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PLURAL SUFFIXATION SKILLS IN CYPRIOT-GREEK CHILDREN WITH SPECIFIC LANGUAGE IMPAIRMENT

Abstract

The current investigation examined plural suffixation skills in preschool children with specific language impairment (SLI). Predictions were made vis-à-vis the following hypotheses: (1) Feature Blindness hypothesis (FB) that could predict an across the board difficulty in producing correct inflectional markers; (2) Low phonetic substance hypothesis (LPS) that would predict a selective deficit on plural formation with particular difficult) with targets on which pluralization requires the addition of a syllable (i.e.. "pappu-s" Sg (grandfather) vs. "pappu-des" P) (grandfathers)) or addition of morphophonological {-s} (i.e., "bala" Sg "ball" vs. "bal-es" PI "balls"). Participants were six Cypriot-Greek speaking children with SLI ages 5:6 to 5;10 and six children with normal language skills. The two groups were matched for age, non-verbal intelligence, socioeconomic status and gender. The study employed a novel word paradigm (e.g., Berko, 1958). Children had to provide the correct plural inflection when presented with carrier targets in the singular form (i.e.. "Here you have one [ɣupi]. Here you there are __ target->[ɣupia]). The dependent variable was the percentage of errors from a set of 148 targets (51 novel words and 97 common nouns). Data analysis suggested that on novel targets performance by the control group was significantly better when compared to the SLI group. Errors within the SLI group were characterized by incorrect use of particular inflection, by omission of morphophonological {-s}, and by overuse of particular inflections such as plural feminine. Overall, the two groups presented with parallel profiles in pluralization skills, although the SLI children did so in a less consistent manner when compared to normally developing peers. The variability of responses supported neither hypothesis. To the first approximation pluralization skills in children with SLI may be governed *by* the frequency of the inflection within the language in a synergistic relationship with the phonological saliency of the plural marker.

Introduction

Specific language impairment (hereafter referred to as SLI) is used to describe children with remarkable linguistic deficits in the face of normal non-verbal intelligence, hearing status, neurological and emotional status (e.g., absence of autism). The diagnosis is based on exclusionary criteria that rule out any pathological condition that may cause a language disorder (Stark & Tallal, 1988; Leonard, 1998). The prevalence of SLI is 7%. It affects more boys than girls and there are reports of familial aggregation indicating that SLI might be hereditary (Gopnik & Graco, 199, Ullamn, 1999, Tomblin, 1989, 1992, 1995). Children with SLI form a heterogeneous group. If one considers the overall linguistic profiles of these children, the picture is consistent with a moderate language deficit across all linguistic parameters and a remarkable difficulty in the use of morphological elements (omission and misuse of bound and free-standing morphemes such as articles, clitics, verb and noun inflections).

During the last ten years there has been a keen interest in the cross-linguistic investigation of SLI. Languages studied include ap: : from English. Italian (Cipriani et al., 1991; Leonard, Bortolini,

Caselli, McGregor, Sabbadini, 1992), German (Clahsen, 1989), Hebrew (Dromi, Leonard, & Shteinman, 1993), and Greek (Dadalakis, 1994; Petinou & Terzi, in press). Converging evidence indicates that morphological deficits are robust in children with SLI of various linguistic backgrounds (e.g., Italian, Hebrew, German, and English). For example, in Italian and Hebrew children with SLI have selective deficits when it comes to using the appropriate noun or verb inflection. These deficits are governed by phonological factors such as the presence of a word final vowel. Cross-linguistic investigations are of particular interest especially within the realm of inflectional morphology. This is because the typology of a given language allows the testing of certain hypotheses to explain the nature and underlying deficit associated with SLI. For example in highly inflected languages such as Italian and Greek one can make specific predictions on what is spared and what is erred vis-à-vis the different theoretical proposals.

Theoretical frameworks

Different models have been proposed to determine the nature of SLI and the mechanisms responsible in explaining morphological deficits, in this investigation we focused on two prominent frameworks regarding inflectional morphology and SLI. These included the Feature Blindness hypothesis (FB) (Gopnik& Grago, 1991) and the Low Phonetic Substance hypothesis (LPS) advanced by Leonard and his colleagues (Leonard et. al., 1998). According to the LPS hypothesis, morphological deficits stem from difficulties in processing elements of low phonetic substance. Morphological inflections (e.g.. articles, clitics, plural and possessive {-s}) become less salient because they are usually unstressed, do not correspond to real word referents, occur at prosodically vulnerable feet within the utterance and are shorter in duration when compared to adjacent morphemes. In addition, they are subjected to common phonological processes such as final consonant and unstressed syllable deletions. The locus of the deficit is morphophonological. That is the child need not only to hear the final {-s} but also to hypothesize it as a morphophonological element and put it in the appropriate word specific paradigm (Leonard, 1998; Pinker, 1984). SLI children have the ability to perceive final consonants, but processing capacity (to use Leonard's exact wording) is "taxed" when these elements assume morphophonological role. For example final consonant [t] in 'raft' will be easier to hypothesize than final consonant [t] in 'laughed', because in the latter case the target is morphophonological {-ed} past tense. On parallel grounds, the final [-es] in the Greek word [ps-es] (last night), should theoretically be easier to perceive, hypothesize and produce than comparable {-es} in the word [bal-es] (balls).

On the other end of the theoretical spectrum, the MFH postulates that the linguistic deficits seen in children with SLI are attributable to the lack of rule formation in the grammar system suggesting that individuals with SLI lack the features of person, number, gender, and tense from the underlying grammar. Here the deficit is rule based and its locus is morpho-syntactic (Gopnik & Graco, 1991; Ullman, 1999). The base of this framework evolves from a possible dual mechanism that may govern the representation of regular and irregular targets (cats vs. mice). Children with SLI do produce a form that resembles plural {-s}, but the form is assumed to be an unanalyzed portion of a memorized lexical item (direct lexical route in learning particular words on the bases of memorization). Consequently, the linguistic deficits exhibited are governed by an overall rule-based deficit.

Whether or not such scenario occurs in Greek SLI warrants further investigation with the exception of one recent study that employed a novel-word paradigm in studying pluralization skills in Greek children with SLI (Dadalakis, 1994). The error patterns included the use of the singular instead of plural inflection (50%), the substitution of real words instead of nonce word target (9.8%), and the over use/preference of one morpheme (30%). The study concluded that Greek children with SLI had difficulty with implicit rules governing pluralization, a position favoring the FBH. However, the results should be interpreted with caution, due to the variability of responses and to methodological issues including the restricted range of word targets employed, the wide age range of subjects (6-17 years), and the lack of

control group. The variability of responses and the differential treatment of particular morphological inflections warrant further investigation and interpretation.

Purpose of the investigation

In the current investigation we examined plural suffixation skills in Cypriot-Greek preschool children with SLI. Predictions were made vis-à-vis the two aforementioned proposals. The SH hypothesis would predict a selective deficit on plural formation with particular difficulty on targets requiring the addition of a syllable in the process of pluralization (i.e.. "pappu-s" Sg (grandfather) vs. "pappu-d-es" P) (grandfathers)) or addition of morphophonological {-s} (i.e.. "bala" Sg "ball" vs. "bal-es" Pl "balls"). Overall the SH would predict a progressive difficulty starting with what should be the least to what should be the most difficult inflection for a child with SLI to produce: vowel stressed< vowel unstressed< vowel consonant stressed< vowel consonant unstressed< addition of a syllable.

The FB hypothesis would predict an across the board difficulty in producing correct inflectional markers. Because the study employed a novel-word paradigm (e.g., in the form of Berko's "WUG" test (1958)), we predicted that children with SLI would have particular difficulty in producing the correct inflection on novel-word targets.

In this investigation the following research questions were advanced: (a) Do the deficits seen in Greek children with SLI stem from rule-governed bases or do they vary as a function of the phonological characteristics of each stem? We wanted to provide a more rigorous investigation of the types and patterns of errors exhibited regarding inflectional morphology by zeroing into the errors: (b) Do Greek children with SLI show typical or atypical pattern of development at least in the realization of inflections. This is crucial question because it will tell us a lot about the nature of developmental language deficit including the mechanisms employed by children with SLI in dealing with challenging linguistic elements.

The morphological system of Modern Greek

The grammatical categories of MG are gender, case, and number. Gender distribution of nouns neuter> feminine>masculine. Gender is usually determined by the morphological/inflectional paradigm in which it belongs. There are three definite articles 'o', 'I', 'to' corresponding to masculine, feminine, neuter gender in nominative case respectively (singular number). 'T' 'I' and 'ta' are the counterpart articles in the plural number. There are four cases including nominative, genitive, accusative, and vocative to which the corresponding inflectional marker is assigned as a function of gender and number (see table 1)

Methodology

Participants

Participants were six Cypriot-Greek speaking children with SLI ages 5;6 to 5;10 and six normally developing children of comparable ages who served as the control group. The two groups were matched for age, non-verbal intelligence, socioeconomic status and gender. Non-verbal intelligence was measured with the Raven's Colored Progressive Matrices and socioeconomic status was determined based on a list published by the Cyprus Ministry of Internal Affairs (1989). All children had Greek as their dominant language. Table 2 presents demographic information.

Documentation of SLI

The clinical diagnosis of SLI was determined by two certified speech language pathologists. The diagnostic criteria were based on the exclusionary list adopted by Stark & Tallal (1988) and Leonard (1998). In addition, suggestions by Dunn, Fax, Sliwinski & Aram (1996) were considered regarding the use of spontaneous language measures as criteria for identifying SLI. Based on language samples collected during the diagnostic procedures the 100 utterances were analyzed for grammatical errors including: Omission of articles in obligatory contexts, clitic misplacement, incorrect suffixation of plural

targets, agreement errors, omission of negation and reduced mean length of utterance in words (MLUW).

Procedures & Stimuli

The study employed a novel word paradigm (Berko, 1958). This task was employed in order to test children's ability to use grammatical morphemes with nonce words. Grammatical morpheme use with nonce words cannot be attributed to rote learning. Children had to provide the correct plural inflection when presented with carrier targets in the singular form (i.e., "Here you have one [γupi]. Here you there are __ target->[γupia]). The examiner presented the child with a book containing the targets depicted on black-white line drawings. Stimuli included a total of 148 items, 97 familiar and 51 unfamiliar/novel targets all distributed across the three genders and were constructed according to Greek phonotactic rules, but were non-existent words. Usually the initial and middle phoneme was changed from a real word to a novel word (e.g.. [melisa] (bee)->[mekasa] (a novel item depicting a funny looking figure)). To ensure that the children's phonological abilities were not obstacles to the use of grammatical morphemes of interest all had to scored above 80% on a picture naming articulation test requiring them to produce final consonants in monomorphemic words ([emis], [pses], [petaludes]).

Data and response coding

Each session was tape-recorded and phonetically transcribed using the International Phonetic Alphabet (IPA). Point-by-point transcription reliability on the novel word and familiar word targets based on a sample from four children was 100% for familiar targets and 88% for novel word targets. Error patterns were coded according to the following criteria:

1. Omission of inflection (bare stem) resulting in lack of pluralization
2. Substitution of the target inflection.
3. No response
4. Neologisitc responses (a nonsense word that did not correspond to the actual target)
5. Substitution of unfamiliar with a familiar target (thospi —> klosti)
6. Final consonant deletion and stress change

Results

The dependent variable was the proportion of errors observed within each experimental paradigm (familiar vs. novel word task). Proportions were transformed to arcsines before any statistical analyses were employed. A three way analysis of variance was performed with group (SLI vs. NLD) as the between subject variable and task (familiar vs. novel) and noun gender (masculine, feminine, neuter) as the within subject variables. Statistical analyses revealed a group main effect, $\underline{F}$ (1,10) = 9.35, $\underline{p}$<.01, suggesting that proportion of errors within the SLI ($\underline{M}$ = .35) group was significantly larger that proportion of errors exhibited by the NLD group ($\underline{M}$ = .19). A task main effect was also significant indicating that regardless of experimental group and gender category, more errors were made on the novel ($\underline{M}$ = .39) than the on familiar task ($\underline{M}$ = .15), $\underline{F}$(l, 10) = 39.84, $\underline{p}$ < .01 (Figure 1). Gender main effect also reached statistical significance, $\underline{F}$(2,20) = 12.85, $\underline{p}$ < .01 (Figure 2). Post- hoc Tukey main effect revealed that the fewest errors were made on feminine targets when compared to the masculine and neuter targets. No significant differences were revealed between masculine and neuter. The only interaction that reached statistical significance was task (familiar vs. novel words) by noun gender categories, $\underline{F}$(2,20)= 21.13, $\underline{p}$< .01 We observed that the proportion of errors increased dramatically in favor of the neuter and masculine gender especially during novel tasks for both groups. Figure 3 presents the overall performance of each group as a function of all tasks. In sum, the differences observed between the two groups were quantitative rather than qualitative in nature in nature. Both groups made errors on all tasks, but as predicted NLD children did so less often.

A qualitative/descriptive analysis of the data was motivated by the typology of errors

including inflectional substitutions, no responses, lack of pluralization, and neologistic forms. Most of the errors observed were in the form of substitutions. That is one inflection substituting another (usually the feminine {-es} used with the highest frequency). This was a pattern exhibited by both groups on both experimental tasks across all genders, although on the novel task the number of errors increased. Regarding a phonological saliency issue, the only pattern that could be explained by this framework was the difficulty all children had when the plural formation paradigm required the addition of a syllable (e.g.. [paloma] (floor), vs. [patom-ata] (floors)). This particular difficulty was remarkable within the SLI group as a function of each task. Particularly, the proportion of errors in the familiar versus the novel task on targets requiring an addition of a syllable was .33 and .70 for the SLI group respectively and .08 versus .30 for the NLD group respectively.

Conclusion and Discussion

Based on the results of the current investigation there is no support of the Feature Blindness Hypothesis regarding the inflectional difficulties in Greek children with SLI. Our data indicated that plural suffixation difficulty was not an all-or- none phenomenon. Both error and correct responses were revealed during both experimental tasks. In addition, errors were observed in both groups of children, even though the proportion of errors was higher in the SLI group. In the current study, children with SLI do not present with rule-based suffixation skills, an indication contrary to Dadalakis et al., reports (1994). The rule based knowledge we support is based on the fact that our children with SLI rarely showed error patterns in the form of "lack of pluralization" (e.g., providing the singular form instead of the plural) a pattern that accounted for less than 3% of the data. The pattern of performance is best explained from a developmental perspective. The errors seen were similar to what has been documented in the developmental literature regarding plural development in Greek children (Stephany, 1997). SLI children had the most difficulty on late mastering plural inflection such as neuter "i" and those requiring the addition of a syllable.

Regarding the second hypothesis, the data suggest a marginal effect. Again targets that require the addition of syllable appear to be among the ones that gave children the hardest time. Although in spontaneous language data SLI children do make use of forms such as "petalude-s" more deficits were seen in targets where the inflection {-des} assumed a morphophonological role as in the case of "alepu-des". The evidence was marginal, because the hierarchy we have initially predicted did not hold true. Take the case of neuter "I" which is considered the least frequent inflection within the neuter category, despite its "phonological saliency" as a full vowel. On such targets there were significant errors, in fact comparable error frequencies isometric to the "adding" a syllable tasks. Taken together, Greek children with SLI appear to know a great deal about how and when to use appropriate morphological structures. It appears though from the data we provide that a different perspective is warranted in explaining pluralization difficulties and variability of performance in Greek SLI. We propose some alternative hypotheses that may explain the selective deficit seen within plural inflections. These may include the frequency of the inflection as it is distributed within and between genders. The less frequently an inflection is the more children may rely on learning its pluralization via the lexical route (memory). Consequently, the more frequent an inflection is, the earlier will be hypothesized by the child or even be used as a "default" in replacing other more linguistically more challenging forms. (i.e., the word kentim-ata (laces) is produced as *kentim-es (laces)). These data suggest that these children follow a delayed rather than a disordered mode of plural suffixation. In fact this patter is also reported in other reports both in English and Italian. For example Oetting & Rice (1993) suggested that ESLI do not present with frequency independence. They actually suggest a delayed independence of rule use that is governed by inflection frequency. That is an aspect of rule use (i.e. frequency) takes longer to develop. As a last note, the results should be considered preliminary and be interpreted with caution, because of the small number of subjects. A more complete picture will be developed

with the addition of a younger language-matched group that will help us to delineate if SLI is a form of language delay or language disorder.

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Table 1

Noun morphology of MG

• **Gender**	• **Feminine**
- Masculine	- /I kali/*/I kal-**és**/
- Feminine	- / I θalasa/*/I θalas-**ες**/
- Neuter	- / I taksi/*/I taks-**Is**/
- N>F> M	- / I alepu/*/ I alepu-**δες**/
• **Case**	• **Masculine**
- nominative	- /o maθiti-s/*/I maθit-**és**/
- genitive	- / o rafti-**s**/*/I raft-**ες**/
- accusative	- / o filo-**s**/*/I fil-**I**/
- dative	- /o papa-s/*/I papa-**δες**/
• **Number**	• **Neuter**
- singular	- /to moro/*/ta mor-**ú**/
- plural	- /to poδi/*/ta poδy-**a**/
	- /to laθos/*/ta laθ-**I**/
	- /to soma/*/ta soma-**ta**/

Table 2

GROUP SLI	AGE (MOS.)	GENDER	SES	RAVENS	MLU-W
LK	70	F	3	50	4,3
AK	71	F	1	75	4,4
XK	65	M	1	75	4,0
AX	70	M	2	50	4,0
GK	66	M	1	50	4,5
MA	70	M	3	75	5,5
MEAN	**68**	**N/A**	**1,8**	**62,5**	**4,45**
SD	**2,5**	**N/A**	**.09**	**13,69**	**0,55**
GROUP NLD					
AI	70	F	3	50	5,2
AD	70	F	1	75	4,5
DE	65	M	1	75	4,7
YI	70	M	2	50	4,8
A	66	M	1	50	6,2
AK	70	M	3	75	5,2
MEAN	**68**	**N/A**	**1,8**	**62,5**	**5,1**
SD	**2,3**	**N/A**	**.09**	**13,8**	**0,6**

Figure 1: Percentage of errors as a function of group and word category (group X word category)

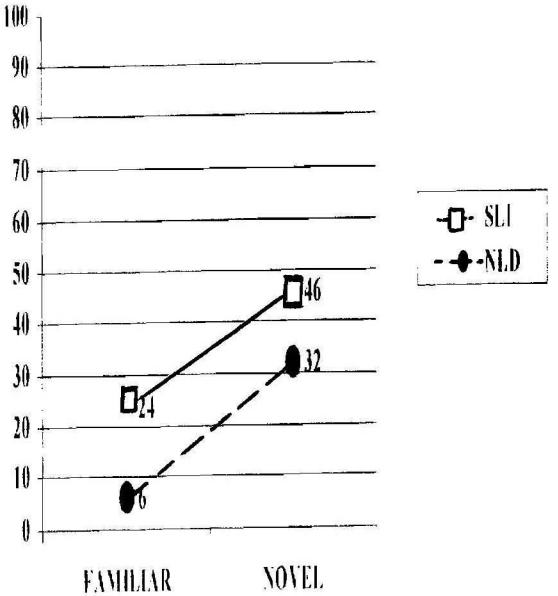

Figure 2: Percentage of errors (noun gender X word task)

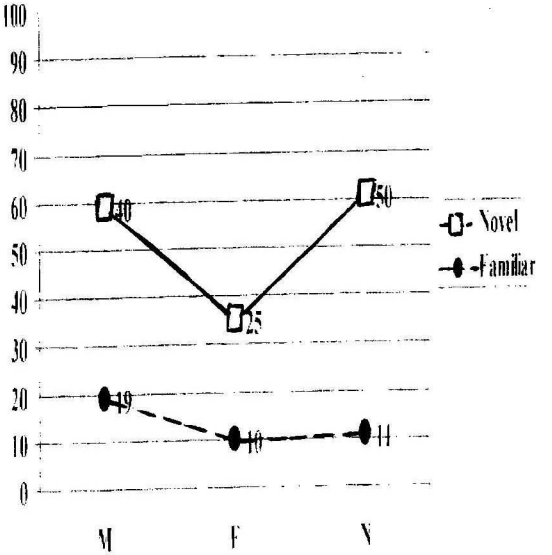

Figure 3: Percentage of errors (group,gender, word task)