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# A cognitive function predicted method by Useful Field of View tests among elder people in Beijing

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## KEYWORDS

Age;  
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**Abstract** *Objective:* To analyze the visual functions of the elder people in China by Useful Field of View (UFOV) to verify performances in Chinese elders.

*Methods:* A total of 90 participants aged 60 years or above were recruited from residents in the Jade Senior Apartment and the Fuchengmen Public Health Community in Beijing. Participants completed three tests, Mini Mental State Examination (MMSE), Digit Span test and UFOV. We also tested the digit span and UFOV the following year.

*Results:* The correlation between age and MMSE score was significant ( $r = -0.422, P < .001$ ). Digit Span scores showed significant negative relationships for all three subtests ( $P < .01$ ) between ages. The scores of UFOV test 1 showed a non-significant correlation with age,  $r = 0.147, P > .1$ , while UFOV test 2 and UFOV test 3 showed significant positive relationships with ages, (both  $P < .01$ ). Thirty-nine participants (out of 90) finished the digit span and UFOV the following year. Only UFOV test 3 has a significant differential performance between two years ( $t = -2.95, P < .01$ ). We found UFOV tests showed the visual response capacity and had a strong correlation with ages (statistically significant).

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*Conclusion:* UFOV could be an effective way to evaluate cognitive ability in Chinese elderly people and the selective-attention test of UFOV may be a more sensitive measurement.

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## Introduction

China has entered the aging society in 1999. There are more than 17 million people who are 60 years and over in 2010.<sup>1</sup> A study demonstrated age-related declines in visual functions which were independent of disease (e.g., cataracts, glaucoma).<sup>2,3</sup> As the age increased, our brains loss cognitive functions such as memory. The Cognitive dysfunction has a strongest age-related correlation.<sup>4</sup> Prevalence of cognitive impairment was associated as factors among elderly Hong Kong Chinese aged 70 years and over.<sup>5</sup> A method, Useful Field of View (UFOV), was introduced to our study. UFOV is developed to reflect the visual difficulties with elder people in everyday tasks and assess order cognitive abilities.<sup>6,7</sup> After decades of modification, the UFOV provides a large range of potential applications from cognitive performances, diseases to everyday activities.<sup>8–11</sup> The population of elder people in China who drive was not reported, however, due to the fact of different situations and economic levels of the developing countries, less Chinese elder people can drive than developed countries'. The correlations between cognitive abilities and visual functions of Chinese elder people haven't been reported neither.

In the current study, we used three tasks. The first was Mini-Mental State Examination,<sup>12</sup> a short and widely used assessment, to measure age-related declines in cognitive ability. Recent literature has shown the benefits of assessing neuropsychological functioning as a measure of predictive driving behaviors. The assessment contains tests of orientation, immediate and delayed recall, backward spelling, object naming, repetition of a phrase, following a three stage command, sentence reading and comprehension, sentence writing, and design copying. Scores range from 0 to 30. The second was WAIS Digit Span<sup>13</sup> to measure working memory (i.e. short-term memory). The Digit Span test consists of three subtests, including Digits Forward, Digits Backward, and Digits Sequencing. In each subtest, participants were given a series of digits and required to repeat the digits in a certain manner. The last was UFOV, which includes three subtests, to examine age-related changes in attentional capacity. Test 1 measures how fast observers process visual information in the central visual field. Test 2 measures divided attention, which indicates the capacity of attending to more than one target at a time. This function is critical for individuals' safety and well-being. For example, an elder individual approaching an intersection may not be able to pay attention to the traffic light change when carrying on a conversation over the phone. Test 3 measures selective attention, which indicates the ability to focus attention on a particular stimulus in a complex display and ignore irrelevant distracters. Elder people have difficulties disengaging attention from

that stimulus in order to focus on another. For example, the older individual may focus too much on the road under foot, not noticing an upcoming cyclist across the street.

The purpose of the current study is, to validate the perceptual and cognitive assessments that are suitable and practicable for Chinese elder population. We firstly introduced UFOV to analyze the visual functions of the elder people in China. Correlations of visual and cognitive functions were recorded and analyzed statistically.

## Material and methods

### Ethical approval

This study was approved by the ethics committees of Beijing University of Traditional Chinese Medicine (No. 2015BZHLYL0159).

### Participants

Participants were recruited from residents in the Jiade Senior Apartment and the Fuchengmen Public Health Community in Beijing. Inclusion criteria were being 60 years of age or above, and speaking Mandarin. Exclusion criteria were institutionalization, sensory deficits (visual and hearing loss) of sufficient severity to interfere with neuropsychological testing, and pre-existing dementia. Those who had acute and a chaotic history of drug use or mental disorders were also excluded. A total of 90 healthy adults aged 60 years or above ( $M = 72.98$ ,  $SD = 7.492$ ) volunteered to participate in the study.

## Methods

### MMSE test

MMSE is a simple state examination. Participants who have no major problem of comprehension and memory can complete. It tests the cognitive function of the elder with a score ranging from 0 to 30 (maximum score). Orientation in time and space (items 1–10) is tested, as is memory (items 11–13), calculation (items 14–18), understanding (items 19–21) and constructive praxis (items 22–30).<sup>14–16</sup>

The experimenters accurately recorded participants' answers to each question, and then objectively assigned scores based on the standard scoring criteria.

### The digit span test

Digit-span is a memory span which is a common measure to test short-term memory. It is also a component of cognitive ability tests such as the Wechsler Adult Intelligence Scale

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