Speech in Same- and Different-sex Twins 4 and 5 Years Old

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The purpose of this study was to examine the impact of the sex makeup of pairs of twins on language acquisition. Past research indicated that this variable plays a role in speech problems of twin children. The questions raised were whether being a boy or a girl and having a boy or girl co-twin affected linguistic performance. A language test was given to 30 pairs of boy-girl twins, 16 pairs of boy twins, and 16 pairs of girl twins whose average age was 4 years 8 months. Their test scores confirmed our hypotheses. The poorest performance was obtained by the boy twin pairs and the best performance, by either the girl twin pairs or the different-sex pairs. The results were interpreted in the light of findings on language learning differences between girls and boys, and also in terms of Vygotsky's zone of proximal development.

Aims of the Study

Two types of comparisons provide the framework for research on twin children: comparisons of monozygotic and dizygotic twins, aimed at understanding the effects of heredity and culture, and comparisons of twins and singletons, aimed at gaining insight into the impact of twinship on the development of twin children.

Both types of comparisons are based on the postulate that the development paths of two twins are similar. Yet clinical analyses and interviews with parents of twins have often revealed that, within a given twinship, one is the "father's twin" and the other is the "mother's twin". Following Von Bracken (1939), Zazzo (1960, 1976) coined the terms "Minister of External Affairs" to refer to the co-twin who takes charge of everything happening outside the twin pair and "Minister of Internal Affairs" for the co-twin in charge of events within the pair. Twins thus have their own systems of roles, which Zazzo conceptualized under the heading "the couple effect". Such role systems have also been approached in studies on non-twin siblings (e.g., Dunn & McGuire, 1992; Dunn & Plomin, 1990). The notion of "sibling differential experiences" stresses the fact that siblings differ in how they perceive (in the terminology used by Daniels & Plomin, 1985) or represent (in the terminology used by Almodovar, 1998) the various dimensions of the family environment, including the attitudes of each of the parents and sibling interactions. A number of regularities have been noted and related to the long-term adaptation of each child and the role played by the quality of sibling relationships during childhood and pre-adolescence.

These studies suggested that there was a third type of comparison (i.e., comparisons between co-twins) that could be used to show that not all twins underwent the same conditions of development, and consequently, that the developmental paths of twins, although similar, were not identical. While this remark may seem obvious for pairs of different-sex twins, it is less so for same-sex pairs. Taking these environmental differences into account could have important repercussions, not only on developmental psychology but also on child-raising and teaching practices.

Our research deals with the speech of twin children. We began by making comparisons of the second type (twins–singletons), but it soon became clear from the results that comparisons of the third type were necessary (between co-twins).

Comparison of Singleton and Twin Language Development

By the late 19th century (see Garitte et al., 1995), speech retardation was noted in some twin children, and a peculiar language was observed in certain twin pairs (autonomous language). At the beginning of the 20th century, several studies were conducted to characterize this delay, which appears to affect all components of language (phonology, lexicon, and syntax; see Day, 1932), and to determine the features of the autonomous languages of twins (e.g., Luria & Youdovitch, 1956). By the end of the century, findings obtained in psycholinguistic and pragmatic research led a number of investigators (McEvoy & Dodd, 1992; McEvoy & Dodd, 1994; Tomasello et al., 1986; Tomasello et al., 1989) to take an interest in the processes that might account for the language lag, and to cast doubt on the existence of autonomous languages (Bakker, 1987). Several lines of research were explored, and it became evident that the language-learning conditions of twin children have a number of specificities. First, compared to mothers who have only one child to raise at a time, mothers of twins make shorter utterances and speak less to each child (e.g., Bornstein & Ruddy, 1984; Conway et al., 1980; Lytton et al., 1977). Their verbal exchanges are less intense, more directive, and less interrogative, and they deal more with

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essentials (Tomasello et al., 1986). At the conversational level, these mothers engage in fewer mother–child joint attention episodes, and they have more trouble sustaining joint attention with one twin because the other often disrupts the interaction (Clark & Dickman, 1984). Mother–twin exchanges contain fewer speaking turns, and mothers of twins generally "lump" the two twins together in their verbal productions, thereby generating a linguistic environment that is less attuned to each child (Stafford, 1987). Therefore the learning conditions of these two child populations are clearly both qualitatively and quantitatively different.

Another consideration is that twin children can choose to take or not to take a speaking turn. Savic (1980) pointed out that triadic exchanges between an adult and both twins always had one speaker and two possible addressees. In such situations, a twin child may or may not reply (counting on the co-twin to do so), or the two children may compete for the chance to speak.

Comparison of Co-twin Language Performance

In all of the above studies, the speech examined was either the mother's or the twins', but the comparisons were almost always of the second type (twins–singletons). Very few studies have looked at the individual language development of each twin by making the third type of comparison (co-twins compared to each other). However, some of the research seems to suggest that looking at differences between the dyad's members would indeed be fruitful. Haden and Penne (1985) for example, investigated the syntactic and interactive language development of a set of twins between the ages of 3.7 and 5.2. The boy was language-impaired, whereas his sister's speech was perfectly normal. The presence of the girl had a detrimental effect on the boy's speech development, although his problems tapered off with therapy. Alin-Akerman (1987) studied the personality and language development of 69 nine-month-old twins. She showed that while the girls' scores were close to the mean, girl twins had lower scores than girl singletons, and that boys had particularly low scores in overall development and in speech. Hay et al. (1987) showed that twin boys were behind on a measure of general intellectual and social functioning (Vineland Social Maturity Scale), symbolic play, and language skills (speaking and understanding), in addition to having more articulation problems. Their study clearly pointed out the double disadvantage of being both a boy and a twin. Finally, Lewis and Thompson (1992) examined speech problems reported by the parents of a population of 9.35-year-old same-sex twins in which one or both of the children was undergoing speech therapy. They showed that the speech impairments of monozygotic twins were more similar than were those of dizygotic pairs.

In a more recent study by Garitte and Lavandier (1998), who compared the speaking difficulties of twin children to those of singletons with language problems (all children were in speech therapy), no differences were found between the two subject groups (twins–singletons), but the study did show that (1) more twins from same-sex pairs than from different-sex pairs were in speech therapy, and (2) the speech therapists said they only found autonomous language in same-sex pairs. The authors hypothesized in conclusion that, rather than zygosity, the sex makeup of the twin pair might be responsible for their speech deficiencies.

These studies are in line with others which, although not directly aimed at examining developmental differences between twins, have concluded that it would be worthwhile to separate the different types of twin pairs according to what sexes are involved and to whether the dyad is made up of same- or different-sex twins. These two variables, "sex" and "type of pair", appear to play an important role in the development of twin children. In a study on the physical environment of twins and maternal attitudes and practices, Robin et al. (1993) noted the potential impact of the sex variable and suggested distinguishing same-sex and different-sex twins in future research.

The purpose of the present study was to make the third type of comparison (between co-twins) in order to examine the role of sex and the type of twin pair in the linguistic development of these children. We wanted to find out if the language skills of twins depended on whether they belonged to a same- or different-sex pair, and on whether they were girls or boys. Another question raised was whether twin children exhibited a language learning delay. We used a standardized test for a population of ordinary children.

Method

Language Assessment

To assess language development, we administered a language test to 124 French twins. The test employed was designed by researchers in collaboration with speech therapists (Chevrié-Muller et al., 1975), and is widely used in France because of its clinical utility in quickly pinpointing speech problems. The test has five parts with subtests (15 subtests in all).

1. An articulation test composed of a single item called Articulation (ART). The child has to repeat six syllables containing a fricative consonant followed by "a" ([*sa*], [*ja*], [*xa*], [*va*], [*fa*], [*za*]).

2. A phonology test composed of three items to assess oral word production.

a) Picture Naming (PNA). The experimenter says aloud 33 sentences with one word missing (e.g., "It's a very little child, it's a...") and the child has to point to the corresponding picture (here, the picture of a baby).

b) Easy Word Repetition (WRE). The child has to repeat after the experimenter 46 everyday vocabulary words (e.g., cork, house, sausage, etc.).

c) Difficult Word Repetition (incorrect answers) (WRD.I). The child has to repeat after the experimenter 6 difficult words that are not part of his or her vocabulary: "topinambour", "instabilité", "Sardanapale", "désenchantement", "Constantinople", "construction" (Jerusalem artichoke, instability, Sardanapalus, disenchantment, Constantinople, construction).

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3. A linguistic expression test composed of three items.

a) Difficult Word Repetition (intelligibility) (WRD.C). The intelligibility of the six words in the preceding item are rated, irrespective of phonetic alterations (i.e., words are scored as recognizable or unrecognizable).

b) Vocabulary (easy) (VOE). In this lexical expression test, the child has to pronounce 31 French words (6 of which are easy), illustrated in pictures, e.g., "genou" and "pinceau" (knee, paintbrush) for the easy words and "coccinelle", "salière", "tire-bouchon" (ladybug, salt shaker, corkscrew) for the difficult words. A different score is given for errors ("salt" instead of "salt shaker"), explanatory paraphrases ("jar to put salt in"), closely-related words ("salt canister"), and correct words ("salt shaker").

c) Vocabulary (difficult) (VOD). This item gives a score for the 24 difficult words in the preceding list (i.e., the 6 easy words are not included).

4. A linguistic comprehension test with seven items.

a) Spatial Orientation (SPA). To test the child's understanding of partitions (e.g., "each", "in a...") and spatial concepts (e.g., "back to back", "lined up", "between", etc.), the child has to make four toy ducks do what the experimenter requests (i.e., "take the ducks and make them swim around the pond"). This item does not require an oral response.

b) Color Naming (COL). This item tests knowledge of color words (red, blue, yellow, green). The child is asked to name the color ("What color is this?"), and if he/she does not respond, to point to the color ("Show me the red one").

c) Token Classification (TCL). This non-verbalized item is based on Piaget's concrete operation stages. The child must understand instructions to sort tokens by shape and/or color (e.g., "sort the tokens by color", "put all the red ones together", etc.).

d) Likeness (LIK). The idea here is to test the abstract concept referred to by the French word "pareil" (like). Five pictures are used, each representing two objects that are the same or different in shape, color, and size (e.g., two like vases, two unlike pans).

e) Verbal Comprehension (VER). The child has to exhibit an understanding of five different pictures presented one by one, by answering a series of three questions (e.g., "What is the boy doing?", "What is he holding the dog with?", "How is he dressed?"). The child's comprehension of both the picture and the question word are scored.

f) Picture Pointing (PPO). The child has to point to the picture that matches what the experimenter says. The pictures used are the same as in the picture naming test (PNA). Insofar as the number of words understood is always greater than the number produced, a score farther below the mean in naming than in pointing could be indicative of a specific clinical disorder (such as developmental dysphasia).

5. A memory test composed of two items.

a) Digit Repetition (DRE). The child repeats a series of digits (same series as in Terman-Merrill's psychometric test). This verbal material is not semantically loaded.

b) Sentence Repetition (SRE). The sentences to be repeated tell a story about a clown and a kitten. They are long and complex enough (e.g., "The clown called her from the open door so she would come back") to prevent echolalia.

The 15 scores obtained on this test were converted for comparison. The raw scores were reduced and centered, with the mean at 0, and 12 standard deviations ranging from –6 to +6. This divided the children into 13 classes based on their deviation from the mean. From the clinical standpoint, the 15 centered and reduced scores define a "profile" indicating to a therapist whether a child's results are homogeneous or whether certain functional levels stand apart from the others and require special attention. Given that our goal was not clinical, we did not establish a profile for each twin, but compared the means obtained by the three twin groups.

The twins were tested in their home by two different experimenters[1] on the same day, at the same time, in two different rooms.

Subjects' Characteristics

The sample was composed of 124 children, 60 twins from different-sex pairs (30 girls and 30 boys) and 64 twins from same-sex pairs (32 girls and 32 boys) (see Table 1). Their mean age was 4 years 7 months (range 48–63 months). The mean age difference between the four groups (same- and different-sex girl pairs, same- and different-sex boy pairs) was not statistically significant (56;22, 55;16, 56;18, and 55;16 months old, respectively).

All of the children were attending preschool. They were contacted through the National Association for the Support of Parents of Multiple Births (ANEPNM) from five departments of France located in and around Paris. The purpose

Table 1

Characteristics of the Sample

	Number of children		Total by type of pair
	Boys	Girls	
Different-sex twins	30	30	60
Same-sex twins	32	32	64
Total	62	62	124

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of this association is to supply material aid as well as child-raising support to parents of twins, triplets and so forth. The parents who belong to this association are generally from the middle class.

Results

Analysis of the Results by Subtest

In order to compare the four groups of children, group means and standard deviations were calculated and an analysis of variance was computed. The results are presented in Table 2.

As Table 2 shows, all scores were slightly above the mean. Two subtest scores, Picture Naming (PNA)[2] and Difficult Word Repetition (WRD.C) were more than one standard deviation away from the mean. Among the eight scores below the mean (although by less than one standard deviation), six were obtained by the same-sex boy twin group. We can therefore conclude that at the ages tested, none of the twin groups had a language impairment, at least not on the skills assessed here.

The statistical analyses presented in Table 2 yielded significant differences for 7 out of 15 subtests: Articulation (ART), Picture Naming (PNA), Easy Word Repetition (WRE), Difficult Word Repetition (correct answers) (WRD.C), Vocabulary (easy) (VOE), Verbal Comprehension (VER), and Digit Repetition (DRE). For the five components of language tested (articulation, phonology, lexical expression, comprehension, and memory), the boys from same-sex sets had at least one item where their performance was below that of the other children. To analyze these

Table 2

Means and Standard Deviations on Each Subtest, by Type of Twin Pair and Twin Sex

	Different-sex twins				Same-sex twins				
	Boys		Girls		Boys		Girls		Statistical Significance
Subtest	μ	σ	μ	σ	μ	σ	μ	σ	
ART	0.53	0.86	0.50	0.94	–0.16	1.74	0.56	0.72	$F(3, 120) = 2.88$, $p \leq 0.05$
PNA	1.20	1.00	1.27	0.74	0.38	1.34	1.16	0.57	$F(3, 120) = 6.02$, $p \leq 0.001$
WRE	0.93	0.69	0.87	0.86	0.26	0.96	0.84	0.77	$F(3, 119) = 4.44$, $p \leq 0.005$
WRD.I	0.79	1.15	0.70	1.12	0.03	1.43	0.34	1.60	*ns*
WRD.C	1.69	0.97	1.63	1.10	0.84	1.34	1.09	1.47	$F(3,118) = 3.39$, $p \leq 0.05$
VOD	0.17	0.87	0.13	0.94	–0.31	0.82	–0.30	1.00	*ns*
VOE	0.33	0.84	0.40	1.00	–0.25	0.92	0.06	0.98	$F(3, 120) = 3.10$, $p \leq 0.05$
SPA	0.20	1.35	0.10	1.35	–0.03	1.20	0.41	1.29	*ns*
COL	0.80	0.55	0.87	0.51	0.69	0.90	0.84	0.51	*ns*
TCL	–0.03	0.96	0.23	1.19	0.38	1.10	0.47	1.14	*ns*
LIK	0.37	1.30	0.30	1.34	0.44	1.32	0.22	1.21	*ns*
VER	0.47	1.04	0.10	0.99	–0.38	0.79	–0.12	1.26	$F(3, 120) = 3.66$, $p \leq .01$
PPO	0.47	1.07	0.37	0.89	0.12	1.10	0.12	1.01	*ns*
DRE	0.24	1.18	0.33	0.92	–0.28	1.53	0.62	1.16	$F(3, 119) = 3.05$, $p \leq 0.05$
SRE	0.59	0.82	0.47	0.97	0.29	0.86	0.34	0.90	*ns*

Table 3

Statistical Significance of the Comparison of Means on the 15 Subtests, by Type of Twin Pair and Twin Sex (Bonferroni's Multiple Range Test)

Subtest	Comparison of twin groups with significant differences	Significant difference of means	Probability
ART	Same-sex boys/Same-sex girls	–.7188	$p \leq .08$
PNA	Same-sex boys/Different-sex girls	–.8917	$p \leq .005$
	Same-sex boys/Same-sex girls	–.7813	$p \leq .01$
	Same-sex boys/Different sex boys	–.8250	$p \leq .01$
WRE	Same-sex boys/Different-sex girls	–.6086	$p \leq .05$
	Same-sex boys/Same-sex girls	–.5857	$p \leq .05$
	Same-sex boys/Different-sex boys	–.6753	$p \leq .01$
VOE	Same-sex boys/Different-sex girls	–.6500	$p \leq .05$
VER	Same-sex boys/Different-sex boys	–.8417	$p \leq .01$
DRE	Same-sex boys/Same-sex girls	–.9062	$p \leq .05$

Note: Unlike Table 2, the WRD.C observed here was not significant.

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differences, we used Bonferroni's Multiple Range Test to compare the four twin groups on each subtest.

As Table 3 shows, significant differences were observed between the boys from same-sex twins and the other three twin groups only on tests PNA, WRE, WRD.C, VOE, VER, and DRE. Thus, even though same-sex twin boys were not behind the general population as far as language acquisition was concerned, some of their scores were statistically poorer than those of all other groups of twins.

Although the differences between the other twin groups were not significant, our next step was to attempt to differentiate them (girl co-twins, and girls and boys from different-sex pairs).

Comparison of Girls and Boys by Type of Pair

To distinguish between the three groups of twin children, their performance was ranked from best to worst. Table 4 presents the ranking.

The results showed that boys from different-sex twin pairs most often held the top position (i.e., they attained the best score seven times). After that came girls from same-sex pairs (four times), then girls from different-sex pairs (3 times), and last, boys from same-sex pairs (only once). In second position, the most frequent type of twin was a girl from a different-sex pair (8 times), whereas the third position was most often occupied by a girl from a same-sex pair (9 times). In other words, the overall ranking (irrespective of statistical significance) was (1) different-sex twin boys, (2) different-sex twin girls, (3) same-sex twin girls, and (4) same-sex twin boys.

Discussion

Three main findings stand out from this study.

1. No linguistic retardation was observed in the sample studied, regardless of the type of twin pair. Three reasons can be proposed: (a) speech lags taper off between the ages of 5 and 10 (Davis, 1937; Launay & Borel-Maisonny, 1975; Mittler, 1976; etc.); (b) due to Zazzo's renown as a child psychologist in France, his work with twins is known by most parents of twins, teachers, pediatricians, psychologists, and childcare personnel, and as a result, careful attention is often paid to language development in twins; and (c) all of the twins were recruited from the ANEPNM, most of whose members are from a socioeconomic class above the mean. Clearly, then, this precludes generalizing the present findings to the entire population of twin children.
2. As far as language is concerned, it is statistically more advantageous for a boy twin to have a girl co-twin than a boy co-twin: boys from same-sex pairs, although not below the general population mean, had poorer performance in general than any other type of twin. In contrast, for a girl twin, having a girl or boy co-twin does not seem to have a real impact on language learning.
3. The overall ranking (independently of statistical significance) was as follows: boys from different-sex pairs, girls from different-sex pairs, girls from same-sex pairs, and boys from same-sex pairs.

The interpretation we propose is based on the concept of zone of proximal development. The "superiority" sometimes observed in the speaking skills of girls may provide a tutoring type of interaction between the twins, and the relatively narrow zone of proximal development (Vygotsky, 1933–34) this creates would allow the boy twin to progress. Having a model of development close to their own, boys may benefit from an implicit boy-girl co-twin tutoring relationship that moves them in the direction of the model afforded by the girl (this interpretation would explain why boys from different-sex pairs had better performance than boys from same-sex pairs). Moreover, girls may also benefit from being in a tutoring position (this would explain why, although the differences were not statistically significant, girls from different-sex pairs achieved better results than girls from same-sex pairs).

However, the earlier language acquisition often recognized in girls as compared to boys may have created a bias in our study, and may be the reason why the performance of different-sex pair girls was not statistically different from that of same-sex pair girls. Female precociousness may mask the interaction between co-twin tutoring and maternal tutoring. It has been shown that maternal tutoring is dependent upon the sex-makeup of the twin dyad: mothers are more differentiating with different-sex twins than with same-sex twins (see Robin et al., 1993). It therefore seems probable that co-twin tutoring interacts with maternal tutoring in other cognitive domains, in a way that is more profitable to different-sex twins than to same-sex twins.

Conclusion

This exploratory study showed that it is worthwhile to compare co-twins with each other. However, this third type of comparison needs to be investigated in greater depth, not only from the pre-linguistic standpoint — insofar as the essentials of language have already been acquired at the

Table 4

Number of Subtest Scores of Each Rank Obtained by the Different Types of Twins (Irrespective of Statistical Significance)

Type of twin / Rank		1st	2nd	3rd	4th	Total
Different-sex twins	Boys	7	5	2	1	15
	Girls	3	8	4	0	15
Same-sex twins	Boys	1	1	0	13	15
	Girls	4	1	9	1	15
Total subtests		15	15	15	15	60

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age studied here — but also by using other language tests to verify our results and validate our interpretation. Further studies based on this type of comparison could also look at other cognitive domains, in order to investigate the explanatory factors of differences observed between co-twins. One factor that seems particularly important is the nature of the co-twins' interactions with each other, especially co-twin tutoring. It would be useful to compare mother-to-twins and twin-to-twin verbal interactions in a quasi-experimental situation, while differentiating the twins by their sexes and by the sex-makeup of the twin pair, as in the present study.

Footnotes

1 Eliane Benjamin and Céline Canhao.

2 Except for the boys from same-sex twin pairs.

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