

Grammatical comprehension in developmental semantic–pragmatic disorder

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This is a clinical case study of 105 children; 35 children demonstrated ‘semantic–pragmatic’ type of specific language impairment, 35 children presented with delayed language development due to mental retardation, and 35 children with normal language development. In contrast to the disturbances of linguistic form that characterize the most frequently reported type of specific language impairment, the semantic–pragmatic disorder is characterized mostly by ‘inappropriate’ language use. A cognitive explanation has been proposed, which accounts for all instances of inappropriate language thus far studied in this population. An expressive linguistic explanation has also been proposed, which accounts for some instances of inappropriate language. This study investigates the possibility that a receptive linguistic explanation can account for inappropriate responses to questions. A linguistic explanation with receptive and expressive components could account for some of the semantic–pragmatic behaviors previously accounted for by the cognitive explanation. To test this proposal, the linguistic profiles of all children were examined using the Arabic language test. The results indicate that grammatical comprehension was impaired in about 45.7% of the children examined. Therefore, instances of inappropriate language use that appear to express disordered concepts may reflect receptive linguistic deficits instead.

Keywords:

syntactic comprehension, receptive linguistic deficit, semantic–pragmatic specific language impairment

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Introduction

Specific language impairment (SLI) presents when children present language maturation at least 12 months behind their chronological age in the absence of sensory or intellectual deficits, pervasive developmental disorders, evident cerebral damage, and adequate social and emotional conditions [1]. SLI cases can present great variability in clinical manifestations concerning language. One approach to dealing with this heterogeneity involves the identification of clinical subtypes of SLI [2].

For example, Rapin and Allen [3] described three subtypes of SLI and six profiles of language problems based on the evaluation of spontaneous and directed language, taking into account the level of linguistic analysis, in terms of phonological, morphosyntactic, semantic–lexical, and pragmatic analysis. The three subtypes of SLI were as follows:

- (1) *Mixed receptive expressive disorders*: Verbal auditory agnosia and phonologic–syntactic deficit disorder.
- (2) *Expressive disorders*: Verbal dyspraxia and phonological programming deficit disorder.
- (3) *Higher-order processing disorders*: Lexical–syntactic deficit disorder and semantic–pragmatic disorder.

Five of these six profiles have found empirical confirmation in a study by Conti-Ramsden *et al.* [4]

that combined clinical and test information. A cluster analysis was performed on the children’s performance, and the children were divided into six groups. One of the groups had no match with Rapin and Allen’s categories because it comprised children who appeared to be performing within the normal range. In contrast, the ‘verbal auditory agnosia’ group described by Rapin and Allen was not found. Van der Lely [5] proposed SLI classification of five subtypes, which includes the following: semantic–pragmatic SLI, primarily phonological SLI, primarily syntactic SLI, mixed primarily phonological SLI who show impairment in both phonology and syntax with more phonological than syntactic impairment, and mixed primarily syntactic SLI whose syntactic impairment is more apparent (or more persistent) compared with phonological deficits.

Children with pragmatic impairment have problems using language appropriately in a given context. Although they can present in the early years with language delay and poor social development, often these difficulties seem at least superficially to be overcome by the school years and children may be fluent with seemingly normal syntax and adequate articulation. However, problems such as understanding discourse, literal use of language, impaired understanding of social inference, and the social use of language remain substantial [6]. They may have difficulty with speaker

listener roles, turn taking, and the relevance of language in conversation. These children do not compensate for their language difficulties by developing a rich repertoire of nonverbal communication [7]. In addition, they also share a number of conversational problems with high-functioning autistic children (e.g. they have a tendency to talk about personal preoccupations, inappropriate questioning style, with repetitive speech and some stereotyped speech), although they do not appear to have the same degree of cognitive rigidity or obsession tendency as seen in those with autism spectrum disorders [8]. As a result, their language use leads to listener's impression of inappropriateness.

Rapin and Allen [9] pointed out that it is not known to what extent inappropriate language reflects a 'thought disorder', or a cognitive deficit, in addition to a 'communication disorder, or a linguistic deficit. Cognitive deficits refer to problems with concepts, whereas linguistic deficits refer to problems with linguistic form – that is, the pairing of form and concepts. Bishop and Adams [10] suggested that cognitive deficits could account for this inappropriateness and did not propose an alternative linguistic explanation.

In contrast, Snow [11] supported the linguistic explanation, which implies that the child's concepts are appropriate, but he or she has difficulty selecting the correct linguistic form to convey the intended meaning. He proposed that the child's inappropriate responses reflected poor comprehension of some of the questions addressed to him, which extended the scope of the linguistic explanation to include the receptive deficit.

The aim of this study was to determine whether the linguistic hypothesis especially in its receptive part warrants further investigation in study of this population to prove that the breakdown in receptive syntax is linguistic in origin.

Participants and methods

This case–control study included 105 Arabic-speaking children (60♂ and 55♀) in the age range of 3–6 years (mean age 4.27 years) who were selected from the Phoniatic clinics of Al Demerdash and Al Zahra University Hospitals. Of the 105 children, 35 children presented with semantic–pragmatic SLI (the semantic–pragmatic group), 35 with delayed language development due to mental retardation (the delayed language group), and 35 children with normal language development (the control group). The study was approved by ethical committee.

Methods

Information about each child included full name, date of birth, age, address, and order of birth. Language assessment was based on the Arabic Language Test [12]. Psychometric evaluation was carried out using the Stanford Binet Intelligence Scale [13].

Statistical analysis

Data were analyzed using SPSS, version 15 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were presented using mean and SD. Qualitative data were presented using frequency and related percentage. Comparison between groups was made using the χ^2 -test. A *P* value of 0.05 was chosen as level of significance. Post-hoc test was used to compare the linguistic quotients (language age/chronological age) across the different groups, including the control group.

Results

The dataset consisted of 105 children (60♂ and 55♀), with a mean age of 4.3 years (Table 1).

The age of various linguistic parameters varied from 2 to 8 years, with the lowest mean age for receptive syntax (3.97 years) and the highest mean age for semantics (4.07 years) (Table 2).

Tables 3–5 provide estimates of the quotients of various linguistic parameters in the three groups. Because receptive syntax was impaired in 16 (45.7%) children of the 35 in the semantic–pragmatic group, receptive syntax quotient did not reach the

Table 1 Characteristics of the study group

Characteristics	Study sample
Total number (<i>n</i>)	105
Age (mean ± SD)	4.2729 ± 0.96101
Sex [<i>n</i> (%)]	
Male	60 (57.1)
Female	55 (52.3)
Order of birth [<i>n</i> (%)]	
1st order	37 (35.2)
2nd order	40 (38)
≥3rd order	28 (26.6)

Table 2 Age of linguistic parameters

Language parameters	<i>n</i>	Minimal age (years)	Maximal age (years)	Mean age	SD
Semantic	105	2	8	4.0794	1.19851
Pragmatic	105	2	8	4.0206	1.20772
Receptive syntax	105	2	8	3.9775	1.19505
Expressive syntax	105	2	8	4.0144	1.19845
Phonology	105	2	8	3.9919	1.21458
Total language age	105	2	8	4.0119	1.21815

Table 3 Comparison between the semantic–pragmatic group and the control group as regards linguistic parameters

Language quotients	Control		Semantic–pragmatic		<i>P</i> value
	Mean	SD	Mean	SD	
Pragmatic quotient	1.0055	0.0538	0.7178	0.08041	0.000
Semantic quotient	1.0130	0.0624	0.7724	0.06273	0.000
Receptive syntax quotient	1.0101	0.06291	0.8820	0.10758	0.000
Expressive syntax quotient	1.0146	0.06189	1.0211	0.10516	0.685
Phonological quotient	1.0055	0.04516	1.0117	0.09409	0.006
Total quotient	1.0182	0.06440	0.8218	0.07160	0.000

P < 0.005, significant.

Table 4 Comparison between the delayed language group and the control group as regards linguistic parameters

Language quotients	Control		Delayed language		<i>P</i> value
	Mean	SD	Mean	SD	
Pragmatic quotient	1.0055	0.0538	0.6518	0.11755	0.000
Semantic quotient	1.0130	0.0624	0.6858	0.10810	0.000
Receptive. syntax quotient	1.0101	0.06291	0.6767	0.11920	0.000
Expressive syntax quotient	1.0146	0.06189	0.6905	0.11528	0.000
Phonological quotient	1.0055	0.04516	0.7124	0.16340	0.000
Total quotient	1.0182	0.06440	0.6792	0.10448	0.000

P < 0.005, significant.

Table 5 Comparison between the semantic–pragmatic group and the delayed language group as regards linguistic parameters

Language quotients	Delayed language		Semantic–pragmatic		<i>P</i> value
	Mean	SD	Mean	SD	
Pragmatic quotient	0.6518	0.11755	0.7178	0.08041	0.000
Semantic quotient	0.6858	0.0624	0.7724	0.10810	0.000
Receptive syntax quotient	0.6767	0.11920	0.8820	0.10758	0.000
Expressive syntax quotient	0.6905	0.11528	1.0211	0.10516	0.000
Phonological quotient	0.7124	0.16340	1.0117	0.09409	0.000
Total quotient	0.6792	0.10448	0.8218	0.07160	0.000

P < 0.005, significant.

normal level as expressive syntax and phonological quotients.

There was a significant difference between the semantic–pragmatic group and the control group in quotients of various linguistic parameters: semantic, pragmatic, and receptive syntax quotients, whereas there was no significant difference between the two groups in quotients of expressive syntax and phonology (*P* = 0.000; *P* < 0.005).

There was a significant difference between the delayed language group and the control group in quotients of all linguistic parameters: semantic, pragmatic, receptive syntax, expressive syntax, and phonology (*P* = 0.000; *P* < 0.005).

There was a significant difference between the semantic–pragmatic group and the delayed language

group in quotients of all linguistic parameters: semantic, pragmatic, receptive syntax, expressive syntax, and phonology (*P* = 0.000; *P* < 0.005).

Discussion

Although SLI has been viewed as a heterogeneous condition in which children may present with a wide range of different disturbances in language processing [14], sufficient information on grammatical comprehension in patients with semantic–pragmatic SLI was absent. In the present study, comparison between the control group and the semantic–pragmatic group showed a significant difference between the two groups in certain parameters only (semantic, pragmatic, and receptive syntactic), whereas the comparison between the control group and the delayed language group showed a significant difference in all parameters. This proves that the delayed language group due to mental retardation has a linguistic affection in all parameters, and this is due to delayed development and maturation in all aptitudes; even motoric development is delayed.

The receptive syntax may be affected in a large number of patients with semantic–pragmatic SLI, particularly with complex sentence, despite the fact that they can express the same sentence in a better way. This supports that the child's inappropriate responses reflects poor comprehension of some of the questions addressed to him, which extends the scope of the linguistic explanation to include the receptive deficit.

Rinaldi [15] indicated that impairment of receptive syntax in these children may be explained by their impaired semantic abilities. Semantic abilities concern the understanding of meaning of words or phrases and their expression [8]. This finding is in agreement with the criteria we find in the language of children with semantic–pragmatic disorder and it is also proved by statistical analysis.

This result is in agreement with that reported by Leonard [16] as well. He suggested that children with SLI may be 1 year below age level in one set of features, 1.5 year below in another, 6 months below in a third, and so on.

In light of growing evidence that developmental disorders may also have neurogenic explanation [17], syndromes differentially affecting morphosyntactic and lexical form classes may also implicate different sites of involvement [18].

Acknowledgements

Conflicts of interest

None declared.

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