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ABSTRACT

Some results of seven studies of children's native Finnish language acquisition from 1971-1980 are summarized, focusing on two aspects: the main features in the development of Finnish inflection forms in 2-7-year-old children, and selected information derived from children's errors at the various age levels. Subjects were 260 children attending nursery schools, day care "clubs", and schools. Mastery of morphological forms were measured by tests using archaic (i.e., unfamiliar to the children) Finnish words, and some cognitive-linguistic skills were also measured with a variety of tests. Results indicated that the correct inflections are achieved gradually, as a result of the child's developmental level, the difficulty of the morphological form, and the linguistic and grammatical properties of the words to be inflected. Results also suggest that erroneous responses can offer psychologically valuable information about development, with the errors having different meanings in different age groups, revealing both linguistic progress and information about children's perception, processing, and interpretation of the tasks and approaches to solving cognitive and linguistic problems. However, more detailed research is needed to learn the strategies children use. Errors occurring in spontaneous speech were found not to have the same developmental meaning as those produced in a morphological test. (MSE)

THE ACQUISITION PROCESS OF FINNISH MORPHOLOGY IN 2-7-YEAR OLD CHILDREN

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The acquisition of morphological rules of the native language in children has received considerable attention during the last few years (e.g., Bates and Rankin 1979; Berman 1981; Derwing and Baker 1977; Snow et al. 1980). Morphology means the level of linguistic structures at which stems and inflections are combined to form words. The study of the development of the morphological forms offers means for discovering processes through which children learn linguistic rules of their native language and how they handle linguistic data at different age levels. Finnish is an interesting language in this respect because it has a very complicated morphological rule system.*)

Research on children's language development has been done at the Department of Psychology, University of Jyväskylä, since the late sixties. This paper summarizes some results of seven studies (Lyytinen 1973; 1974; 1975; 1976; 1978; 1981; Lyytinen et al. 1981). The studies concerned the acquisition of the Finnish inflectional forms in early childhood, compared the results of various kinds of training programmes, and analysed children's language errors and the relations of these linguistic variables with cognitive skills and with certain environmental factors. This article focuses on two aspects of these results: 1) on the main features in the development of the Finnish inflectional forms in 2-7-year old children and 2) on selected information derived from children's errors at the various age levels.

*) Free word-order, gradation in the stem, several cases, and verb-inflection in various persons are typical characteristics of the Finnish language.

Method

Subjects

The data of the research was collected in 1971-1980. Subject samples covered a total of 260 children attending nursery schools, day clubs and schools, out of which 135 were girls and 125 boys. The number of subjects and the publications, where the investigation in question have been described in more detail, are presented in Table 1.

Table 1: The data of the research

Age groups	N	Data
1;8 - 2;8	107	Lyytinen 1975, 1979, Lyytinen et al., 1981
3;0 - 3;11	24	Lyytinen 1973, 1978
4;0 - 4;11	56	Lyytinen 1973, 1974, 1978
5;0 - 5;11	24	Lyytinen 1973, 1978
6;11 - 7;9	49	Lyytinen 1981

The morphological tests

The mastery of the morphological forms was measured with tests constructed for this purpose. The test items were presented by means of picture cards which had been constructed by applying Berko's (1958) method. The pictures were made colourful and their topics were chosen to interest children. The purpose of the picture cards was to give meaning to the test items and to motivate children to make verbal utterances.

Words characteristic of the spoken language were used in the test for the two-year-olds. The tests meant for the older children consisted of archaic words that were in accord with the structure of Finnish, but whose meaning was unknown to the children. The use of archaic words was an attempt to make sure that children could not perform the tasks merely by copying models of colloquial Finnish.

The test items consisted of words of 2-4 syllables, ending with a vowel or a consonant. A third of the words required changes in the word stem when inflected. The infelctional forms investigated are presented in Table 2.

Table 2: The forms and their Finnish allomorphs in the morphological tests

The morphological forms		Allomorphs	Age groups measured
Inflection of adjectives	Comparative	-mpi	2, 3, 4, 5, 7
	Superlative	-in	3, 4, 5, 7
	Plural partitive of adjective	-a, -ä, -ta, -tä	3, 4, 5
	Adverbial suffix	-sti	3, 4, 5, 7
Inflection of nouns	Inessive	-ssa, -ssä	2, 3, 4, 5
	Illative	-vowel lenghtened + n or -n-n[1]) or sg -seen and pl -siin	2
	Partitive	-a, -ä, -ta, -tä	2, 3, 4, 5
	Translative	-ksi, -kse when followed by poss. suff.	7
Inflection of verbs	Active indicative present	-no special ending	2, 3, 4, 5
	Active indicative past	-i	3, 4, 5
	Active indicative pluperfect	-nut, -nyt, -neet	7
	Active conditional present	-isi	2) 5) 2) 7
	Passive indicative present	-taan, -tään, -daan, -dään	3, 4, 5
	Passive indicative past	-ttiin, -tiin	7
	Passive indicative perfect	-tu, -ty, -ttu, -tty	2

[1]) Vowel between h-n is the same as the vowel preceding h

[2]) Data material presented by Ruoppila (1969)

The cognitive-linguistic tests

Selected cognitive-linguistic skills of the children were also measured. As the age range of the subjects was extensive, there was no possibility to use same tests in all age groups. Cognitive skills of 2-year-olds were measured by Bayley Scales of Infant Development (Mental Development Index) and their active vocabulary using a picture card naming task. These tests were suitable no more for the 3-year-olds or older. Verbal skills of the 3-5-year-old children were evaluated by the vocabulary test of Ruoppila (1971). Their cognitive level was measured by the memory (number, word, sentence, visual and task memory) tasks and by the analogical reasoning (verbal and block analogies) tasks. These tasks had been constructed for this purpose. The cognitive level of 7-year-olds was measured by Raven's Progressive Matrices Test, and the verbal skills by evaluating the reading and writing skills of the children.

The classification of children's linguistic errors

The errors of the inflectional forms were analysed in three studies. The subjects involved were 2 (Lyytinen et al. 1981), 3-5 (Lyytinen 1973) and 7 (Lyytinen 1981) years old respectively. The main categories used in the error classification were the same in all the studies. Normative information defined by grammar book (Penttilä 1963) was used as a criterion for correct performance. The error categories were:

1. Inadequate responses
   (included utterances like: niin on 'so it is', tämmönenkin on 'there is one like this', on mukavaa 'it is nice', en tiedä 'I don't know' etc.).
2. Suffix errors
   (included subclasses like: partly correct suffix, suffix or another morphological form, stimulus word repeated without suffix, dialectal inflection)
3. Stem errors
   (included subclasses like: stimulus word changed into colloquial one or into another artificial word, phoneme/syllable added to stem or left out from stem, consonantal gradation error)
4. Both suffix and stem error in the same word.

This paper focuses on the analysis of categories 1-3 and on describing one subclass of category 2, called 'use of suffix of another morphologocial form'.

Results

The reliabilities of the morphological tests and the error classification

The reliabilities of the morphological tests were estimated at all age levels by the split-half method and were shown to be very acceptable (.83-.97). The reliability of the error classification was estimated by taking a random sample (10%) of responses out of each data separately, which was then independently classified by two raters. The percentages of agreement between the raters varied from 78 to 94.

The acquisition patterns of some Finnish inflectional forms

Among the 2-year-old children considerable mastery could be found in three forms: in the present indicative active (55%), the inessive (49%) and the illative (43%). The percentages refer to the responses where the ending of the inflectional form was correctly produced. Some of the 2-year-olds used the partitive adequately (32%) but very few showed the mastery of the perfect indicative passive (7.3%) and the comparative (3.4%). Because the youngest age group inflected words of the spoken language and the older children archaic words, their percentages cannot be directly compared.

The 3-year-olds performed best on tasks concerning the inessive (41%) and the comparative (34%). The clearest developmental change appeared in the mastery of the comparative. Only a few of the 3-year-olds could produce the partitive, the present indicative active, the past indicative active, and the present indicative passive adequately to the archaic test words. The other inflections measured are not yet mastered in this age group.

The 4-year-old children mastered the comparative, the inessive, the partitive and the verb forms clearly better than the 3-year-olds. Half of the 4-year-olds achieved the maximum scores in the comparative and one-third in the inessive. This age group had most problems in the adjectival inflection: in the plural partitive of adjectives (14%) and in the superlative (14%). The 4-year-olds had considerable difficulties also with the inflection of the conditional (22%).

The 5-year-old children had clearly advanced in the use of the present indicative active (66%) and passive (58%), the adverb (51%) and the partitive (47%). The majority of the children produced completely correct inflections in the comparative and the inessive. There were further difficulties with the superlative (21%) and the plural partitive of adjectives (22%).

The 7-year-old children reached a good mastery of the adverb (81%) and the superlative (74%). The developmental change was the clearest in the superlative. The scores of this form were three times higher in 7-year-olds than among the 5-year-old children. This result is consistent with the earlier results in Finnish that demonstrated that the production of the superlative becomes more common only after 5 (Luukkonen and Ruoppila 1969; Ruoppila and Liste 1967). The 7-year-olds

also mastered the translative and the pluperfect indicative active well. The majority of them were not yet, however, able to apply the conditional form ot the archaic test words (38%).

In considering, e.g., the inflection of adjectives, it is noticed that the comparative is adequately used already by 4-year-olds. The superlative and adverbs are not commonly used until the age of 7. A generalized use of cases precedes that of the verb forms. Using familiar words, even 2-year-olds are able to express location with correct inflectional endings. One-third of the 4-year-olds are able to form the inessive correctly in words whose meaning is unknown to them. As for the verb forms, the present and the past indicative active as well as the present indicative passive are adequately used by 5-year-olds. But the conditional is not totally mastered even at the age of 7.

The intercorrelations of the mastery of the morphological forms and some cognitive-linguistic variables

The examination of the intercorrelations between the cognitive-linguistic skills and the mastery of the inflections revealed positive relationships (Table 3). Only one correlation did not reach significance. It was that between the morphological forms and the vocabulary test result among the 3-year-olds. The highest correlations were found in the 2-year-old children.[1)]

Table 3: Correlations between the mastery of the morphological forms and some cognitive-linguistic variables

The mastery of the morphological forms / Cognitive-linguistic variables / Age	Naming of the picture cards[1)]	MDI of Bayley Scale[1)]	Vocabulary test	Memory tasks[2)]	Analogical reasoning tasks[2)]	Raven	Reading skill	Writing skill
2	xxx .55	xxx .62						
3			.21	x .40	x .34			
4			xx .47	xx .56	x .36			
5			xx .55	x .36	x .14			
7						xx .35	xxx .49	xx .39

x p < .05
xx p < .01
xxx p < .001

1) As differences of a few months in age may cause variation in the performances of the 2-year-olds, the influence of age has been partialed out of the correlations.
2) Coefficients are means of the correlations of the five memory tasks and of the two analogical reasoning tasks.

The positive correlations between the mastery of the morphology and cognitive-linguistic variables demonstrate that the results in the morphological tests involve more than just the children's linguistic skills. Performing Berko's tasks requires cognitive and verbal processing, such as perceptual integration and interpretation of picture cards, memory of the stimulus words and production of the linguistic form needed in describing what happens in the picture. Children's readiness to do this processing varies at different age levels. The differences manifest themselves as erroneous responses which reveal some aspects of the cognitive processes the child uses in attempting to solve the linguistic task.

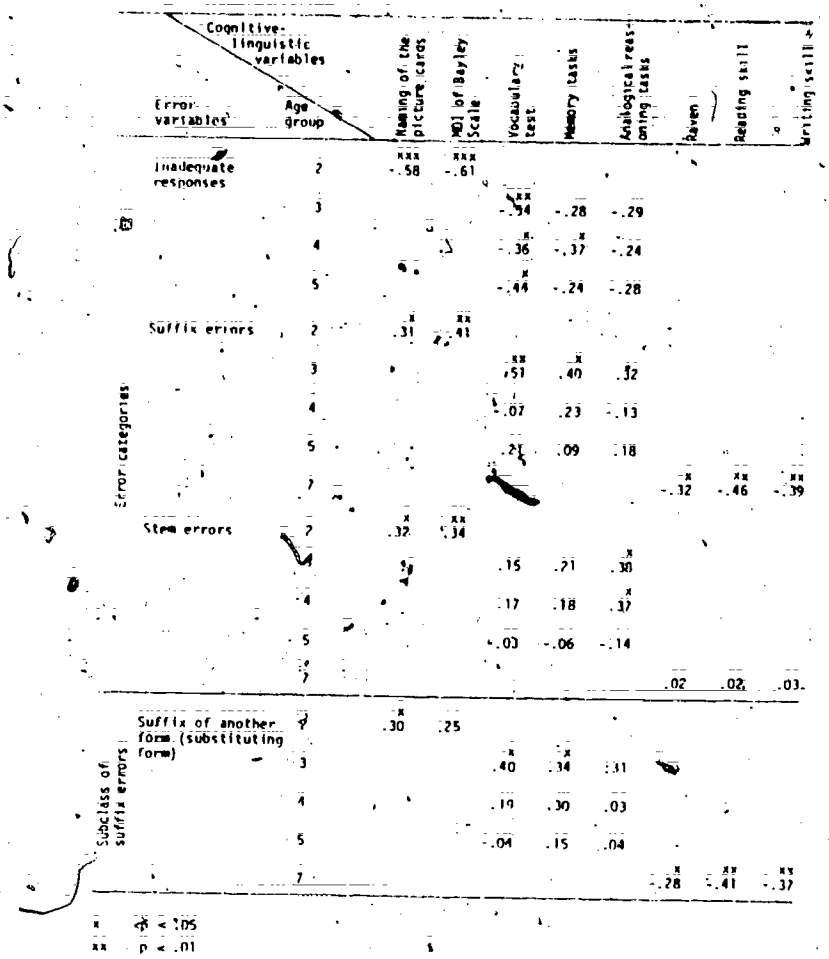
The meaning of the errors in different age groups

An attempt was made to get more detailed data concerning the acquisition process of Finnish morphology by analysing the erroneous responses in addition to the correct ones at different age levels.

The changes in the erroneous responses were both quantitative and qualitative. The inadequate responses decreased as a function of age and the errors made by the children became specific suffix and stem errors whose meaning proved to be different at the various age levels. The connections between errors and some variables describing children's cognitive and linguistic skills (Table 4) are considered in the following as an attempt to throw some light on the developmental meaning of errors.

The results indicate that the error categories differ qualitatively from each other. Inadequate responses are so-called 'bad errors' which correlated negatively with cognitive and linguistic variables in all age groups. The suffix and stem error categories had different meanings at the various age and cognitive levels. The 2- and 3-year-olds who had performed well in the cognitive and linguistic tasks made more suffix and stem errors and fewer inadequate responses than the 2- and 3-year-olds with lower cognitive-linguistic scores. Error analysis shows that, when unable to find a right answer, cognitively brighter children make attempts to solve the task by using a roundabout expression, e.g., overgeneralizing a form they had learned earlier. In this way these children can produce at least partially correct - often intelligible - linguistic answers.

Table 4: The correlations between the erroneous responses and cognitive-linguistic variables in the different age groups



Error variables	Age group	Naming of the picture cards	MDI of Bayley Scale	Vocabulary test	Memory tasks	Analogical reasoning tasks	Raven	Reading skill	Writing skill
Inadequate responses	2	-.58***	-.61***						
	3			-.54**	-.28	-.29			
	4			-.36*	-.37*	-.24			
	5			-.44*	-.24	-.28			
Suffix errors	2	.31*	.41**						
	3			.51**	.40*	.32			
	4			.07	.23	.13			
	5			.21	.09	.18			
	7						-.32*	-.46**	-.39**
Stem errors	2	.32*	.34**						
	3			.15	.21	.30*			
	4			.17	.18	.37*			
	5			-.03	-.06	-.14			
	7						.02	.02	.03
Suffix of another form (substituting form)	2	.30*	.25						
	3			.40*	.34*	.31			
	4			.19	.30	.03			
	5			-.04	.15	.04			
	7						-.28*	-.41**	-.37**

Error categories / Subclass of suffix errors

* $p < .05$
** $p < .01$

In the 4-year olds a positive correlation was still found between the stem errors and the analogical reasoning tasks (.37; $p < .05$). But such a covariation could no longer be found among the 5- and 7-year-olds. In these age groups, correlations between errors and the cognitive-linguistic variables were already, in most cases, negative. The children begin at this age to master the basic rule system of their native language and linguistically correct forms dominate their answers.

At the age of 7 the meanings of suffix and stem errors differ from each other. Among the first graders suffix errors correlated negatively ($p < .05$) with Raven and the reading and writing skills ($p < .01$). Instead, the stem errors and the cognitive-linguistic skills of the children did not correlate with each other anymore. Probably the stem errors do no more reflect an inability to construct adequate responses, but rather an inaccuracy, due to reasons of attention or associations, in their speech production.

Steps in the acquisition of Finnish morphological forms

It was found that the correct production of the Finnish morphological forms can be described to be achieved through steps. The transitional steps from inadequate responses to correct performances are presented by age groups in Fig. 1. The matching of the group's performance on a particular step is made according to its most typical response. If two types characterize equally the responses of the age group, the line locating the prevailing phase of mastery is marked to cross the steps.

At the first step children who do not master the required form produce an inadequate response. At the second step the children tend to repeat the stimulus word in its basic form without a suffix. At the third step the expected inflection is replaced by some other, previously acquired form. At the fourth step the child masters the form, but, as the grammatical characteristics of words (gradation, length of word) vary, specific errors related to stem inflection (changing, adding, excluding phonemes/syllables) may be made. Qualitatively these errors are 'better' than those of the earlier steps, because they do not generally change the meaning of the utterance. At the fifth step the child masters the forms of both ending and stem inflection and can apply them to grammatically different new words.

Fig. 1 shows that there appears at all age levels simultaneously linguistic behaviour that is characteristic of several steps. The prevailing performance of the children, when solving the task, varies according to the morphological form in question within a age group. The degree of the mastery of a form is also affected by the grammatical properties of the stimulus word. In single words with consonant

gradation, changes of stem (inflection characteristic of step 4) occurred still in the 7-year-olds, even in such morphological forms whose endings they master very well.

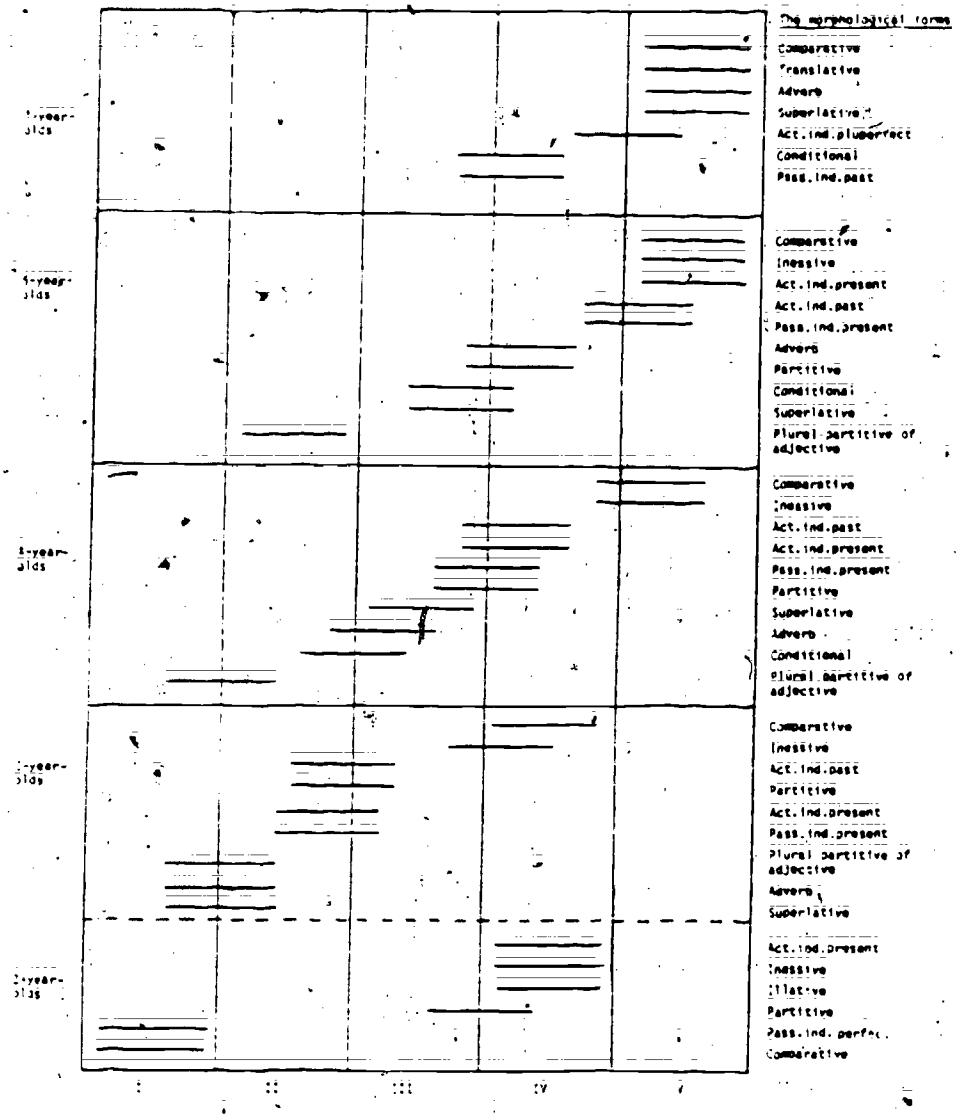


Fig. 1: Steps in the acquisition of the morphological forms

The substitution of the morphological forms at various age levels

The analysis of individual protocols revealed that, psychologically, the most interesting type of error was the use of the suffix of another morphological form instead of the right one.

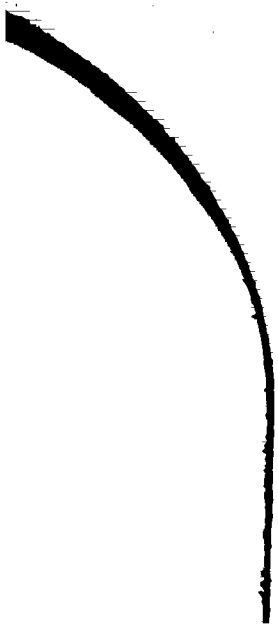
Among the 2-year-olds, whose repertoire of acquired endings is small, substituting endings were naturally less common than among the older subjects. One-third of the 2-year-olds had instances where a partitive form was replaced by a singular nominative form. Some of the children (9%) substituted also the perfect passive by the present indicative active form. It was the nearest already-mastered verb form which the 2-year-olds had.

Among the 3-year-olds there was rapid progress in the acquired comparative forms. This could also be seen in the use of substituting forms. The comparative was extensively overgeneralized to the inflection of adjectives in a wider sense. The forms that were used to replace the superlative were comparatives in more than 30% of the cases. The 3-year-olds also applied the comparative - though less than above - to the inflection of adverbs. The perfect passive was used to substitute for the active and passive forms of the present and past indicative. It was interesting to see that the perfect passive was also applied to case endings, especially to producing the inessive form.

The use of substitutes was the most common in the 4-year-olds. All the substitutes for the superlative were comparatives. The perfect passive no longer occurred to the extent it did in the 3-year-olds. It was primarily used to substitute for forms of the present indicative passive. Instead, the 4-year-olds substituted forms of the present for the past and forms of the active for the passive.

As the number of correct inflections increased, the 5-year-olds resorted to substituting forms less often than the 4-year-olds. The same trend as in the younger children could be noticed in the use of substituting forms. The most common feature was that the superlative was replaced by the comparative and that the verb forms got mixed up - though less often than in the 4-year-olds.

In the 7-year-olds, substitutes only occurred in the past passive and in the conditional. The former was replaced by the past indicative



active and the latter by the present indicative active, whereas the substitute characteristic of the earlier age groups, the perfect passive, was no longer found.

Certain regularities could be established in the use of the substituting forms in all age groups. As for the verb forms, there was a lot of overgeneralizing. Active and passive forms as well as present and past forms got confused. It was also a general observation, concerning all age groups, that substitutes were less frequent in the inflection of nouns than in that of adjectives and verbs. For example not even in the 2-year-olds was there any instance of confusing closely related cases as the illative and the inessive, which both express location.

Conclusions

De Villiers and de Villiers (1979) have pointed out that it may take more than a year from the first appearance of a morpheme to its consistent use in a child's speech. The process is piecemeal. It takes time for the child to learn the conditions of a morpheme's use. The present studies agree with this suggestion. The results indicated that the correct inflections are achieved gradually.

Children in all age groups simultaneously displayed linguistic behaviour that was characteristic of several steps each describing a phase in the acquisition of morphological forms. The child's prevailing performance is a combined outcome of the subject's developmental level, the difficulty of the morphological form, and the linguistic and grammatical properties of the words to be inflected.

The results suggest that, in investigating the acquisition of morphological forms, the erroneous responses can offer psychologically valuable information about development. The errors have different meanings in different age groups. The occurrence of certain errors (e.g. substituting forms in certain inflections) in the 2- and 3-year-old children implies that their linguistic skills are in good progress, while similar errors among some years older children indicate performance weaker than that of their age level. Erroneous responses on the morphological test reveal also how children perceive, process and interpret the tasks and configure how children of various ages approach and solve cognitive-linguistic problems. Data concerning the erroneous

performance of children in different types of tasks are, however, needed to specify in more detail the strategies children use.

An important question in the studies of analysing errors concerns the criterion used in defining errors and the method of collecting linguistic responses. In these studies normative information defined by grammar book was used as a criterion for a correct answer. The errors were analysed from answers elicited by the linguistic tasks given in Berko's method. Data collected by this way seem to yield information that cannot necessarily be obtained by analyzing children's spontaneous utterances. This was shown by the results obtained in the 7-year-olds (Lyytinen 1981). These indicated that the inflections occurring in children's everyday speech were limited in content and not related with reading and writing school achievements of children as were the performances measured with the present method. Furthermore, the errors that occurred in the spontaneous speech had not the same developmental meaning (e.g., correlations with cognitive-linguistic tests) as had those produced on the morphological test.

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