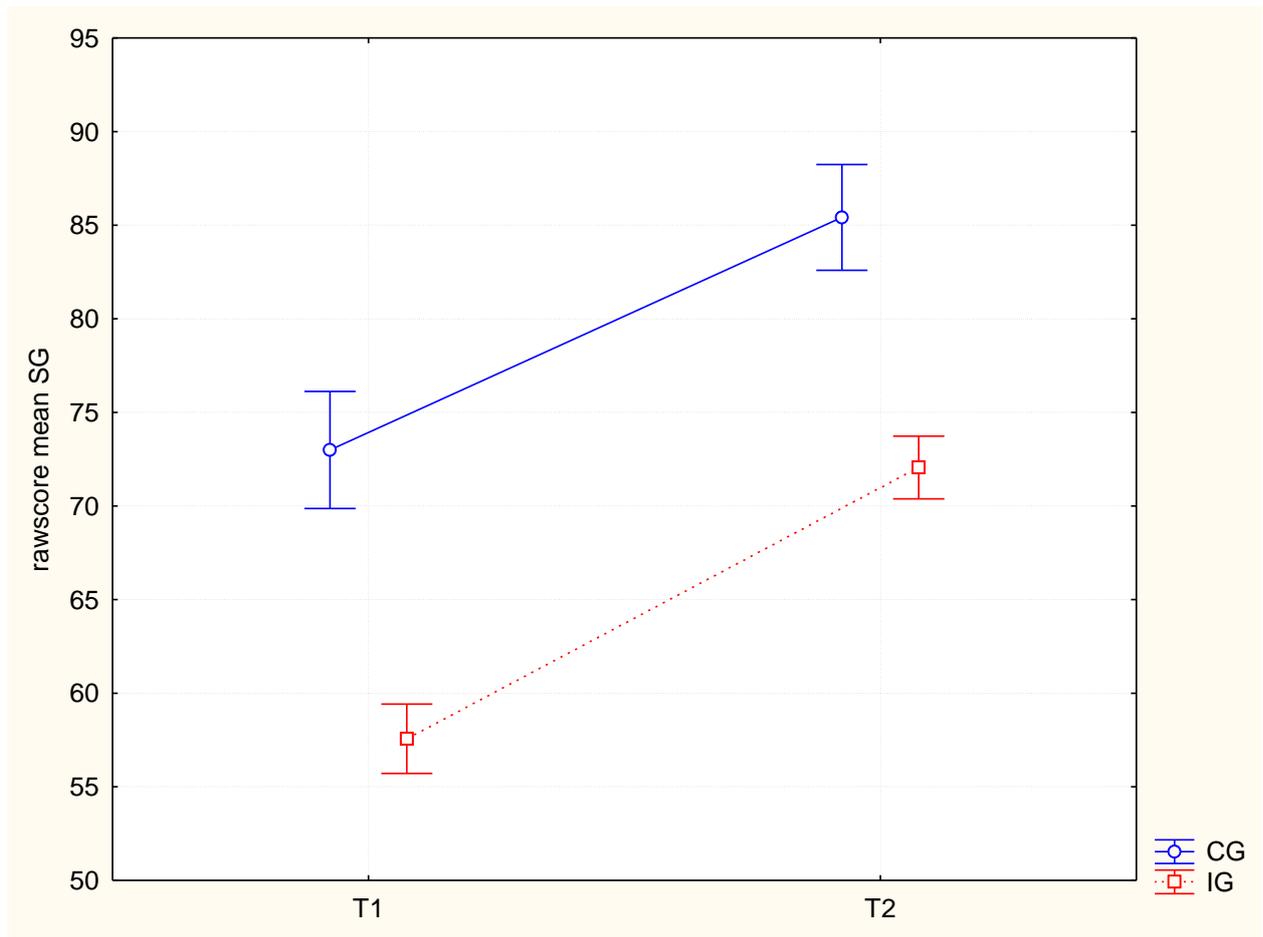


Figure 2: Achievement in the competence area Sentence Memory (SM) at the beginning and the end of the training year

## **Development of children with and without language problems**

Although the program was aimed at children with language difficulties, many children without language problems participated in the intervention groups. This was due to the fact that some kindergarten teachers did not properly use diagnostic instruments that would help them to identify more precisely who would qualify for the intervention. Some teachers selected children according to their observation, without making use of diagnostic instruments, some used instruments but did not have the skills for that. Children (from both intervention and comparison groups) with average language abilities at the first assessment were analyzed separately according to the following categories.

*Classification of children with and without language difficulties* (from the intervention and comparison group): In order to analyze the effects of the language learning intervention program, children's performance on the SM (sentence memory) and PMN (phonological memory for non-words) were analyzed. Participants were, accordingly, divided into two groups. Those with language difficulties presented a T-score (test score) lower than 40 points (standard deviation lower than the mean value) at the first assessment. Those without language difficulties had scores which were the same ( $T=40$ ) or higher than the mean levels ( $T > 40$ ).

An analysis of variance was carried out for each of the variables sentence memory (SM) and phonological memory for non-words (PMN) with the factors time (pre- and post-test) x intervention (children with and without intervention) x language abilities (children with and without language difficulties).

### **Phonological memory for non-words**

The three-factor ANOVA (time x language abilities x intervention) shows a main effect of time ( $F(1, 864) = 53.65, p < .01, \eta^2 = .06$ ) and a statistically significant interaction time x need for intervention ( $F(1, 864) = 59.33, p < .01, \eta^2 = .06$ ). Children with language deficits learned more over time but the progress the children made did not depend on the intervention.

Figure 3

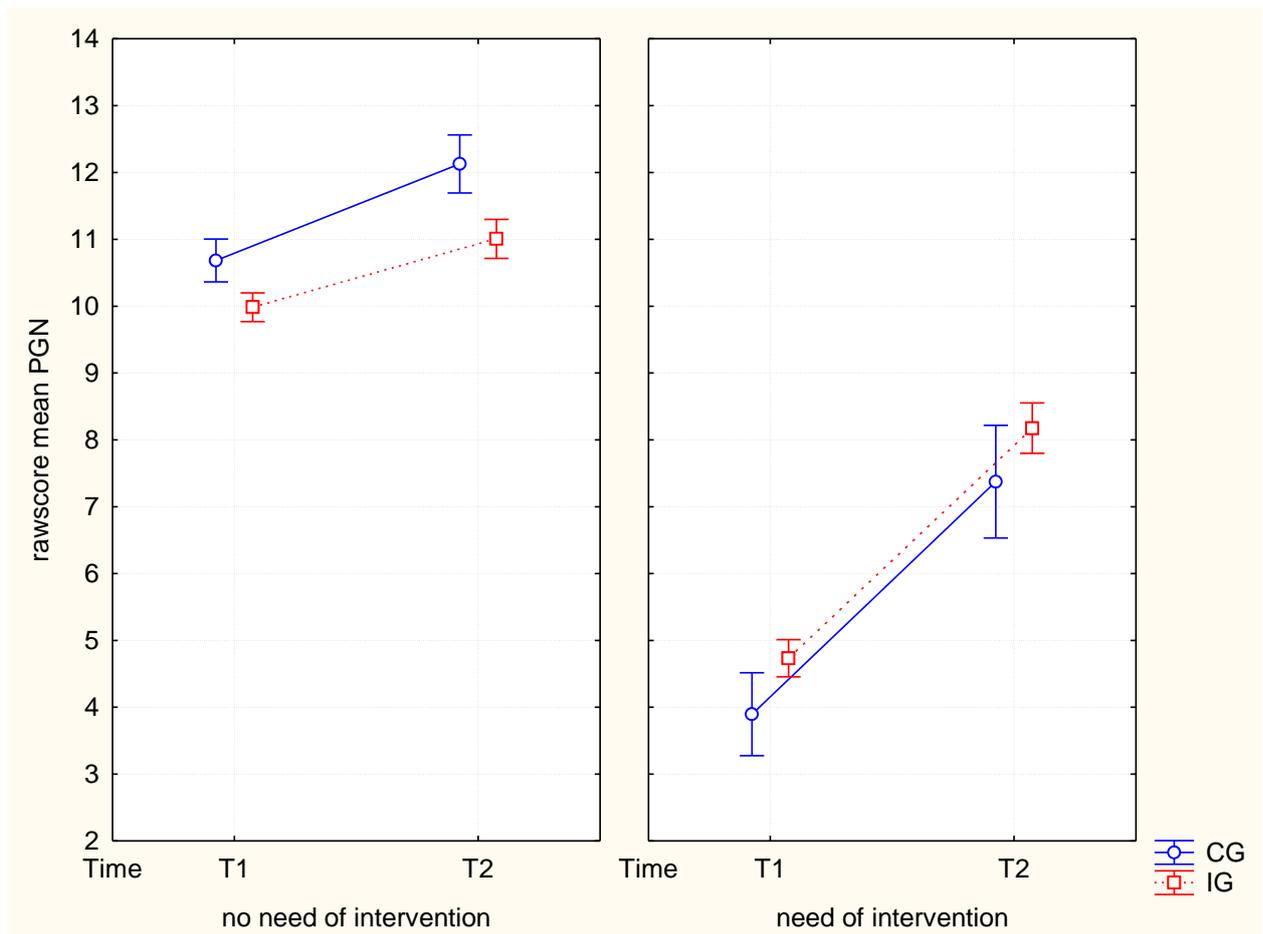


Figure 3: Achievement of children with and without language difficulties in the competence area Phonological Working Memory for Non-Words (PMN) at the beginning and the end of the training year

### Sentence memory

The ANOVA shows a significant main effect of time ( $F(1, 862) = 61.09, p < .01, \eta^2 = .07$ ) a significant interaction time x need for intervention ( $F(1, 862) = 126.01, p < .01, \eta^2 = .13$ ), but neither a significant interaction time x intervention nor any further significant interactions. Children with language difficulties and lower scores at time 1 achieve better than children without language deficits, but this effect applies to both groups, the intervention group as well as the comparison group.

Figure 4

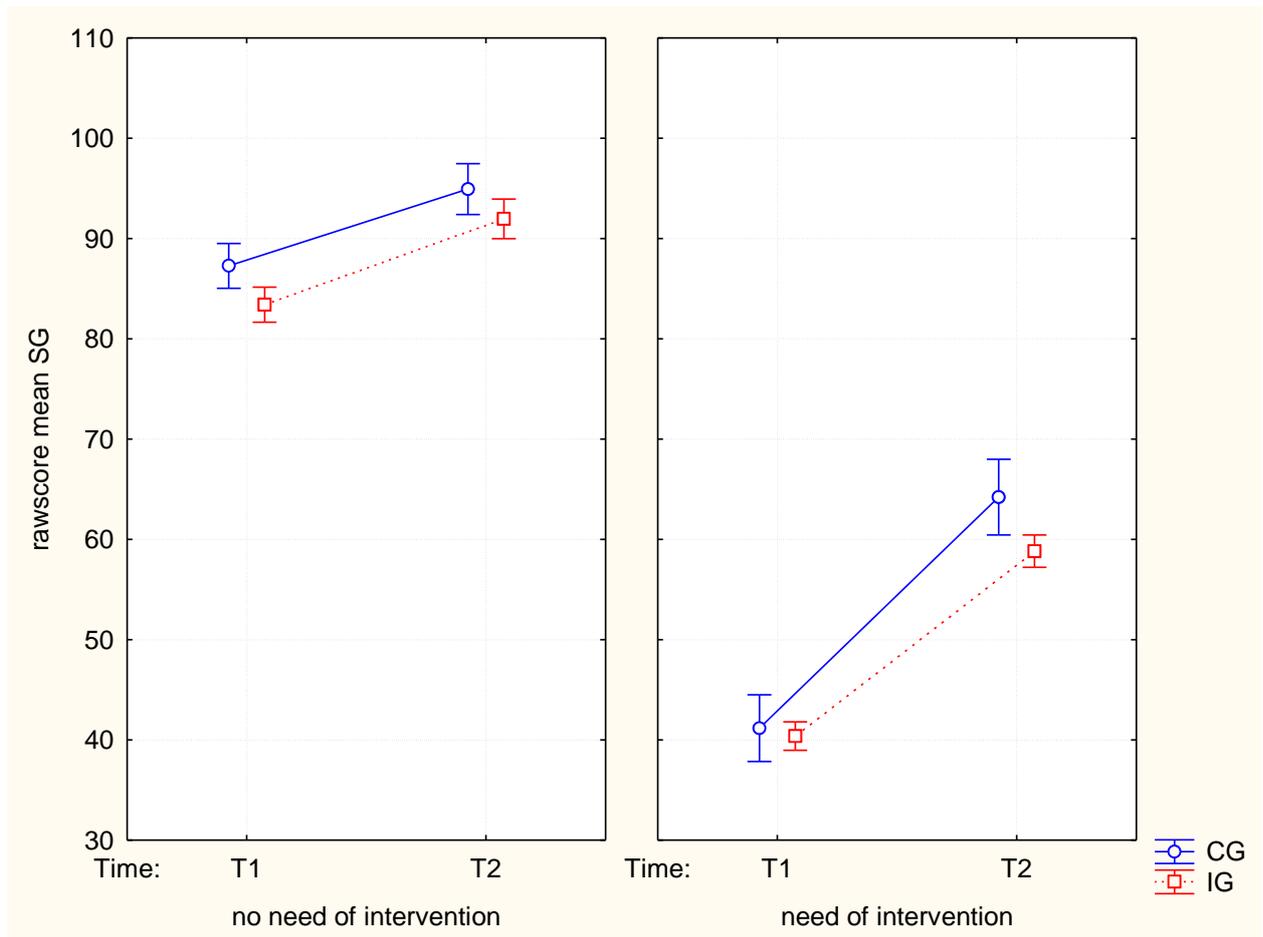


Figure 4: Achievement of children with and without language difficulties in the competence area Sentence Memory (SM) at the beginning and the end of the training year

### Differences in language achievement between cohort 1 and cohort 2

Finally, the difference in language acquisition between the first and second cohort, which was tested one year later, should be investigated. The ANOVA with repeated measurements shows a significant effect on the two cohorts in the Phonological memory for non-words ( $F(1,868)=81.11$ ;  $p<0.001$ ) and for the Sentence Memory a significant main effect for the intervention program ( $F(1,866)=6.72$ ;  $p<0.01$ ). The three-way-interaction time, intervention and cohort barely fails the level of significance ( $F(1,866)=3.30$ ;  $p=0.07$ ). Therefore, the positive effects of the intervention programme apply only to the children of the second cohort.

Figure 5

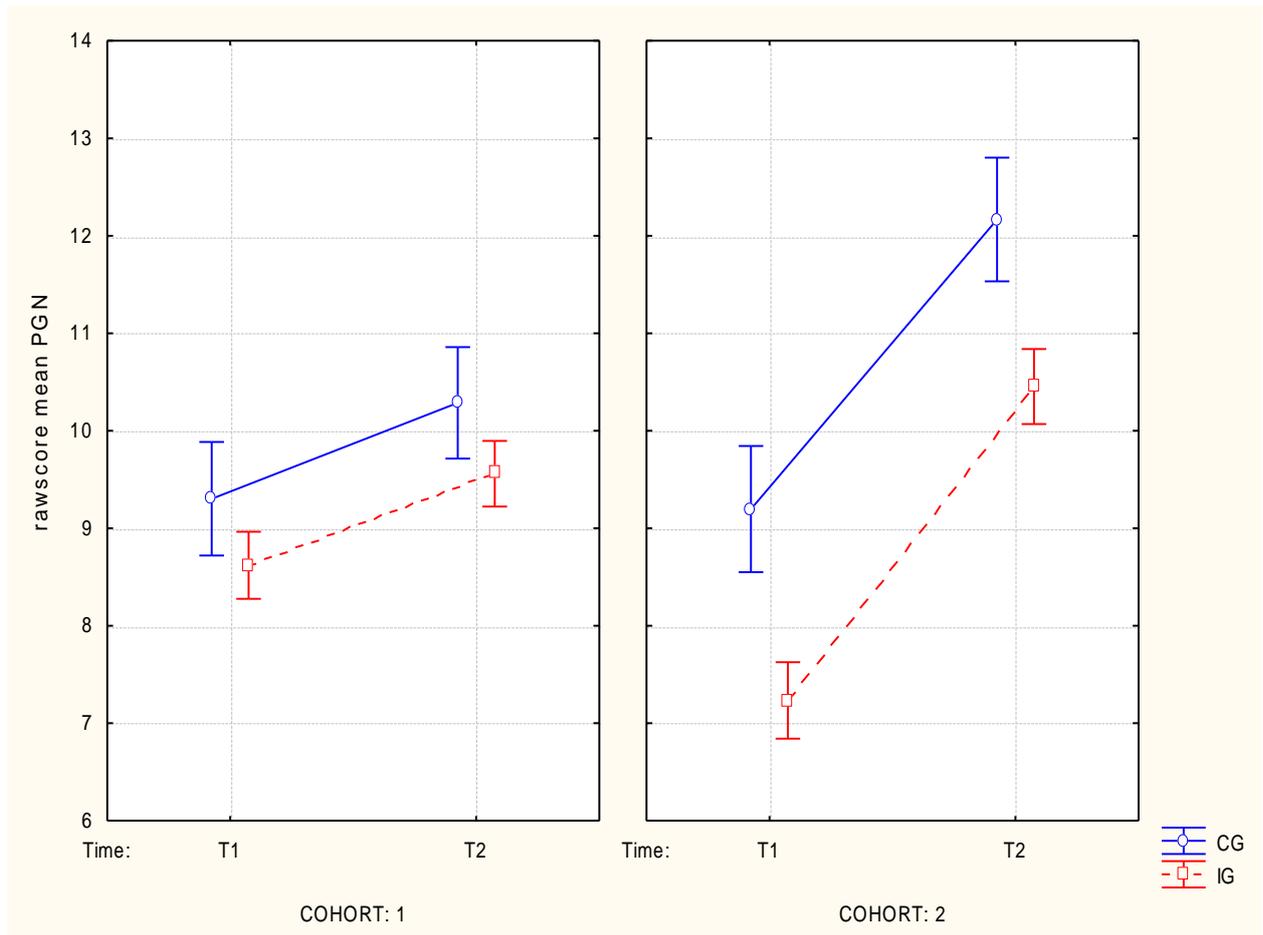


Figure 5: Achievement of children from both cohorts in the competence area Phonological Working Memory for Non-Words (PM) at the beginning and the end of the training year

Figure 6

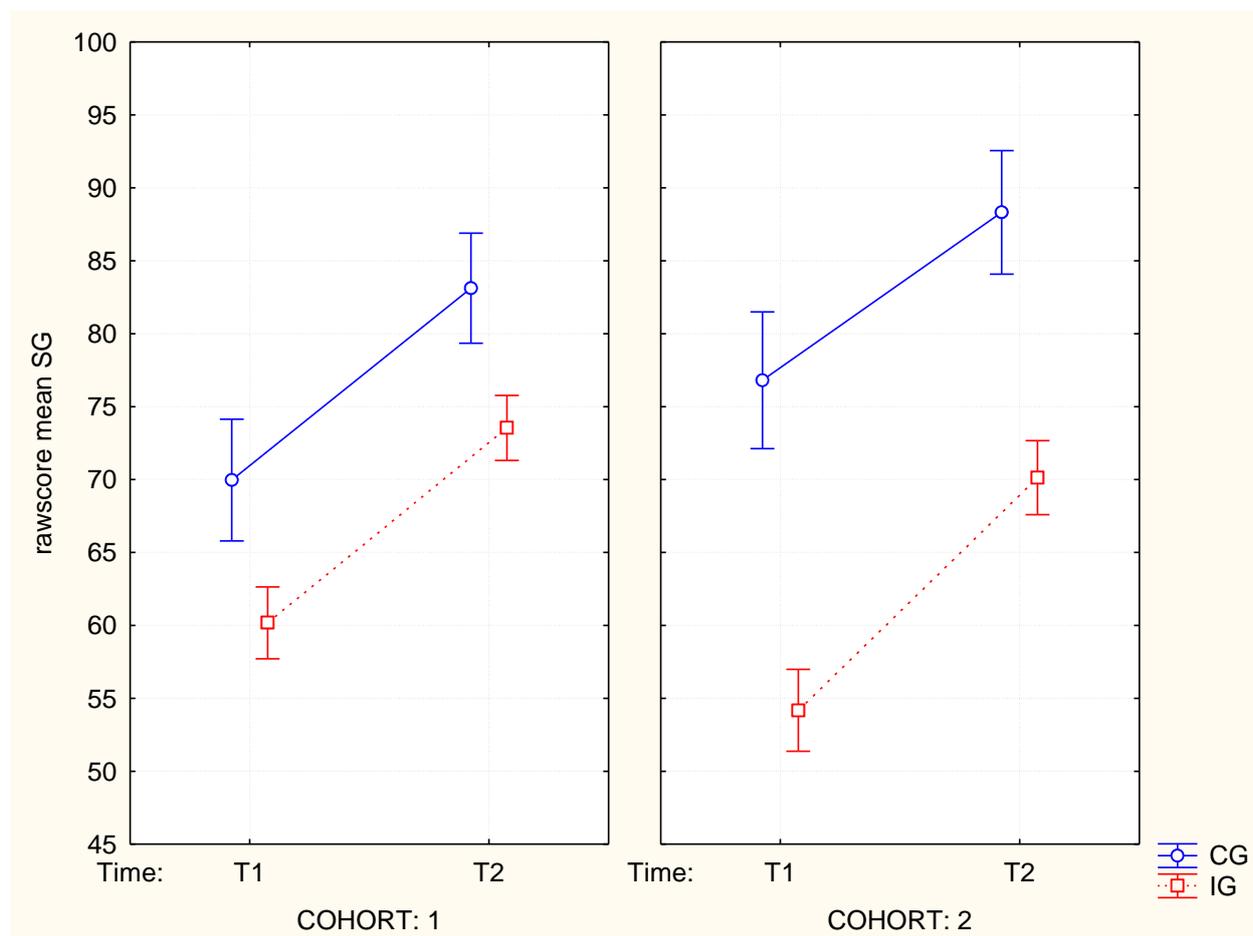


Figure 6: Achievement of children from both cohorts in the competence area Sentence Memory (SM) at the beginning and the end of the training year

### Discussion

Children's competencies increased over the training period in all tested areas: phonological working memory, syntax and semantics.

The age of the children and even more importantly, their starting capabilities are relevant to the progress in achievement. Younger children and children with fewer starting capabilities demonstrate a greater increase. Consequently, further language training programmes should begin as early as possible, and be appropriate to the children's starting abilities.

Furthermore, results reveal a progress of language competencies of children with language problems in comparison to children without language problems, irrespective if they were in

the intervention group or not. We found no evidence for the effect of the intervention; neither for children with language deficits nor for children without such deficits.

Finally, the significant difference between the achievement of the first and second cohort needs an explanation. This could be caused by different factors. First, the selection of children with language difficulties was more precise in cohort 2, because the base level of language abilities was lower at the beginning of the intervention. In addition, the conditions of work were more flexible in cohort 2: the intervention groups were smaller, the children younger, and the possibility to work separately with parts of the group allowed an individualized intervention. Furthermore, the second cohort kindergarten teachers could have gained more experience and more practical knowledge in enhancing language skills. All these factors are of essential importance for effective language learning interventions.

## **Bibliography**

- Baumert, Jürgen, Klieme, Eckhard, Neubrand, Michael, Prenzel, Manfred, Schiefele, Ulrich, Schneider, Wolfgang, Stanat, Petra, Tillmann, Klaus-Jürgen & Weiß, Manfred, Eds., 2001. *PISA 2000: Basiskompetenzen von Schülerinnen und Schülern im internationalen Vergleich*. Opladen: Verlag Leske & Budrich.
- Bowey, Judith A., 2005. Predicting individual differences in learning to read. In *The Science of Reading, edited by Margaret J. Snowling & Charles Hulme*, 155-172. Malden: Blackwell publishing.
- Bulheller, Stephan & Häcker, Hartmut, Ed., 2002. *CPM – Manual. Raven's Progressive Matrices und Vocabulary Scales*. Frankfurt a. M.: Swets press.
- Dodd, Barbara & Crosbie, Sharon, 2002. Language and Cognition: Evidence from Disordered Language. In *Childhood Cognitive Development*, edited by Usha Goswami, 470-490. Malden: Blackwell publishing.
- Grimm, Hannelore, 2003. *SSV – Sprachscreening für das Vorschulalter*. Kurzform des SETK 3-5. Göttingen: Hogrefe Verlag.
- Hulme, Charles & Snowling, Margaret J., 2009. *Developmental Disorders of Language Learning and Cognition*. Chichester: Wiley-Blackwell publishing.
- Landerl, Karin, Wimmer, Heinz & Moser, Ewald, 1997. *Salzburger Lese- und Rechtschreibtest*. Verfahren zur Differentialdiagnostik von Störungen des Lesens und Schreibens für die 1. bis 4. Schulstufe. Bern: Huber Verlag.

Mayringer, Heinz & Wimmer, Heinz, 2003. *SLS – Salzburger Lese-Screening für die Klassenstufen 1-4*. Bern: Huber Verlag.

Perfetti, Charles A., Landi, Nicole & Oakhill, Jane, 2005. The acquisition of reading comprehension skill. In *The Science of Reading, edited by Margaret J. Snowling & Charles Hulme*, 227-247. Malden: Blackwell publishing.

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