Quadrant II – Transcript and Related Materials

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Unit: III – Cognitive Development

Module Name: Middle Adulthood: Expert Cognition, Expertise and Age – Part 01

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Notes

MIDDLE ADULTHOOD: EXPERT COGNITION, EXPERTISE AND AGE

Intelligence

The possible changes in intelligence in middle adulthood focuses on the concepts of fluid and crystallized intelligence, the Seattle Longitudinal Study, and cohort effects.

Fluid and Crystallized Intelligence: - John Horn argues that some abilities begin to decline in middle age while others increase. Horn maintains that crystallized intelligence, an individual's accumulated information and verbal skills, continues to increase in middle adulthood, whereas fluid intelligence, one's ability to reason abstractly, begins to decline in the middle adulthood years.

Horn's data were collected in a cross-sectional manner. A cross-sectional study assesses individuals of different ages at the same point in time. For example, a cross-sectional study might assess the intelligence of different groups of 40-, 50-, and 60-year-olds in a single evaluation, such as in 1980. The 40-year-olds in the study would have been born in 1940 and the 60-year-olds in 1920—different eras that offered different economic and educational opportunities. The 60-year-olds likely had fewer educational opportunities as they grew up. Thus, if we

find differences between 40- and 60-year-olds on intelligence tests when they are assessed cross-sectionally, these differences might be due to cohort effects related to educational differences rather than to age.

By contrast, in a longitudinal study, the same individuals are studied over a period of time. Thus, a longitudinal study of intelligence in middle adulthood might consist of giving the same intelligence test to the same individuals when they are 40, 50, and 60 years of age. As we see next, whether data on intelligence are collected cross-sectionally or longitudinally can make a difference in what is found about changes in crystallized and fluid intelligence and about intellectual decline.

The Seattle Longitudinal Study: - The Seattle Longitudinal Study that involves extensive evaluation of intellectual abilities in the adulthood years was initiated by K. Warner Schaie (1994, 1996, 2005, 2010, 2011). Participants have been assessed in seven-year intervals since 1956: 1963, 1970, 1977, 1984, 1991, 1998, and 2005. Five hundred individuals initially were tested in 1956. New waves of participants are added periodically. The main focus in the Seattle Longitudinal Study has been on individual change and stability in intelligence, and the study is considered to be one of the most thorough examinations of how people develop and change as they go through the adulthood years.

The main mental abilities tested are vocabulary (ability to understand ideas expressed in words), verbal memory (ability to encode and recall meaningful language units, such as a list of words), number (ability to perform simple mathematical computations such as addition, subtraction, and multiplication), spatial orientation (ability to visualize and mentally rotate stimuli in two- and three-dimensional space), inductive reasoning (ability to recognize and understand patterns and relationships in a problem and use this understanding to solve other instances of the problem) and perceptual speed (ability to quickly and accurately make simple discriminations in visual stimuli).

The highest level of functioning for four of the six intellectual abilities occurs in the middle adulthood years. For both women and men, peak performance on verbal ability, verbal memory, inductive reasoning, and spatial orientation was attained in middle age. For only two of the six abilities—number and perceptual speed—were there declines in middle age. Perceptual speed showed the earliest decline, actually beginning in early adulthood. Interestingly, in terms of John Horn's ideas, for the participants in the Seattle Longitudinal Study, middle age was a time of peak performance for some aspects of both crystallized

intelligence (verbal ability) and fluid intelligence (spatial orientation and inductive reasoning). The decline in functioning for most cognitive abilities began to steepen in the sixties, although the decline in verbal ability did not steepen until the mid-seventies. From the mid-seventies through the late eighties, all cognitive abilities showed considerable decline.

When Schaie (1994) assessed intellectual abilities both cross-sectionally and longitudinally, he found decline more likely in the cross-sectional than in the longitudinal assessments. For example, when assessed cross-sectionally, inductive reasoning showed a consistent decline in the middle adulthood years. In contrast, when assessed longitudinally, inductive reasoning increased until toward the end of middle adulthood, when it began to show a slight decline. In Schaie's view, it is in middle adulthood, not early adulthood, that people reach a peak in their cognitive functioning for many intellectual skills.

In further analysis, Schaie (2007) recently examined generational differences in parents and their children over a seven-year time frame from 60 to 67 years of age. That is, parents were assessed when they were 60 to 67 years of age; then when their children reached 60 to 67 years of age, they also were assessed. Higher levels of cognitive functioning occurred for the second generation in inductive reasoning, verbal memory, and spatial orientation, whereas the first generation scored higher on numeric ability. Noteworthy was the finding that the parent generation showed cognitive decline from 60 to 67 years of age, but their offspring showed stability or modest increase in cognitive functioning across the same age range.

The results from Schaie's study that have been described so far focus on average cognitive stability or change for all participants across the middle adulthood years. Schaie and Sherry Willis examined individual differences for the participants in the Seattle study and found substantial individual variations. They classified participants as "decliners," "stable," and "gainers" for three categories—number ability, delayed recall (a verbal memory task), and word fluency—from 46 to 60 years of age. The largest percentage of decline (31 percent) or gain (16 percent) occurred for delayed recall; the largest percentage with stable scores (79 percent) occurred for numerical ability. Word fluency declined for 20 percent of the individuals from 46 to 60 years of age. In Willis and Schaie's analysis, cognitively normal and impaired older adults did not differ on measures of vocabulary, spatial orientation, and numerical ability in middle adulthood. However, declines in memory (immediate recall and delayed recall),

word fluency, and perceptual speed in middle adulthood were linked to neuropsychologists' ratings of the individuals' cognitive impairment in late adulthood.

Some researchers disagree with Schaie that middle adulthood is the time when the level of functioning in a number of cognitive domains is maintained or even increases. For example, Timothy Salthouse (2009) recently concluded that cross-sectional research on aging and cognitive functioning should not be dismissed and that this research indicates reasoning, memory, spatial visualization, and processing speed begin declining in early adulthood and show further decline in the 50s. Salthouse (2009) does agree that cognitive functioning involving accumulated knowledge, such as vocabulary and general information, does not show early age related decline and increases at least until 60 years of age. Salthouse (2009) argued that a lower level of cognitive functioning in early and middle adulthood is likely due to age-related neurobiological decline. Cross-sectional studies have shown that these neurobiological factors decline in the 20s and 30s: regional brain volume, cortical thickness, synaptic density, some aspects of myelination, the functioning of some aspects of neurotransmitters such as dopamine and serotonin, blood flow in the cerebral cortex and the accumulation of tangles in neurons. Schaie continues to emphasize that longitudinal studies hold the key to determining age-related changes in cognitive functioning and that middle age is the time during which many cognitive skills actually peak. In the next decade, expanding research on age-related neurobiological changes and their possible links to cognitive skills should further refine our knowledge about age-related cognitive functioning in the adult years.

References

1. Santrock, J.W. (2011). Life Span Development. (13th Ed). New Delhi: Mc Graw-Hill College.