Stability and Usefulness of Language Test Results Under Two Years of Age
Stabilité et fiabilité des résultats de tests linguistiques chez les moins de deux ans

by • par

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ABSTRACT

In recent years there has been a marked trend towards diagnosis and treatment of speech and language disorders at the earliest possible age. There are, however, numerous difficulties which arise in testing infants and young children. This article addresses one aspect of these difficulties: it attempts to determine at what age formal measurement of infant linguistic abilities begins to be reliable. The linguistic abilities of 25 normally developing infants were tested at six points during their first two years of life using a familiar, standardised language test. Results across the various ages were analysed in order to determine whether and at what age there is some stability in infant test results. Stability over time was demonstrated for a parent-report instrument (REEL) from nine months on. Results of this parent-report instrument from 15 months on also correlated with direct language testing results at 24 months (Reynell Developmental Language Scales). Further, the comparisons of ranks showed significant correlations between the receptive and expressive scales from nine months on.

ABRÉGÉ

Depuis quelques années, il existe une forte tendance vers le diagnostic et le traitement des troubles du langage et de parole au stade le plus précoce possible. Il existe cependant bon nombre de difficultés pour ce qui est du dépistage chez les nourrissons et les jeunes enfants. Le présent article étudie un aspect de ces difficultés : à quel âge la mesure formelle des habiletés linguistiques de l'enfant commence-t-elle à être fiable? On a évalué les habiletés linguistiques de 25 nourrisons au développement normal à six moments au cours de leurs deux premières années en utilisant un test de langage normalisé courant. On a ensuite analysé les résultats obtenus chez les divers groupes d'âge afin d'établir s'il y avait une stabilité quelconque et, si oui, à quel âge. On a pu démontrer une stabilité temporelle, avec un instrument comportant des comptes rendus de parents (*REEL*), à partir de l'âge de neuf mois. Les résultats obtenus avec ce type d'instrument chez les enfants de 15 mois et plus ont également correspondu aux résultats des évaluations directes du langage à 24 mois (*Reynell Developmental Language Scales*). De plus, les comparaisons de rangs ont relevé d'importantes corrélations entre les échelles de compréhension et d'expression à partir de l'âge de neuf mois.

KEY WORDS
language tests • testing in infancy • predictive value

Remediation of less than optimal language development at the earliest possible age is becoming an increasingly dominant focus of speech-language pathology services for children (Wetherby & Prizant, 1993). The importance of early intervention has been amply demonstrated. According to Beitchman, Nair, Clegg, and Patel (1986), 11% of kindergarten children in Canada have some kind of communication disorder. These disorders tend to persist into later childhood (Scarborough & Dobrich, 1990; Whitehurst, Fischel, Arnold, & Lonigan, 1992). Even prior to the emergence of words, a child's profile of symbolic and communicative abilities may be a sensitive indicator of the likelihood of subsequent difficulties in communication and language development (Howlin &

Kendall, 1991; McCathren, Warren, & Yoder, 1996; Wetherby & Prizant, 1993). Ward (1992) showed that 88.6% of infants who were screened at nine months of age and classified as being at risk for language delay were still showing indications of risk one year later.

Strong developmental considerations call for a rigorous effort towards early detection and treatment of language disorders. A number of authors have shown that infants and toddlers with communication delays or disorders are at high risk for developing social and behavioural disorders (e.g., Baker & Cantwell, 1987; Baltaxe & Simmons, 1988). Furthermore, preschool children need good communication skills in order to learn from others in a social context and to develop relationships with adults and their peers. Children whose early skills lag behind

those of their peers are also at significant risk of later learning difficulties (Silva, Williams, & McGee, 1987). The need for appropriate testing in the domain of speech and language is underscored by the fact that disorders of communication are among the most prevalent of early childhood disabilities (Wetherby & Prizant, 1993).

Early identification and treatment of language disorders has numerous advantages. It is easier for parents to adjust to their infant's problems and provide appropriate support when these are identified at an early age and professional help is offered (Bristol & Schopler, 1984). Early detection of communicative disabilities along with early intervention may prevent or diminish the persistence of both speech and language problems and concomitant emotional and behavioural disturbances. When children reach school age, communication problems often reappear, emerging as learning disabilities which tend to persist in children who have had early difficulty in acquiring language skills (Aram & Hall, 1989; Maxwell & Wallach, 1984; Scarborough & Dobrich, 1990). Unresolved language difficulties have a negative impact on reading ability (Kamhi & Catts, 1991). It is thus of utmost importance to have reliable assessment tools that are applicable at a very early age.

Commonly used general screening instruments like the Denver Developmental Screening Test are insufficiently sensitive insofar as language is concerned, failing to identify as many as 47% of children later found to have expressive language delay (Borowitz & Glascoe, 1986; Kilmon, Barber, & Chapman, 1991). It is therefore preferable to rely on tests with a much more specific focus on language. One such test which has frequently been used is the Receptive Expressive Emergent Language Scales (REEL; Bzoch & League, 1980).

Identifying less than optimal language development in infants and toddlers poses a sizeable challenge. Direct responses to formal tests cannot be considered reliable: short attention span, highly variable performance from one moment to the next, and limited expressive capability are characteristic under the age of two. Children this young are likely to display very different communication patterns when interacting with unfamiliar adults as compared with their interaction with their parents. Further, what happens in a professional's office is a long way from the nature of the daily conversational interchanges within which language is learned. It is therefore expedient to have parents report on their observation of how their child's language is evolving.

The reliability of parent report on critical details of development has been clearly demonstrated (Bates, 1993; Dale, 1991; Dale, Bates, Reznick, & Morisset, 1989), particularly for the latter half of the second year of life.

Capute, Shapiro, and Palmer (1987) found that parents were the most reliable observers and reporters of their infant's language before the age of two, with maternal report being more reliable over this age range than formal testing by speech-language pathologists or physicians. Other authors have reported that parents are capable of providing reliable information on the communicative-linguistic development of their infants, consistent with that noted by trained observers (Bates, Bretherton, & Snyder, 1988; Camaioni, Castelli, Longobardi, & Volterra, 1991). Bates, Benigni, Bretherton, and Volterra (1979) found parent report to be a better predictor of later development than either direct laboratory or home observation.

Stability of test results over time is a most important issue where infants and toddlers are concerned. The consistency with which scores obtained at a very early age represent those obtained later has strong implications for intervention-related decisions. In the short term, there is the difficulty of obtaining a valid assessment of language abilities in young children via testing at a single point in time (Bates, 1993). Young children's performance can vary under the influence of a variety of factors, including their mood of the moment, their degree of comfort with the examiner, and the limitations of their ability to maintain concentration. Parent report based on typical communicative behaviour in day-to-day situations has proven its value in overcoming this problem, at least in part. Variations in child mood and state of arousal might still bias the results obtained, at least during the early months of life.

For the longer term, there is the question of how early one can have confidence that test scores reliably reflect efficiency of language development. This implies consistency of scores across time relative to a standard or set of norms. It would be very useful to know whether a commonly used and easily administered parent report tool would show stability of results in this sense during the first two years of life, and if so, from what age.

This study is designed to answer the question of test result stability over the first two years of life. It takes as its starting point a data bank collected during a broader study of the influence of parent-child social games on the development of children's game-playing and language skills (Flanders, Cossette, Ricard, & Decarie, 1995; Flanders & Cronk, 1995; Flanders, Cronk, & Gourde, 1995; Flanders & Ricard, 1992). Testing was carried out with a group of 25 typically developing infants, using the REEL (Bzoch & League, 1980). This parent-report tool, which samples key indicators of both receptive and expressive language during the first three years of life, was administered at three-month intervals across the period from 6 to 18

months. One further testing session occurred at 24 months using the Reynell Developmental Language Scales (Reynell, 1977). A direct test covering a wide range of receptive and expressive language abilities was used at this point, on the assumption that children would be able to clearly demonstrate their skills in this way as of the second year of life.

Method

Participants

Twenty-five six-month-old infants, 12 boys and 13 girls, from English-speaking homes were recruited from the birth records of the city of Montreal. All infants had uneventful birth histories and no known developmental abnormalities. Their IQs, as determined by the Griffiths Test of Mental Abilities (Griffiths, 1967), administered at the age of one year, ranged from 93.2 to 134.4 with a mean of 101.3. The families of the infants represented all but the lowest of the six socio-economic levels of the Blishen and McRoberts Socio-economic Index (1976).

Procedure

The 25 infants came with their mothers to the Université de Montréal Laboratory of Infant Psychology when they were 6, 9, 12, 15, 18, and 24 months old. The REEL was administered at each session except the last one (24 months), at which time the Reynell was used instead. Testing at the second and subsequent sessions began with the first items previously indicated as not yet mastered. Since the REEL is a progressive developmental scale, all items previously reported as mastered were automatically credited to the child. All of the infants were tested at all age levels where the REEL was used and all but two were available for the additional testing at 24 months with the Reynell.

Test Characteristics

Parent-report instruments have been shown to provide a reliable and valid measure of early child language (Bates, Bretherton, Shore, & McKnew, 1983; Dale, 1991; Dale et al., 1989; Rescorla, 1991). The REEL (Bzoch & League, 1980) was selected for use across the first five sessions, being one of the most commonly used early assessment tools (Muirhead & Logan de Chavez, 1993). The REEL is a quickly administered test covering both the expressive and receptive aspects of young infants' language abilities. Information is obtained by interview with a knowledgeable informant, usually the primary caretaker, with the addition of direct observation and/or other interviews if necessary. It was designed to assess language

development in children from birth to 36 months. The scale is divided into a series of age intervals that increase monthly until the age of one year, bi-monthly between 12 and 24 months, and at 3-month intervals from 24 to 36 months. The test contains six items per interval: three probing receptive and three expressive language behaviours. Its test-retest reliability is reported to be between 90 and 100% (Kilmon et al., 1991).

The Reynell Developmental Language Scales (RLDS; Reynell, 1977) were adopted for use at the 24-month session being a relatively short (approximately 30 min.) direct test of children's language abilities. Muirhead and Logan de Chavez (1993) report it to be one of the more frequently used tests of early language in North America. The RLDS consists of two scales, verbal comprehension and expressive language, covering the age range from six months to six years, with its greatest sensitivity between 18 months and 4 years (Reynell & Huntley, 1985). The population sample tested in standardising it was largest at two years. The receptive scales measure three broad categories: (a) verbal preconcepts, (b) comprehension of verbal labels (e.g., representing familiar objects, toy models of objects, object use, attributes of objects, object relations), and (c) abstract concepts. The expressive scales measure structure, vocabulary, and content. The test-retest reliability is reported to be 96% on the expressive scale and 91% on the comprehension scale, with the lowest reliability at the upper ages (Reynell & Huntley, 1985). Although the version available at the time of testing was the original (Reynell, 1977) rather than the revised version (Reynell, 1985), there are minimal differences between the two versions at the 24-month level where used in this study.

Results

The means and standard deviations for the receptive and expressive test results at each age, expressed as age equivalents, are found in Table 1. In order to determine whether there is stability in the language test results of infants over the first two years of life, the expressive and

Table 1. Means and Standard Deviations of Receptive and Expressive Language Age-equivalent Test Scores at Every Age Level (N = 25).

Test	Age (months)	Mean		Standard Deviation	
		Recep.	Expr.	Recep.	Expr.
REEL	6	6.00	5.60	0.29	0.86
REEL	9	8.72	8.88	1.46	1.33
REEL	12	21.52	12.56	1.98	2.00
REEL	15	17.36	17.32	3.88	3.45
REEL	18	21.21	23.13	3.69	4.33
REYNELL	24	31.72	32.72	9.07	10.14

receptive scores on the REEL test at each of the five ages at which it was administered were correlated with each other using Spearman Rank Correlations (Norusis, 1988).

Two series of correlations were performed: the expressive with the receptive scores at each age and the expressive and receptive scores at each age with the equivalent scores at every other age. In addition the REEL scores (expressive and receptive) at all five ages were correlated with both scales of the Reynell.

Same-age Comparisons Between Receptive and Expressive Scores on the REEL and Reynell Tests

Results of the same-age comparisons between receptive and expressive scores in the REEL test at 6, 9, 12, 15, and 18 months and the Reynell at 24 months are presented in Table 2. Except for the six-month session, all correlations proved to be highly significant (i.e., at the .001 level). Thus, from the age of nine months on, language scores in the receptive and expressive domains were found to be closely related in this population of normally developing infants without developmental anomalies.

again, significant correlations begin at nine months. Stability of results within this parent-report type test is thus demonstrated from nine months onward.

Table 3. Spearman Rank Correlations Among of the Receptive-Expressive Emergent Language Scales (REEL) Scores at All Ages (N = 25).

Age (Months)	R9	E9	R12	E12	R15	E15	R18	E18
R6	.534**	.337	.316	.316	.365	.228	.354	.354
E6	.000	.160	.233	.400	.238	.310	.167	.107
R9			.635***	.671***	.571**	.605***	.711***	.506**
E9			.584**	.586**	.590***	.571**	.539**	.406
R12					.703***	.750***	.586**	.565**
E12					.560**	.748***	.593***	.694***
R15							.827***	.733***
E15							.816**	.855**

Notes. R = receptive scale; E = expressive scale; ** = p < .01; *** = p < .001

Comparisons Between REEL and Reynell Test Scores

Table 4 shows the correlations of REEL test results at 6, 9, 12, 15, and 18 months with Reynell results at 24 months. Both receptive and expressive scores were compared between tests at all ages. From 15 months on, all correlations between the two tests were significant, over half being at the .001 level. With a single exception (receptive score at nine months) there were no significant correlations between the two tests below the age of 15 months.

The REEL test results thus show stability from nine months through to 18 months (the last point at which we used that test). In addition, its results correlate at 15 and 18 months with the Reynell results at 24 months.

Discussion

This study found a very large number of significant correlations, many of them highly significant, among the various test results from nine months on and consistent correlations with later results as of 15 months. These rank order statistical tests suggest it is fair to conclude that there is stability in the picture of infant language abilities available through formal test results obtained via parent report from early in the second year of life.

From nine months on one can expect an internally consistent picture of an infant's communicative abilities. Further, there is good predictive validity from the results of this parent-report language test given at 15 months for

Table 2. Spearman Rank Correlations Between Mean Age-equivalent Scores for the Comprehension and Production Scales of the REEL and Reynell Developmental Language Scales (N = 25).

Test	Age (months)	Mean	SD	Correlation
REEL	6	32.39	9.07	.2881
REEL	9	32.54	8.49	.7108 ***
REEL	12	33.26	10.22	.7639 ***
REEL	15	33.80	9.02	.8157 ***
REEL	18	126.35	26.86	.7571 ***
REYNELL	24	31.72	9.07	.8038 ***

Note. *** p < .001

Comparisons Among the Expressive and Receptive Scores on the REEL at the Various Ages

Table 3 shows the results of the Spearman Rank Correlations among the Receptive and Expressive scores on the REEL at 6, 9, 12, 15, and 18 months. From nine months on, all but one of the correlations proved to be significant, with more than half at the .001 level. Once

Table 4. Spearman Rank Tests of Correlation Between Receptive and Expressive Scores of the Receptive Expressive Emergent Language Scales (REEL) at 6, 9, 12, 15, and 18 Months and the Reynell Language Development Scale (RDLS) at 24 Months.

REEL (N = 25)	RDLS (N = 23)	
	Expressive	Receptive
Scale/Age (months)		
R6	.246	.241
E6	-.050	.015
R9	.471**	.318
E9	.403	.343
R12	.405	.358
E12	.303	.280
R15	.752***	.713***
E15	.541**	.571**
R18	.660***	.607***
E18	.578**	.690***

Notes. R = Receptive Scale; E = Expressive Scale; ** = p < .01; *** = p < .001

the linguistic abilities of the same infant measured by direct testing at 24 months of age. A shift in focus within the REEL towards more explicitly linguistic features of communication around 15 months might well explain the beginning of significant predictive correlations with results obtained by direct testing at 24 months.

Direct testing certainly has advantages in terms of the kind of observations that can be made, but also carries its costs in length of time necessary to gather reliable information and to interpret it (Wetherby & Prizant, 1992). Multiple observation periods are frequently required in order to draw reasonably valid conclusions (Olswang, Bain, & Johnson, 1992). It is therefore reassuring to find that a parent-report instrument based on a relatively small number of items per age has such strong predictive value for the results obtained at a later age, including those obtained via more direct and detailed testing.

Parent-report results can thus be considered predictive of later direct testing results as of 15 to 18 months, an age where significant verbal behaviours would be emerging in the majority of children. The usefulness of early formal testing is further supported by the strong and consistent correlations between receptive and expressive results found from nine months on in the normal population. Such correlations confirm that a coherent picture of the very young child's communicative abilities is available through a formal parent report assessment tool like the REEL.

The testing reported here was done with typically developing infants, albeit within an age span where there is considerable individual variation in rate of development. Without broader studies testing high-risk populations, we must be prudent in any attempt to generalise these findings to infants with delays in language or other areas of development. Nevertheless, to whatever extent difficulties at the 18-month point can be predicted from parent-report assessment at nine months, a door is opened for preventive support to language development before the problem becomes a major one.

The earliest prelinguistic stages of communicative development have come to be recognised as critical groundwork for later success with language (Bee et al., 1982; Rescorla & Schwartz, 1990; Thal, 1991). The second year of life is normally a time of extremely rapid development in phonological and lexical capacities. Restricted phonemic repertory and vocabulary at 24 months have therefore been considered strong indicators of atypical development (Paul, 1991). Individual variability in rate of early language acquisition and varied possible outcomes for early expressive delay (Weismer, Murray-Branch, & Miller, 1994) have nevertheless encouraged a conservative approach when decisions are being made as to whether language intervention is necessary. It may be that our tendency to monitor children about whom we have doubts rather than intervening immediately has been more conservative than necessary, especially for populations like the prematurely born. If the stability of parent report test results shown here for a typically developing population were to be demonstrated as well for those at risk, supportive intervention could confidently begin in the prelinguistic period, without waiting for persistent evidence of linguistic delay to confirm less than optimal developmental capacity.

Given the large number of preschool children who have language problems that go undiagnosed before they reach school age, it is important to be able to identify them as soon as possible in order to help them to enter their school lives with as little handicap as possible. It is heartening to find that language tests given during the child's second year of life can yield valuable predictive information. In other words, an infant who is suspect for language delay need not wait until the age where linguistic structures are expected to be present before he is tested, as has traditionally been done. He or she can be tested via a parent-report instrument as early as nine months in order to see whether there is some delay in the development of early linguistic skills. Should results at 15 months show significant delayed development, there would be even stronger reason to assume that the child is in need of professional intervention to stimulate language development.

Detailed direct observation of infants and toddlers found to be in difficulty with language acquisition will always be necessary for adequate planning of intervention, but that is readily done once contact has been established in a therapy context. The results reported here suggest that a test often used to rapidly assess an infant's communicative ability, the REEL, can indeed be a reliable tool for identifying those in need of early intervention.

Acknowledgements

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