

The Recovery Processes of Two English-Japanese Bilingual Aphasics

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The recovery processes of two English-Japanese bilingual aphasics, one with Broca's aphasia and the other with Wernicke's aphasia, were investigated with special emphasis on the effect of language therapy. The degree of impairment initially manifested in English and Japanese was almost equivalent in each case, the pattern of impairment corresponding to the respective types of aphasia. In both cases, systematic, controlled language therapy was conducted. Analysis of the recovery courses revealed that language therapy was one decisive variable in the relative degree of recovery of a bilingual aphasic's two languages. The type of aphasia appeared to exert a crucial influence on the relative recovery rate of different modalities.

INTRODUCTION

The investigation of bilingual or polyglot aphasics has drawn the unceasing interest of investigators for over a century. Although many studies on this subject are isolated case reports which tend to lack detailed information based on objective testing, more systematic, controlled studies have been emerging recently (Lambert & Fillenbaum, 1959; Charlton, 1964; Fredman, 1975, Watamori & Sasanuma, 1976; Voinescu, Vish, Sirian, & Maretsis, 1977).

Lambert and Fillenbaum studied compound and coordinate bilingual aphasics and tentatively concluded that the aphasic impairment affected equally all languages of a compound bilingual but affected differentially the languages of a coordinate bilingual. In this study, Lambert and Fillenbaum actually tested the compound bilingual aphasics but not the coordinate population, the latter being collected through published European materials. In criticizing their report on this point, Charlton (1964) conducted cross-sectional research on nine unselected bilingual and polyglot

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aphasics and found that all languages of polyglot aphasics were affected equally in seven out of nine patients irrespective of the premorbid frequency of the use of these languages or intelligence of the patients. However, the author does not state whether he used equivalent and comprehensive test batteries in testing all the languages of these polyglots, nor does he provide information as to the time of the test administration.

Fredman (1975) studied 40 bilingual or polyglot aphasics who had immigrated to Israel as adults. They were coordinate bilinguals whose "home languages" were not Hebrew.¹ A comprehensive language evaluation in Hebrew was administered before and after the 3 months of language therapy given in Hebrew. The family of the aphasic was asked to fill in the "Home Language Questionnaire," which was intended to check the patient's facility in using the "home language" at home before and after the language rehabilitation. The author found a significantly high correlation coefficient between the gains in the language test in Hebrew and the gains in the patient's "home language" usage measured by the questionnaire, thus concluding that therapy in Hebrew had a positive effect on the patient's skill in communication in his "home language." However, caution should be taken in interpreting Fredman's results in that both the evaluation and the language therapy appeared to be carried out during the optimal spontaneous recovery period [the patients were tested as early as 2 weeks postonset (p.o.) and on an average of 5 to 6 weeks p.o. and were enrolled in the 3-month therapy program thereafter]. Since the data on the control group are not available in this study, it is virtually impossible to eliminate the possible contamination effect of spontaneous recovery on the effect of language therapy.

Watamori and Sasanuma (1976) reported the case of an English-Japanese bilingual with Broca's aphasia who had chosen the English language for his therapy in a community where Japanese was the only language in the environment. They found that in this compound bilingual patient, the patterns of the impairment of the two languages in question were almost identical, each pattern corresponding to his type of aphasia. Analyses of the effect of language therapy in terms of different language modalities disclosed that the efficacy of the therapy was more pronounced in the oral production and writing modalities than in the auditory and reading comprehension modalities in this patient.

Voinescu et al. (1977) studied a polyglot who had been able to speak four languages (Romanian, Russian, Greek, and German). The patient manifested a fluent type of aphasia, and the language therapy was given in

¹ The majority of cases used in this study were polyglot aphasics using two or more languages premorbidly. "Home language" refers to the language the patient had been using at home. It included Yiddish, German, Hungarian, Polish, Arabic, French, Romanian, and Indian.

Romanian for 6 weeks. The results of parallel tests in the four languages given at the end of the 6 weeks disclosed the following: (1) quantitative discrepancies in verbal expression but no discrepancy in reception among the four languages; and, simultaneously (2) qualitatively identical features of disturbance in the four languages either in verbal expression or reception; (3) the language used in the therapy (Romanian) was least impaired when examined, and the therapeutic intervention in that language seemed to have had a beneficial effect on speech in other languages not under therapy. Regrettably, no data are available on the status of the patient's language impairment *before* therapeutic intervention.

In the present study, two United States-born, English-Japanese bilingual aphasics who manifested different types of aphasia (Broca's aphasia in one patient and Wernicke's aphasia in the other) are reported with discussions on the effect of the language therapy given to these patients.

CASE 1

A detailed case history of this patient is reported elsewhere (Watamori & Sasanuma, 1976). He is a 69-year-old right-handed businessman born in California in 1908 to Japanese immigrant parents. He was brought up in a bilingual environment, using Japanese at home and English in the community, and graduated from the University of California at Berkeley in 1930. Six years later he came to Japan to study at a Japanese university. He graduated from the university, married a native Japanese woman, and has since been living in Japan. After World War II he worked for an American firm and visited the United States several times every year until the onset of his present illness. According to his wife, he spoke perfect Japanese at home and had no trouble in handling the contemporary Japanese orthography although he seemed to prefer using English in reading and writing.

In March 1973, immediately after his return from a visit to the United States, the patient complained of a visual disturbance. A couple of days later, a speech disturbance appeared which increased gradually for the next 10 days. He was diagnosed as having suffered a cerebral thrombosis. On April 22, 1973, he had a second attack and became totally speechless with only the residual utterance "so,so." Neurological examination revealed no paralysis or paresis in either of his limbs and no abnormalities of the arteries on the CAG. Computerized axial tomography (CT scan) was performed on June 1, 1977, 50 months p.o. The result revealed a large, well-defined low-density area centered around Broca's area and a less well-defined low-density area in the inferoposterior parietal lobe. The left lateral ventricle was moderately enlarged. These findings were compatible with a cerebral infarction (Fig. 1).

In June 1973, 2 months after the onset, he was referred to the Speech Pathology Services of the Tokyo Metropolitan Geriatric Hospital.

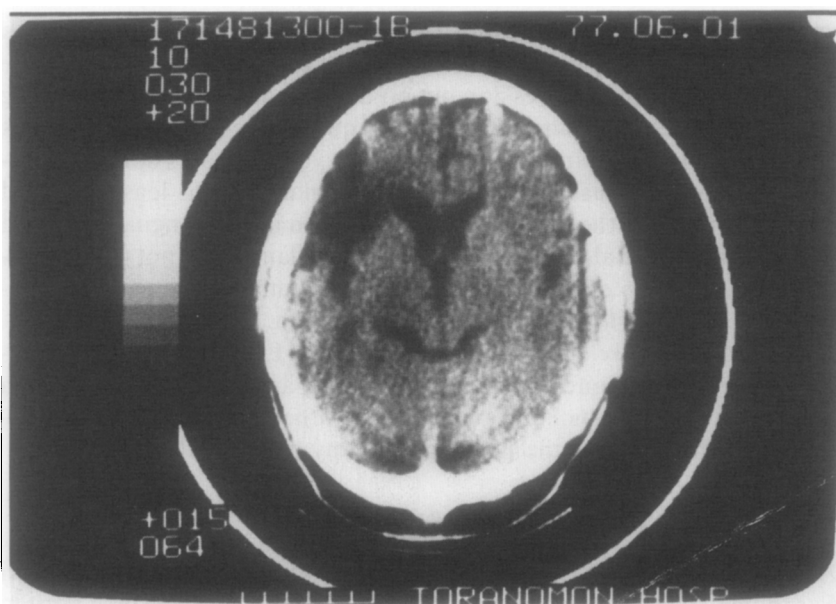


FIG. 1. Computerized axial tomogram of patient 1, showing a large, well-defined low-density area centered around Broca's area and a less well-defined low-density area in the inferoposterior parietal lobe. The left lateral ventricle was moderately enlarged.

The Course of Recovery in Case 1

Figure 2a shows the results of the initial evaluation at 2 months p.o. using parallel tests constructed from selected subtests of the Minnesota Test for Differential Diagnosis of Aphasia in English and Japanese. The patient's speech was confined to the residual utterance "so, so," and no propositional speech was present in either language, nor was he able to repeat any words in either language. He identified 8 of 10 pictures named by the examiner in each language. He responded correctly to most of the simple questions in a conversational situation that require yes-no responses in both languages. However, he was unable to follow even one-step commands such as "Give me the cup" in either language. The performance level of his reading comprehension was almost identical to that of his auditory comprehension in both languages. No spontaneous writing was present in either language although he was able to copy words in English and in Japanese (kana only). The patient was diagnosed as having severe Broca's aphasia with oral and verbal apraxias. As can be seen in Fig. 2a, the degree and the pattern of impairment in Japanese was almost equal to that in English across all language modalities, with English slightly less impaired.

On the basis of this initial evaluation, it was provisionally decided that the language therapy would be conducted in Japanese since he lived in the

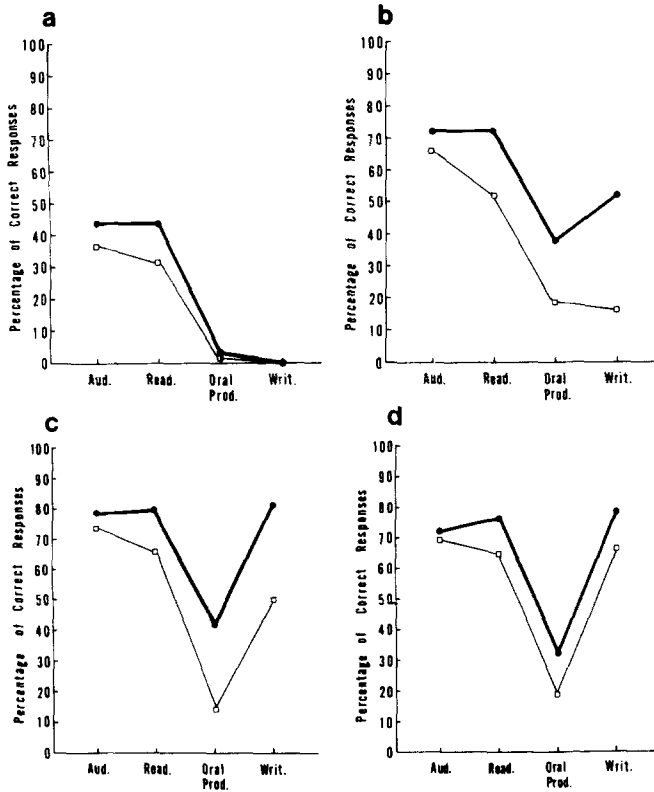


FIG. 2. Results of evaluations in four language modalities at 2, 14, 26, and 49 months p.o. for patient 1: (a) 2 months p.o., (before therapeutic intervention was instituted); (b) 14 months p.o., after 12 months of therapy in English only; (c) 26 months p.o., after 8 months of therapy in Japanese together with English; (d) 49 months p.o., after 31 months of therapy in Japanese and 19 months of nontreatment in English). (● — ●) English; (□ — □) Japanese.

Japanese community and his wife did not speak any English. After being in therapy for 2 weeks (four sessions), however, the patient indicated with gestures that he felt he could not improve in Japanese and would like to work in English. His wife supported this idea, and thus the therapy was thereafter conducted exclusively in English. One-hour therapy sessions in English were given four times a week until 18 months p.o., at which time the patient started to exhibit a growing interest in the Japanese language and thus the therapy program was modified to incorporate Japanese as well as English. In other words, beginning from 18 months p.o., the patient received language therapy in two languages, each once a week until 30 months p.o. Therapy in English was terminated at 30 months p.o. because of the unavailability of a therapist and the patient has since been enrolled in therapy given exclusively in Japanese. (The time schedules for his therapy can be found in Fig. 4.)

The stimulation approach (Schuell, Jenkins, and Jimenez-Pabon, 1964) was used in the therapy for both languages. The therapy program in English was comprised of tasks in auditory comprehension, reading comprehension, oral production, and writing, all graded in terms of difficulty. The therapy program in Japanese, on the other hand, concentrated on the training of kana usage. The auditory comprehension of this patient was judged to have reached a functional level at the time of the initiation of therapy in Japanese. The analytic training of kana usage in Broca-type aphasics² has been found to be effective in increasing not only kana processing abilities but also the oral production of phonemes as well (Monoi, 1976). This approach is intended in essence to reestablish a one-to-one relationship between the individual kana characters and their corresponding morae and is based on the hypothesis that the impairment of phonological processing constitutes the common source of disorders of kana processing as well as phonemic production and reception (Sasanuma & Fujimura, 1971).

In order to assess the recovery process in the patient's linguistic impairment, parallel tests were administered periodically after the initial evaluation. The results of these reevaluations at 14, 26, and 49 months p.o. are plotted in Figs. 2b, c, and d, respectively. As was mentioned earlier, the results of the initial evaluation at 2 months p.o. (Fig. 2a) revealed essentially the same overall pattern of impairment for both languages. Administration of language therapy in English for the period of a year, however, brought about a considerable gap in the pattern as well as in the degree of impairment between the two languages, as is demonstrated in Fig. 2b. That is, the degree of improvement in English (the treated language) was clearly greater than that in Japanese across all modalities and particularly in writing which seems to have benefited most from therapy.

At 18 months p.o., therapy in Japanese was initiated along with therapy in English. Figure 2c shows the results of the evaluation after 8 months of therapy in the two languages (26 months p.o.). It is clear from the figure that the writing modality in Japanese had improved considerably. The patient was able to write 6 words in kanji and 4 words in kana out of 10 test words each for kanji and kana. Of note, however, is that the gap between the two languages in the oral production modality did not narrow even after therapy in Japanese was initiated.

² The first step in this program is devoted to establishing a few key words, that is, the patient is trained to repeat, read orally, and name these words, as well as to write them in both kanji and kana. (Patient 1 learned to write words in kanji faster than in kana.) Then the patient is trained in steps to (1) resolve words into morae; (2) single out a particular mora from a word; (3) grasp the one-to-one relationships that exist between a mora and a kana; and (4) synthesize words from his learned repertoire of kana characters. At this point, the patient is shown words written in kanji as well as pictures. The program then proceeds to (5) the dictation and spontaneous writing of sentences using both kanji and kana. (Patient 1 is still working on step 4 of this program at the present time.)

Therapy in both languages was continued for a year, and at 30 months p.o. therapy in English was terminated. Although the patient seemed to have reached a plateau at about this time, therapy in Japanese has continued twice weekly since he was still making progress in the writing modality and showed motivation for further learning. The patient had not been exposed to English language stimuli for 19 months when the final evaluation was administered at 49 months p.o. the results of which are shown in Fig. 2d. It can be seen that the degree and the pattern of impairment of the two languages have again become almost identical, with English still being somewhat less impaired than Japanese. It is clear that only a negligible amount of regression had occurred in English after 19 months of nontreatment. The modality most vulnerable to regression was oral production, which, of course, was the most severely affected modality in this patient. It should also be noted that the oral production ability in Japanese remained unchanged even after 31 months of therapy in Japanese (Figs. 2a-d).

CASE 2

The patient is a 52-year-old, right-handed man. He was born on the island of Hawaii in 1922 to Japanese immigrant parents. The language background of his early childhood is not fully known, but apparently he was able to speak and understand both English and Japanese competently before the onset of his present illness. He used to converse in Japanese with his wife and in English with his three children. His wife noticed that her husband had some southern dialectal accent in his Japanese which is spoken in the area where his parents originated. Although he had a functional knowledge of written Japanese, he primarily wrote in English and usually did not attempt to write in Japanese.

The patient attended a local high school and then entered a college in California which he did not complete because of his enlistment in the army. He was transferred to Japan in 1945 and stayed there until 1958. In 1955, he married his wife, a native Japanese woman. The patient has since been working for a security agency under U. S. A. auspices in Hawaii and obtained a diploma in economics from the University of Hawaii in 1965. The patient visited Japan for the second time in August 1974 on business.

On September 27, 1974, while still in Japan, the patient suffered a stroke and was admitted to the U. S. Army Hospital at Camp Zama. He was diagnosed as having suffered a left-middle cerebral artery occlusion due to embolus. The patient had a history of myocardial infarction in 1970. Neurological examination at the army hospital revealed no paralysis in either of his limbs. However, he had some difficulty using a pen, fork, and other utensils, suggesting the possible existence of apraxia in using tools. His EEG was abnormal, demonstrating a persistent generalized left-sided

slowing. A brain scan demonstrated increased uptake in the left temporal area, and a left-carotid arteriogram showed a complete occlusion of one of the proximal branches of a major middle cerebral artery with retrograde arterial supply via anastomotic branches from the anterior cerebral artery. The patient was referred to the speech pathology services of the Tokyo Metropolitan Geriatric Hospital in December 1974 at 3 months p.o.

The Course of Recovery in Case 2

Figures 3a and b show the results of the initial evaluation at 3 months p.o. and the final evaluation at 9 months p.o., respectively, using parallel tests constructed from selected subtests of the Minnesota Test for Differential Diagnosis of Aphasia in English and Japanese.

At the initial evaluation, the patient's speech was characterized by neologistic jargon and literal and verbal paraphasias that had features resembling the language under examination. Fluent idiomatic expressions were interspersed among the jargon speech. He was not logorrheic but was often blocked by word-finding difficulties, thus producing a rather halting flow of speech. These characteristics of his spontaneous speech were identical in both languages. He was totally unable to repeat any words in either language. In conversational situations, the patient often failed to respond appropriately, indicating that his auditory comprehension fluctuated considerably from time to time in either language. He identified 7 of 10 pictures named by the examiner in both languages. He was unable to follow any verbal commands in either language. He had a mild sensorineural hearing loss (average hearing level at speech frequencies: left, 30 db, right, 32 db), but this loss was judged to be unrelated to his comprehension difficulty. His reading ability was superior to his auditory comprehension and he correctly matched all of the 10 printed words to pictures in both languages. He

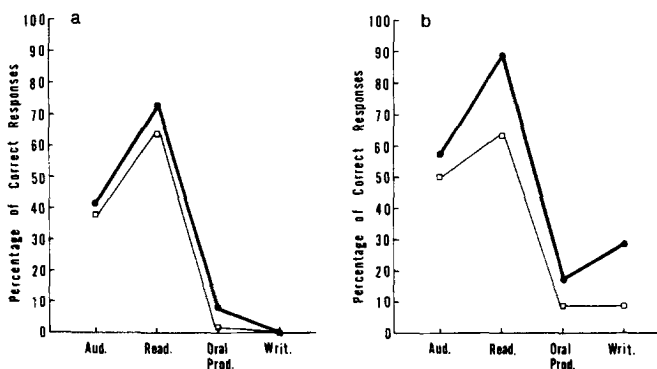


FIG. 3. Results of initial and final evaluations in four language modalities for patient 2: (a) 3 months p.o., before therapeutic intervention was instituted; (b) 9 months p.o., after 6 months of therapy in English. (● — ●) English; (□ — □) Japanese.

followed 8 out of 10 written commands in English but 2 out of 10 in Japanese. His oral reading was totally jargonetic but fluent, maintaining the phonetic and prosodic features of the language under examination. No spontaneous writing was present in either language. On the basis of these findings, the patient was diagnosed as having severe Wernicke's aphasia. As can be seen in Fig. 3a, the degree and pattern of impairment of both languages was almost equal across all language modalities, with English slightly less impaired.

Language therapy was initiated in English after considering the patient's home environment and his residual language abilities. The stimulation approach used consisted essentially of intensive auditory stimulation, incorporating naming and writing tasks at word and sentence levels. The therapy continued for 6 months, with two 1-hr sessions per week. Tape-recorded materials, together with corresponding pictures and printed cards, were given to the patient for self-training at home. The results of the final evaluation, at 9 months p.o. are shown in Fig. 3b. It is clear from the figure that a wide gap between the two languages is apparent now, English being more improved than Japanese. However, it should be noted that the patient's ability in Japanese has also improved slightly. The discrepancies between the two languages are most apparent in the reading and writing modalities. The therapy was terminated in July 1975 because of the patient's return to Hawaii.

DISCUSSION

The recovery processes of two United States-born English-Japanese bilingual aphasics were presented. From the history of the language usage of each, both patients were judged to be compound bilinguals. Therapeutic intervention was made in both patients and the changes in the abilities of the patients' two languages were observed over time. The results will be discussed in terms of (1) the effect of aphasia on the two languages of the bilinguals and (2) the effect of therapeutic intervention on the recovery processes of the two languages.

Effect of Aphasia on the Two Languages of the Bilinguals

There has been a dispute among researchers whether the effect of aphasia impairs all languages of a polyglot to an equal extent. It appears that at least two variables have to be taken into consideration in discussing this issue: (i) the type and severity of aphasia and (ii) the timing of language evaluation. Needless to say, the particular type and severity of aphasia depend highly on neurological factors, such as the location and extent of the lesion, which in turn may affect the pattern of recovery. Another important variable is the timing of language evaluation. While reliable test

results cannot be obtained before patients are neurologically stable, i.e., before 2 to 3 months p.o., too long a delay in administering the language evaluation could significantly affect the results—by introducing the intervening effects of systematic or nonsystematic therapeutic intervention. The positive effects of systematic therapeutic intervention over time are apparent from our results.

Figures 2a and 3a summarize the symptom patterns that our patients exhibited at the time of the initial evaluation, 2 and 3 months p.o. for patients 1 and 2 respectively, when they became neurologically stable. It is clear that the pattern of aphasic impairments in English and in Japanese are almost identical in each patient, i.e., Broca's aphasia in case 1 and Wernicke's aphasia in case 2. Since both of the patients reported in this study were suspected of having large lesions, this might have contributed in producing the same pattern and the same degree of impairment in the two languages in each patient. In other words, since both patients had severe aphasia at first, the differences, if any, might not have been detectable. A study of less severe cases with neurolinguistic methodology might yield different findings in this respect.

Effect of Therapeutic Intervention on the Recovery Processes of the Two Languages

(1) *Relative improvement of treated and nontreated languages.* A comparison of Figs. 2a and b (case 1) and Figs. 3a and b (case 2) reveals that the amount of recovery was clearly greater for the language under therapy (English in both cases) than for the language not under therapy, and the size of the discrepancies between the two languages in terms of the levels of performance in the four language modalities had increased over time.

However, it is also true that the nontreated language did show some improvement, though to a much lesser degree. The underlying mechanisms of this phenomenon are unknown presently, but the interaction of the following two factors might constitute a partial explanation: (1) a spontaneous recovery and (2) an activating effect of the therapy in that the controlled, intensive stimulation in one language might have activated what might be called the universal language processing mechanism as a whole and thus facilitated the recovery of the nontreated language. Case 2, for example, exhibited marked fluctuations in his ability to comprehend speech in both languages at the time of the initial evaluation. After 4 months of therapy, however, he became more "tuned in" to both languages. At about the same time, the patient also began to show self-corrective efforts in his speech for both languages, with decreased frequency of neologistic jargon, indicating that he was now able to utilize the external feedback mechanism regardless of the language he was being treated for at a given time. A similar observation can be made with our first patient. The recovery process of his

receptive abilities exhibited an almost simultaneous improvement in the treated as well as the nontreated language.

(2) *Relative improvement of different modalities in the two types of aphasia.* The first-year recovery course of case 1 with Broca's aphasia was analyzed according to the four language modalities and has been reported elsewhere (Watanori & Sasanuma, 1976). The results of this analysis revealed that auditory and reading comprehension (receptive modalities) improved similarly for both the treated and the nontreated language by the end of 14 months p.o., with a greater amount of improvement in the treated language (Figs. 4a and b). However, in oral production and writing (expressive modalities), a sizable gap emerged between the treated and the nontreated language by the end of 14 months p.o., with a greater amount of improvement in the treated language (Figs. 4c and d). After the therapy in Japanese was initiated at 18 months p.o. a considerable improvement was observed in writing Japanese as well (Fig. 4d). The patient showed superior performance in writing words in kanji at 26 months p.o., but his ability to write kana soon improved to become almost equal to his kanji writing ability on the word level. In contrast to the improvement in the writing modality, however, his oral production in Japanese remained unchanged even under therapy (Fig. 4c). One of the factors contributing to the differences between writing and oral production in Japanese was naming. Although naming was more difficult than writing in both languages, the discrepancy was greater in Japanese than in English. It was observed that, during the extensive naming test (100 words) in Japanese, the patient occasionally responded with English words. This phenomenon, the interference of alien words, never occurred when the same test was administered in English nor in the writing tests in either language. These findings seem to indicate that the patient premorbidly had a stronger association with English words than Japanese words. Thus the possible premorbid difference between the two languages which was not apparent at the time of the initial evaluation might have become distinct only after a certain period of therapeutic intervention.

A similar analysis was carried out for case 2 with Wernicke's aphasia, a qualitatively different type of aphasia from the Broca's aphasia exhibited by case 1. As is shown in Figs. 4a' and b', auditory comprehension in this patient improved similarly for both the treated and the nontreated language, whereas in reading comprehension a sizable improvement was observed only for the treated language, with practically no change for the nontreated language. In contrast to case 1, the oral production ability in case 2 recovered slowly but similarly for both languages (Fig. 4c'). In the writing modality, on the other hand, the degree of improvement for the treated language (English) was considerable, whereas the improvement in the nontreated language (Japanese) appeared to level off after 7 months p.o. However, the fact that there was a possible difference in the pre-

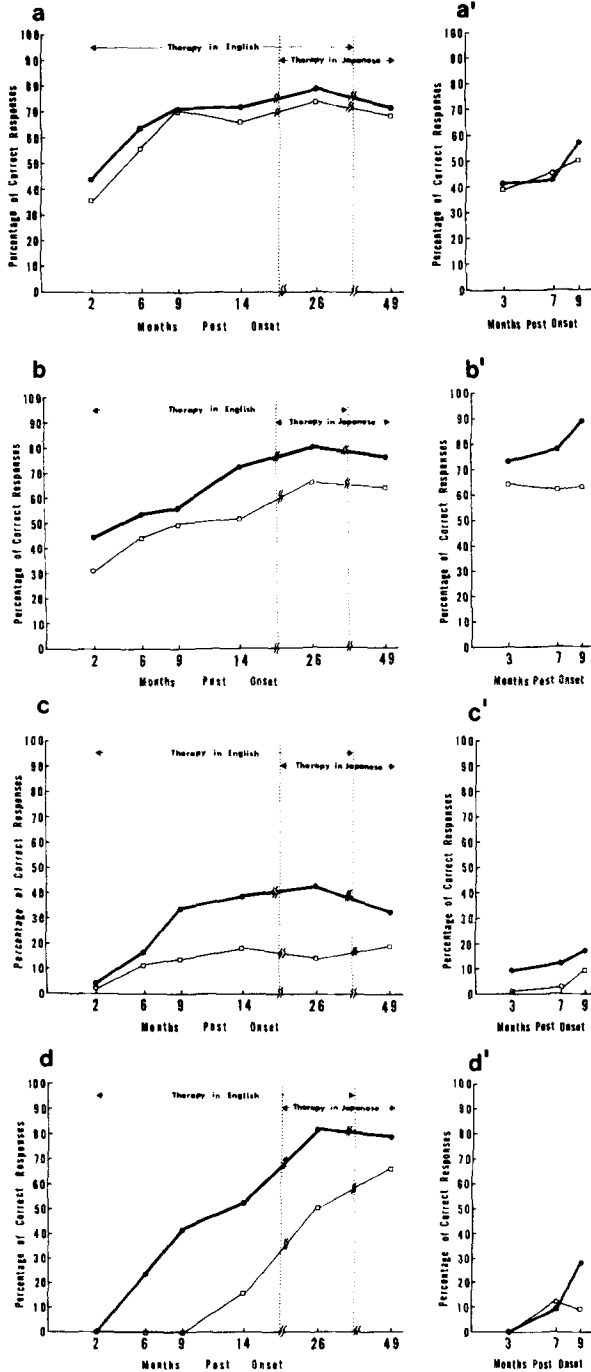


FIG. 4. Recovery curves across time for patients 1 and 2: (a) auditory comprehension, (b) reading, (c) oral production, and (d) writing for patient 1; (a') auditory comprehension, (b') reading, (c') oral production, and (d') writing for patient 2. (● — ●) English; (□ — □) Japanese.

morbid writing abilities of the two languages in this case might have had the effect of augmenting the gap between the two languages.

To summarize, auditory comprehension was the modality in which similar improvement was observed in the treated and the nontreated language, regardless of the type of aphasia. This finding is consistent with the results of Voinescu et al. (1977), who found that the auditory comprehension of their polyglot subject with fluent aphasia was equally impaired in all of the four languages he had been familiar with. Auditory comprehension further has been reported as tending to recover spontaneously more than the expressive modalities (Vignolo, 1964; Hagen, 1973). In contrast, writing ability seemed to improve as a function of language therapy in both patients. In reading, while the Broca's aphasic showed a similar recovery rate for both the treated and the nontreated language, the Wernicke's aphasic showed a selective recovery only for the treated language. Pre-morbid differences in the degree of mastery of reading in the two languages, however, might have contributed to the differential course of recovery in case 2. Finally, in the oral production modality, differential recovery patterns were observed between the two types of aphasias. As Voinescu et al. (1977) reported for their fluent aphasic, our Wernicke's aphasic also showed improvement not only in the treated language but also in the nontreated language, though to a lesser degree. Our Broca's aphasic, on the other hand, appeared to show improvement only in the treated language (English) until therapy in Japanese was initiated. However, the improvement in Japanese was negligible even after therapy in that language was instituted, possibly because of the factors discussed above.

CONCLUSION

Two English-Japanese bilingual aphasic cases were presented, and their course of recovery over time was discussed. The results of the present study seem to indicate the following tentative conclusions.

(1) In either of our bilingual patients, the two languages were not differentially impaired when the test was administered at the time when neurological stability was established, that is, the qualitative aspect (type of aphasia) and the quantitative aspect (degree of impairment) were almost identical for both languages in either patient. Since both of our patients had severe aphasia at the time of the initial evaluation, however, the differential effect of aphasia on the two languages, if any, might not have been apparent.

(2) Systematic, controlled language therapy is one decisive variable affecting the relative degree of recovery in a bilingual aphasic's two languages. In either of the patients reported in this study, all the language modalities recovered, by and large, for the language under therapy. Improvement in the nontreated language, on the other hand, was confined to

certain modalities predicted from the specific types of aphasia, and the amount of improvement even in these modalities tended to be less than that for the treated language.

(3) Finally, the type of aphasia seems to exert a crucial influence on the relative recovery rate of the different modalities.

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