

Hong Kong Neuropsychological Association

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### About Hong Kong Neuropsychological Association (HKNA)

#### NSYCHOLO,

The HKNA was established in October 1998. It aims to promote the advancement of knowledge, to encourage and facilitate clinical and theoretical research in neuropsychology in Hong Kong, and to promote and facilitate communication with relevant professional organizations within the local community, mainland and overseas. Interested parties please fill in application form which can be obtained from the Association or downloaded at: www.hkna.org/assets/HKNAform.pdf. For further information about the Association, please visit website: www.hkna.org.

## **Coming event on Neuropsychology**

## "An International Conference on Neuropsychology:Recent

## Advances in the East and West"

Organizer: Department of Psychology, Chinese University of Hong Kong

**Conference Date:** 9 – 12<sup>th</sup> December 2003

**Conference Venue:** Esther Lee Building, Chung Chi College, Chinese University of Hong Kong, Hong Kong

conference details or enquiries, please call (852) 2609 6648. e-mail For or to the conference website neuropsy conf@psy.cuhk.edu.hk, or visit at http://www.psy.cuhk.edu.hk/~neuropsy conf/2003/

## **Good News!**



Congratulations! Professor Agnes S. Chan, Associate Professor of Department of Psychology, Chinese University of Hong Kong, also the chairman of the Hong Kong Neuropsychological Association, has been selected to be one of the Ten Outstanding Young Persons this year (2003) by the Hong Kong Junior Chamber of Commerce. This award not only is a recognition of her professional accomplishments, but also her contributions and services to the community.

# Frontier In Neuropsychology

# Music Instruction Aids Verbal Memory

Α number studies of have demonstrated that early experience in life affects brain structures and cognitive functions in human (e.g., Bremner & Narayan, 1998; Dawson, Ashman, & Carver, 2000). Chan, Ho, and Cheung (1998) proposed that the impact of early life experience on the development of cognitive functions is predictable when an association with the effect of on experience neuroanatomy is established. They proposed cognitive functions are highly localized in the brain, and different parts of the brain mediate specific cognitive functions. Hence, the degree of an individual's cognitive function should be associated with changes in neuroanatomy. Thus, the memory function of individuals with music training should demonstrate а predictable pattern that follows the corresponding cognitive neuroanatomy.

To test this assumption, Chan et al (1998) had examined the memory of individuals who have undertaken music training to examine the specificity of the effect of experience on cognitive functions with the

neuroanatomical model. They speculated that different experience (e.g., music training) affects the development of the cortical system in a specific pattern (enlarged left but not right planum temporale). Thus, individuals with music training should demonstrate better verbal but not visual memory, given that their left but not right temporal lobe is assumed to be better developed. Their results showed that young adults with at least 6 years of music training demonstrate better verbal but not visual memory than those without such training.

Although there is encouraging evidence to support the hypothesis that the development of cognitive function can be systematically shaped by early life experiences, that evidence is preliminary. To further test the hypothesis, they had tried to further look into the verbal and visual memory of children with various durations of music training.

In their study (Ho, Cheung, and Chan, 2003), they had studied 90 boys between age 6 and 15. Half of them had musical training as members of

their school's string orchestra program, plus lessons in playing classical music on Western instruments, for one to five years. The other 45 participants were schoolmates with no musical training. The researchers gave the children verbal memory tests (HKLLT-Form one; Chan and Kwok, 1999), to see how many words they recalled from a list, and a comparable visual memory test for images (Brief Visuospatial Memory Test-Revised: Benedict. 1997).

Results indicated that students with musical training recalled more words than the untrained students. After 30-minute delays, the trained boys also retained more words than the control group. No statistic significant difference was found in terms of memory. Verbal learning performance was in direct proportion to the duration of musical training.

Ho et al. (2003) found significant verbal memory enhancement in even shorter durations of musical training, i.e., fewer than six years. More training during childhood may be even better because of a "greater extent of cortical reorganization in the left temporal region," and thus enhance verbal learning ability. In musical other words, training stimulates the left brain, which will enhance the designated functions,

such as verbal learning.

In a follow up study, Ho et al (2003) had followed up a year later with the 45 orchestra students, in which 33 boys were still in the program and 9 had dropped out fewer than three months after the first study. They compared this group with a third group of 17 children who had started music training after the initial assessment (beginner group). The beginner's group initially had shown significantly lower verbal-learning ability than the musically more trained boys. However, one year later, these boys demonstrated significant improvement in verbal learning and retention abilities. However, those who terminated their music training within 3 months (the dropouts) showed no further improvement. It is interesting to note that although the dropouts did not show continuous improvement in their verbal memory performance, their verbal memory remained stable after a year. In other words, their improvement in verbal ability did not backtrack.

The researchers proposed that music training during childhood might serve as a kind of sensory stimulation that somehow contributes to the reorganization/better development of the left temporal lobe in musicians, which in turn facilitates cognitive processing mediated by that specific brain area, including verbal memory. This concept is parallel to the idea suggested by Rauscher et al. (1997), who proposed that music training modifies the brain area responsible for spatiotemporal reasoning and piano lessons will improve such specific tasks. At the same time, Chan noted that it's too simplistic to divide brain functions (such as music) strictly into left or right, because "our brain works like network system, it is interconnected, very cooperative and amazing."

Most importantly, the findings of this study seem to suggest that specific experience (e.g., music training) might affect the development of memory in a predictable way in accordance with the localization of brain functions - that is, modification of the left temporal lobe, thus facilitating verbal memory, but not the visual memory. This suggests that experience might affect the development of cognitive functions in а systematic fashion. More research is needed, but knowledge of this mechanism can stimulate further investigation into ways to enhance human brain functioning and to develop a blueprint for cognitive rehabilitation, such as using musical training to enhance verbal memory.

Original article: Ho, Y.C., Cheung, M. C., & Chan, A. S. (2003). Music training improves

verbal but not visual memory: cross-sectional and longitudinal explorations in children, *Neuropsychology*, 17, 439 – 450.)

(Reported by Maggie Wong, Clinical Psychologist)

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Bremner, J. D., & Narayan, N. (1998). The effects of stress on memory and the hippocampus throughout the life cycle: Implications for childhood development and aging. Developmental and Psychopathology, 10, 871 – 885.

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Dawson, G., Ashman, S. B., & Carver, L. J. (2000). The role of early experience in shaping behavioral and brain development and its implications for social policy. Development and Psychopathology, 12, 695 – 712.

Rauscher, F. H., Shaw, G. L., Levine, L. J., Wright, E. L., Dennis, W. R., & Newcomb, R. L. (1997). Music training causes long-term enhancement of preschool children's spatial-temporal reasoning. Neurological

Research, 19, 2-8.

# The Effects in Cognitive functions of Patients with NPC after Radiotherapy

Nasopharyngeal carcinoma (NPC) is one kind of cancer that is relatively common in South-East Asia, and about 1000 people in Hong Kong are diagnosed to have this illness every Radiotherapy is the primary vear. treatment for NPC in which a high dosage of radiation is delivered to the brain. Most patients concern if such a high dosage of radiation may affect functions their brain (including memory, language). One study conducted at the Chinese University of Hong Kong (Cheung et al., 2000) research results showed that only patients with brain lesion, which but not those without brain lesion. demonstrated significant cognitive impairment including memory and language deficits. Thus, the results seem to suggest that radiotherapy per se does not seem to cause deficits. cognitive Cognitive impairment is more likely to occur if radionecrosis is occurred. However, radiotherapy will cause the development of edema or cysts in patients, and cognitive some functions are found to be impaired in

these patients. Therefore, it is important to reduce the chance to have edema after radiotherapy. In another follow-up study by the same group for research (Cheung et al., 2003) showed that the age at completion of radiotherapy significantly predict the volume of radionecrosis if it occurs. It seems that the younger the patients the complete radiotherapy, the probability developing significant radionecrosis will be lower. In a recent study. Chan and her colleagues (Chan et al., in press) reported that Vitamin E has a positive effect on improving the cognitive function of patients with neuropsychological deficits due to radiotherapy.

(Contributed by Prof. Agnes S. Chan)

#### References:

Cheung, M. C., Chan, A., Law, S., Chan, J., & Tse, V. (2000). Cognitive function of nasopharyngeal carcinoma patients with and without temporal lobe radionecrosis. *Archives of Neurology*, 57, 1347-1352.

Cheung, M. C., Chan, A., Law, S. C., Chan, J. H., & Tse, V. K. (2003) Volume of radiation brain injury correlated with the severity of cognitive dysfunction in patients following radiotherapy for nasopharyngeal carcinoma, <u>Cancer</u>, 97, 2019-2026. Chan, A., Cheung, M. C., Law, S. C., & Chan, J. H., (in press) Phase II study of Alpha-Tocopherol in improving the cognitive function of patients with temporal lobe radionecrosis, <u>Cancer</u>

# Compensatory Memory Training

Numerous past studies evidenced that compensatory memory training could be effective for subjects with mild memory impairments. This training in compensatory strategies includes rehearsal, organizational skills, visual imagery, verbal labeling, semantic elaboration. prospective memory, formation. acronym mnemonic techniques, or adopting external compensatory aids such as computers, pagers, or notebooks. Of note, the effective use of memory notebooks may require extensive, structured training and attention to subjects' emotional and social acceptance of such use. The evidence also suggests that memory remediation is most effective when subjects are fairly independent in daily function. are actively involved in identifying the memory problem to be treated, and are capable and motivated to continue active, independent strategy use.

In contrast, specific interventions directed at facilitating the acquisition of

skills specific and domain-specific knowledge rather than improving memory functioning per se, can be effective for subjects with moderate to severe memory impairments. For instance, teaching the application of specific learning techniques and external memory aids to assist with the and acquisition performance of functional work skills. Given the of their evidence potential direct application to functional activities. specific interventions could possibly facilitate more independent living of subjects with moderate to severe memory impairments.

However, there still no evidence exists to support the effectiveness of any cognitive remediation to restore memory function in subjects whose memory functions have been severely impaired.

(Contributed by Sophia Sze, Clinical Psychology Trainee, Chinese University of Hong Kong)