Ann. Bull. RILP (1983) No. 17, 229-237

RECENT DEVELOPMENTS ON APHASIA AND DEMENTIA IN JAPAN

*Toshiko S. Watamori**

Introduction

The "aging" of the Japanese population began after World War II. Fig. 1 shows the changes for the proportion of the population 65 years old and over in Western countries and Japan over a century. The proportion of Japanese 65 years old and over reached 9% in 1980 and will increase ever more steeply for the next 40 years reaching 22% in 2020.† It must be noted that the rate of increase has been much more rapid in Japan than in Western countries. A low birth rate, together with the

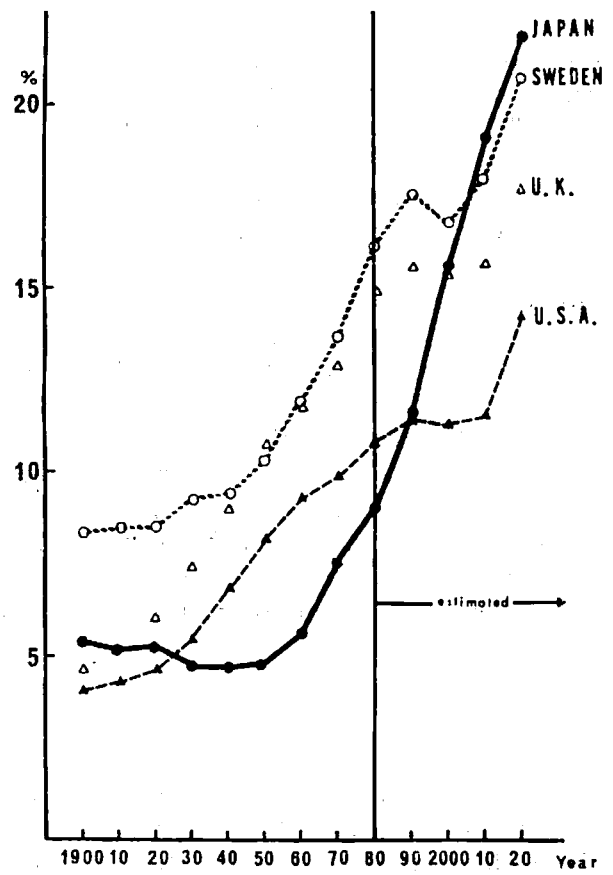

Fig. 1 *Proportion of the population 65 years old and over in Western countries and Japan*

† Based on the Institute of Population Problems, Ministry of Health and Welfare estimates, 1982 and UN World Population Prospects as Assessed in 1980.

* Tokyo Metropolitan Institute of Gerontology

extension of life expectancy, has and will inevitably increase the number and proportion of old people to a magnitude that no other country has ever experienced. As a result of improved medical and health care, Japan will face an increased incidence of age related diseases such as dementia and aphasia. The need for research in this area is urgent considering the steep trend toward an "aged" society in Japan. This paper will summarize the recent research in this area including some of the recent findings on aphasia and dementia.

Research on Aphasia

Research on aphasia has a long history in Japan. The first research paper on aphasia appeared in 1893,[1] only about 30 years after Broca. However, therapy and research within the framework of speech pathology began only 19 years ago.[2] Research in this discipline centered on the development of aphasia test batteries in the beginning but soon focused on multiple areas of interest. For example, the innate nature of the Japanese orthographic system has provided an advantage in studying semantic and phonological functions in aphasia: Sasanuma's papers[3-6] on the selective impairment of kanji and kana in Japanese aphasics have frequently been quoted in the literature. Another well known study was done by Itoh[7,8] on the articulatory dynamics of a patient with apraxia of speech using a fiberscope and an X-ray microbeam system. A series of studies done by Itoh and his colleagues has provided supporting evidence for the presence of the unique articulatory disorder for which Darley[9] gave the term "apraxia of speech".

Although the field of speech pathology is still embryonic in Japan, not even recognized by a formal certification system or systematic educational system in the universities, research on aphasia has attained a relatively high level simply because the leading people in this field have been working on this subject. However, most of the clinical papers are written in Japanese and thus have little chance to be known outside Japan. The areas of current research cover a wide range of topics including; analysis of syntactic recovery in aphasia, comparative analysis of the speech characteristics in apraxia of speech and conduction aphasia, development and standardization of the Communication ADL test, and research on the age variable and aphasia. I will go into some detail on the recent findings relevant to the theme: the age variable and aphasia.

Characteristics of Aphasia in the Aged

The difference in the distribution of aphasia types according to age has drawn the attention of many aphasia researchers and fairly consistent data have been accumulated recently. For example, the tendency of Wernicke's aphasics to be older than Broca's aphasics have been repeatedly shown in studies done in the U.S.[10-12] and other countries.[13,14] Essentially the same findings were reported by Fukusako[15] in Japan in a larger sample of aphasics. Fukusako studied 585 predominantly post-stroke aphasics examined between 1972 and 1981 at the Tokyo Metropolitan Geriatric Hospital. Four hundred and twenty one patients out of 585 were classified into one of the four main types of aphasia. In addition to the mean age

comparisons between Broca's and Wernicke's aphasics, she calculated the incidence of each aphasia type in 6 age groups (Fig. 2). The most significant finding was the striking increase of the incidence of global aphasia in older age groups. On the other hand, the incidence of Broca's aphasia decreased with age, consistent with the previous findings. Wernicke's aphasia was extremely rare in the age group under 39, but appeared at a constant rate in the older age groups. On the contrary, the peak for the incidence of anomic aphasia was under age 39, and appeared less but consistently over that age. Thus it was shown that the incidence of specific aphasia types was different according to age group in a large sample of aphasics in Japan. The age group studies on aphasia types unanimously indicate the increasing severity of the problem linked to aging.

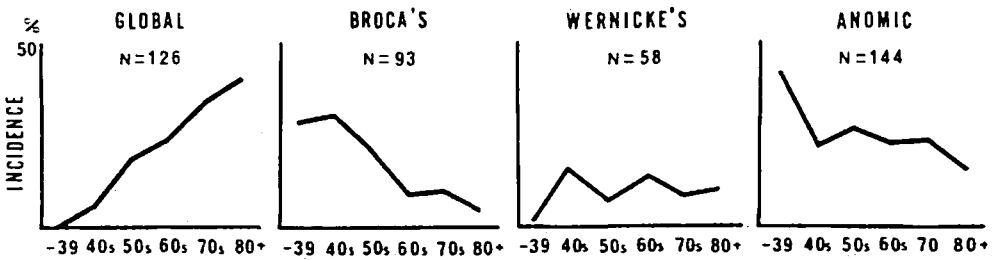

Fig. 2 *Distribution of aphasia types in 6 age groups*

Further evidence on the qualitative differences between younger and older aphasics controlling for the etiology of aphasia was reported by Watamori.[16] Seventeen CVD patients with different onset ages were investigated intensively using a comprehensive test battery of linguistic and cognitive functions. Patients who had left hemisphere lesions verified by CT scans, and were more than 2 years post onset, were selected randomly from the three different age-at-onset groups: child aphasics (onset under 15), adult aphasics (onset between 20 and 59), and geriatric aphasics (onset over 60). Child aphasics were excluded and the results of the comprehensive test in six adult and six geriatric aphasics were compared. While no statistically significant differences were found between the two groups on linguistic tests, half of the geriatric aphasics showed defective scores on the two specific tests of visuoperceptual abilities. Furthermore, while the adult aphasics demonstrated good correspondence between the type of aphasia and the lesion site, geriatric aphasics' impairment did not always correspond to the lesion sites as indicated by the CT scan. Fukusako,[17] also in the same series of studies cited previously, investigated the recovery of 303 aphasics who received more than two months of speech and language therapy. The incidence of improvement†† decreased significantly with age (Fig. 3).

†† Improvement was judged by the changes in % of the total score of the Roken Test for the Differential Diagnosis of Aphasia (RTDDA) administered at the time of initial and final evaluations. A patient was judged "improved" if his gain after therapy was over 20% when his initial score was lower than 50% in the RTDDA. When his initial score was over 50%, 10% was the minimum gain to be judged "improved".

Taken together, these findings show that aphasia among the aged was not only

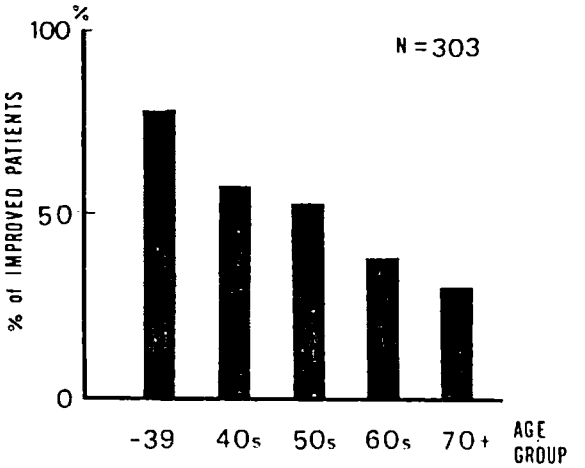

Fig. 3 *Incidence of improved patients in each age group*

Taken together, these findings show that aphasia among the aged was not only different in the distribution between types, but also different in the nature of impairment. These findings might be interpreted as showing an interactive effect of age and cerebral disease in aphasic patients. For example, cerebral infarction is far more common in the population over 60 than under 59[18] and aged CVD patients are more likely to be predisposed to cerebral circulatory insufficiency and hypoxia due to arteriosclerosis. Sokoloff[19] studied the cerebral circulation and metabolism of two groups of elderly men living in the community averaging 72 years of age. Both groups functioned normally and were rigorously selected for freedom from disease. But one group differed from the other in terms of the presence of objective evidence of minimal, asymptomatic arteriosclerosis. Rate of cerebral blood flow and oxygeon consumption in the group without arteriosclerosis were not statistically different from those of young subjects in their twenties. However, the arteriosclerotic group exhibited not only marked reduction of cerebral blood flow and evidence of reduced oxygeon tension in the brain but also greater deficits in cognitive, perceptual and other psychological functions than the group without arteriosclerosis. According to Sokoloff, "the presence of vascular disease was associated with the apparently more rapid deterioration of cerebral functions, probably because of cerebral vascular insufficiency." That is to say, aphasia in the aged population cannot be viewed as a simple sum of "normal" aging plus aphasia. In this sense, research on the characteristics of aphasia in the elderly deserves more attention. The status of nonlinguistic cognitive performance may have predictive significance for the course of recovery in aphasia. Further, comparative study of adult and geriatric aphasics using comprehensive measures will lead us to a better understanding of the functional status of the brain and eventually show us the direction for meaningful therapy.

Research on Senile Dementia

The total amount of research into language disorders in dementia is still quite

small even in Western countries, but a few detailed studies have shown interesting findings.[20-22] For one thing, selective vulnerability of semantic function has been consistently reported in the literature.[23] However, there has been no report thus far that investigated the processes of break down of the linguistic and nonlinguistic functions and the relationship between them.

Watamori and Etoh[24] followed a 55 year old, well educated Alzheimer's patient whose problem started as a form of agraphia for five years. The first symptoms the patient showed were spatial disorders manifested as difficulty in block construction, copying figures and characters, reading and writing, and calculation in the face of relatively preserved attention, memory and personality. A comprehensive neuropsychological test battery was administered once a year for five years. During this time, the patient's language functions and ADL declined almost linearly (Fig. 4).

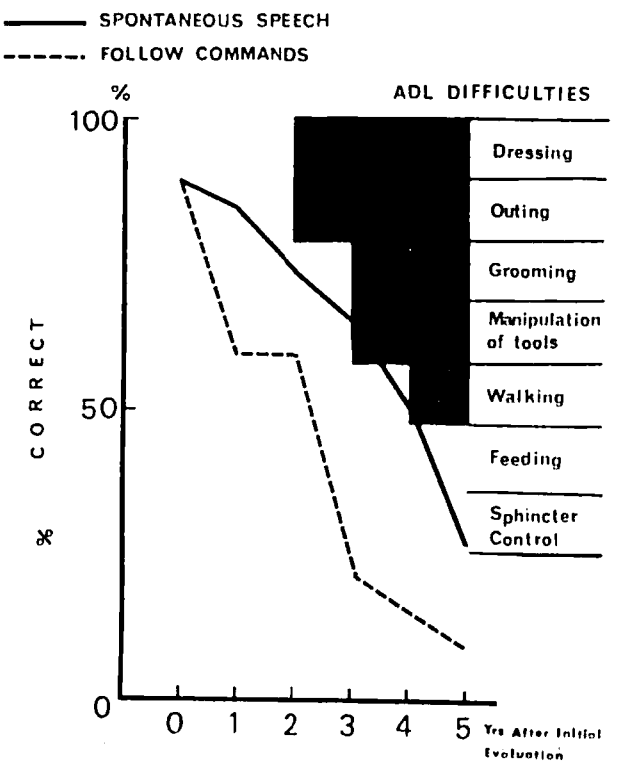

Fig. 4 *Deterioration of functions during the 5 year follow-up period*

However, some interesting concomitances as well as dissociations of functions were noted in the general picture of deterioration. As the spatial disorder progressed, the patient's comprehension as well as expression of spatial terms gradually diminished. It was also noted that his comprehension of sentences with complicated syntactic structures such as passive sentences became extremely low even though he understood the meaning of the major lexical items in the sentences. His inability to analyze grammatical structure according to the principles of syntax left him confused as to the ultimate meaning of the sentences. Such linguistic impairment accompanied by spatial disorder was also seen in the patients of so-called semantic

aphasia and sometimes viewed as a linguistic analog to impairment in the analysis of spatial structure.[25] These findings indicate the relationship between the linguistic and nonlinguistic functions and demonstrate the reality of supra modal spatial thinking.

Another interesting feature found in this case was the dissociation between the two visuoperceptual abilities. The patient's performance on the facial recognition test remained constant for a long time while his performance on the three dimensional construction test showed significant and rapid deterioration from the beginning (Fig. 5).

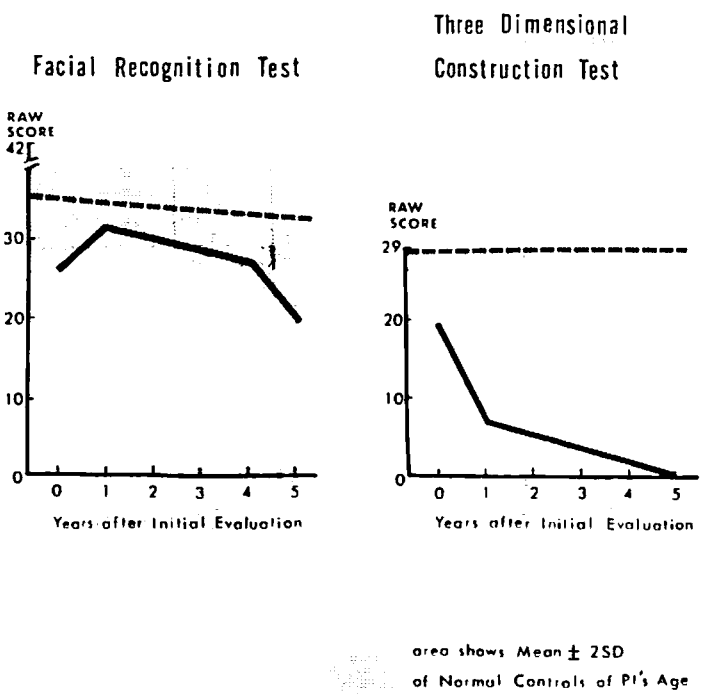

Fig. 5 *Results of two visuoperceptual tests*

Thus it was shown that the process of functional deterioration in dementia is not a unitary, general decline of behavior, but that it has a specific pattern of deterioration in nonlinguistic as well as linguistic functions. It is not known whether such a pattern may differ from patient to patient, or rather, is consistent with the type of dementia. Further longitudinal research is needed to identify the possible patterns of impairment associated with senile dementia. Such information will give rise to the better understanding of the neural mechanisms underlying linguistic and cognitive functions as well as to the early detection and differential diagnosis of dementia.

One further point must be made in this regard. Our review of the literature[23] on the differential diagnosis of aphasia and dementia has shown that the research to date has been confined to comparisons between the general aphasia population and a rather advanced dementia population.[26,27] In clinical practice, the most difficult question of differential diagnosis is posed between the early cases of dementia

and specific types of aphasia such as Wernicke's aphasia or Angular Gyrus Syndromes.[28] Systematic study is needed for the early identification of a dementing condition so that the patient and his family can avoid possible social and occupational embarrassment. With appropriate management, patients can lead longer, more independent lives despite their increasing level of impairment.[29]

Table 1 *Linguistic and nonlinguistic test battery*

Test	Area Tapped				
	General Language Ability	Motor Speech	Orientation	Memory	Nonling. Cognitive Abilities
Temporal Orientation			■		
Repetition of Sentences	■	■			
Naming (100 words)	■	■			
Picture Description	■	■			
Facial Recognition Test (Benton-Japanese Version)					■
Word Fluency	■				
Digit Span				■	
Follow Commands	■				
Story recall (Immediate and Delayed)				■	
Reading Aloud	■	■			
Reading Comprehension	■				
Construction Praxis (Including the Three Dimensional Construction Test by Benton)					■
Tactile Form Perception Test (Benton)					■
Judgment of Line Orientation (Benton)					■

Impact of Aging on the Higher Cortical Functions

Research is still scarce in Western countries as well as in Japan in the area of linguistic functions among the aged. Most of the studies thus far have focused on rather narrow areas of interest. Furthermore, no study has ever attempted to investigate the impact of aging on the higher cortical functions comprehensively. There are indications that the occurrence of specific linguistic deficits as well as specific cognitive deficits have implications for lesional localization and that the pattern of deterioration in specific functions will enable us to estimate the seriousness of the condition. It is clear that a much more extensive research effort should be undertaken to assess the impact of normal aging on higher cortical functions. Recognizing this need, we have constructed a comprehensive test battery for linguistic and cognitive functions at our institute and started to give it to normal old people (Table 1). We believe such data will constitute the data base for the study of pathological conditions such as aphasia and dementia.

Concluding Remarks

The impact of an aging population and relevant research findings on aphasia and dementia in Japan were described. It was emphasized that basic data using a comprehensive test battery is necessary in order to understand the normal aging process as well as such pathological statuses as aphasia and dementia.

Acknowledgement

The author is indebted to Dr. Sumiko Sasanuma, Director of the Department of Rehabilitation Medicine, Tokyo Metropolitan Institute of Gerontology, Dr. Motonobu Itoh, Head of the Section of Communication Research, Tokyo Metropolitan Institute of Gerontology, and Dr. Yoko Fukusako, Head of the Speech Pathology Services, Tokyo Metropolitan Geriatric Hospital. This study was supported in part by a grant in aid for Scientific Research, Ministry of Education, Japan (No. 57570845). Portions of this paper were presented at the 1983 ASHA Western Regional Conference, in Honolulu, July, 1983.

References

1. Japan Speech Abstracts Publication Committee (ed.): The Collective Bibliography on Aphasia in Japan, Nihon Gakujutsu Shinkokai, 1972. (In Japanese)
2. Sasanuma, S., M. Itoh, T.S. Watamori, Y. Fukusako and H. Monoi (1978): Language Therapy for Aphasia, Igaku Shoin Ltd., Tokyo. (In Japanese)
3. Sasanuma, S. and O. Fujimura (1971): Selective impairment of phonetic and non-phonetic transcription of words in Japanese aphasic patients: kana vs. kanji in visual recognition and writing. Cortex, 7: 1-18.
4. Sasanuma, S. and O. Fujimura (1972): An analysis of writing errors in Japanese aphasic patients: kanji vs. kana words. Cortex, 8: 265-282.
5. Sasanuma, S. and H. Monoi (1975): The syndrome of Gogi (word meaning) aphasia: Selective impairment of kanji processing. Neurology, 25: 627-632.
6. Sasanuma, S. (1974): Impairment of written language in Japanese Aphasics: Kana versus Kanji processing. J. of Chinese Linguistics, vol. 2, 141-158.
7. Itoh, M., S. Sasanuma and T. Ushijima (1979): Velar movements during speech in a patient with apraxia of speech. Brain and Language, 7: 227-239.
8. Itoh, M., S. Sasanuma, H. Hirose, H. Yoshioka and T. Ushijima (1980): Abnormal articulatory dynamics in a patient with apraxia of speech: X-ray microbeam observation. Brain and Language, 11: 66-75.
9. Darley, F.L., A.E. Aronson and J.R. Brown (1975): Motor Speech Disorders. Philadelphia: Saunders.
10. Obler, L., M. Albert, H. Goodglass and D.F. Benson (1978): Aphasia type and aging. Brain and Language, 6: 318-322.
11. Harasymiw, S., A. Halper and B. Sutherland (1981): Sex, age and aphasia type. Brain and Language, 12: 190-198.
12. Holland, A.L. (1980): Working with the aging aphasic patient: Some clinical implications. In L.K. Obler and M.L. Albert (eds.): Language and Communication in the Elderly. Lexington Books, Lexington, Mas.

13. De Renzi E., P. Faglioni and P. Ferrari (1980): Note: The influence of sex and age on the incidence and type of aphasia. Cortex, 16; 627-630.
14. Kertesz, A. and A. Sheppard (1981): The epidemiology of aphasic and cognitive impairment in stroke: age, sex, aphasia type and laterality differences. Brain, 104: 117-128.
15. Fukusako, Y. and H. Monoi (1982): Age variable in aphasia therapy; characteristics of aged aphasics. Japanese Journal of Stroke, 4; 202-204. (In Japanese)
16. Watamori, T. (1982): Prognosis for acquired aphasia and significance of age at onset: The long-term outcome of linguistic and nonlinguistic functions. The Japan Journal of Logopedics and Phoniatrics, 23: 227-243. (In Japanese)
17. Fukusako, Y. and H. Monoi (1983): Age variable in aphasia therapy: Comparative study of adult and geriatric aphasics. The Japan Journal of Logopedics and Phoniatrics, 24; 49. (In Japanese)
18. Tanaka, H., Y. Ueda, C. Date et al. (1981): Incidence of stroke in Shibata, Japan; 1976-1978. Stroke, 12: 460-466.
19. Sokoloff, L. (1979): Effects of normal aging on cerebral circulation and energy metabolism. In F. Hoffmeister and C. Müller (eds.): Brain Function in Old Age; Evaluation of changes and disorders. Springer-Verlag, Berlin Heidelberg New York.
20. Bayles, K.A. and D.R. Boone (1982): The potential of language tasks for identifying senile dementia. Journal of Speech and Hearing Disorders, 47; 210-217.
21. Bayles, K.A. (1982): Language function in senile dementia. Brain and Language, 16: 265-280.
22. Obler, L.K. and M.L. Albert (1981): Language in the elderly aphasic and in the dementing patient. In M.T. Sarno (ed.): Acquired Aphasia, Academic Press, New York.
23. Watamori, T.S., S. Murakami, M. Itoh and S. Sasanuma: Language disorders in senile dementia; a review of recent findings. Seishin Igaku (Clinical Psychiatry), in press. (In Japanese).
24. Watamori, T.S. and F. Etoh: A longitudinal study of linguistic and nonlinguistic functions in a patient with Alzheimer's disease. Rinsho Seishin Igaku (Japanese Journal of Clinical Psychiatry), in press. (In Japanese).
25. Hier, D.B., S.I. Mogil, N.P. Rubin et al. (1980): Semantic Aphasia; A neglected entity. Brain and Language, 10; 120-131.
26. Appell, J., A. Kertesz and M. Fisman (1982): A study of language functioning in Alzheimer's patients. Brain & Language, 17; 73-91.
27. Wertz, R.T. (1982): Language deficit in aphasia and dementia: The same as, different from, or both? In Brookshire, R.H. (ed.), Clinical Aphasiology Conference Proceedings 1982, BRK publishers, Minneapolis, Mn.
28. Benson, D.F., J.L. Cummings and S.Y. Tsai (1982): Angular Gyrus Syndrome simulating Alzheimer's disease. Arch. Neurol., 39; 616-620.
29. Watamori, T.S., C. Kikuta and F. Etoh: A positive approach to a patient with progressive dementia: Five year follow-up study. Sogo Rehabilitation, in press. (In Japanese).