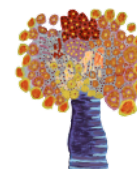




**29TH ECNP
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Programme of the 29th ECNP Congress - Vienna 2016

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Presentation No: P.1.1.001

Session title: Basic and clinical neuroscience - Other

Session type: Poster session

Effect of age and gender in association with spatial anxiety on navigation strategy preferences

C. Levay⁽¹⁾, X. Gonda⁽²⁾, B. Labadi⁽¹⁾

⁽¹⁾University of Pecs, Institute of Psychology, Pecs, Hungary

⁽²⁾Semmelweis University, Department of Psychiatry and Psychotherapy, Budapest, Hungary

Background: Spatial orientation is an outstanding human ability by which people perceive their positions in relation to the environment, enabling them to recognize themselves and identify their position on a cognitive map of an area [1]. People possess an internal representation, a mental map of the place and of their experiences which primarily serves navigational behaviour [2]. The two exploration strategies include orientation strategy (mainly applying Euclidean rules) and route-finding strategy (preferred signal stimuli). Choice of exploration strategy in a given situation is also impacted by affective and cognitive components [3].

Purpose: The present study investigated gender and age differences in navigation strategies and their association with map-using abilities and spatial anxiety.

Methods: 32 young adults (17 men, 15 women; mean age: 33.59 years) and 32 elderly persons (15 men, 17 women; mean age: 73.40 years) were assessed by City map (including Lynch's key elements to score the time of route detections; the spontaneous memory regarding orientation) and Country map (less structured containing greater distances with points of the compass and distance markers) tests for the exploration of the navigation strategies which were recorded orally. Participants also completed the Spatial Orientation

Questionnaire [4] (Path Detection Strategy Scale consisting of orientation strategy and route-finding strategy factors, Map Using Scale, Spatial Anxiety Scale). Statistical analyses were performed with SPSS 19.0.

Results: Women predominantly followed a route-finding strategy. Men, however, followed an orientation strategy when using a country map ($\chi^2 = 6.854$; $df = 2$; $p < 0.05$), and a route-finding strategy when using a city map ($\chi^2 = 2.952$; $df = 2$; $p > 0.05$). No differences in strategy were found between the age groups when using a city map as both groups used route-finding strategy ($\chi^2 = 4.738$; $df = 2$; $p > 0.05$). When using a country map, young people followed an orientation strategy, while the older age group followed a route-finding strategy ($\chi^2 = 14.080$; $df = 2$; $p < 0.01$). In map using [$F(1,64) = 13.828$; $p < 0.01$; mean/average difference = 1.451] and in speed of route detection [$F(1,63) = 16.623$; $p < 0.01$] men and young people overperformed women and elderly people. Young people scored higher in memorizing landmarks [$F(1,63) = 4.973$; $p < 0.05$] and spontaneous recalling [$F(1,63) = 23.244$; $p < 0.01$]. Spatial anxiety, more typical for the older age group [$F(1,64) = 18.286$; $p < 0.01$; mean/average difference = 46.014], worsened significantly the detection time ($r = 0.995^{**}$; $p < 0.01$) and had a negative effect on spontaneous memorizing of landmarks ($r = -0.228$; $p < 0.05$).

Discussion: Our results concerning age and gender differences in spatial navigation strategies correspond to previous data [5]. However, it is a novel finding that elderly subjects do not prefer abstract and Euclidian definitions in their navigation strategies. The background of the observed differences in navigation strategy preferences also in line with the literature and supported by our data include spatial anxiety and orientation experiences. Our results underline important differences in navigation strategies that could also be utilised in the development of support programs for the elderly. Future research should focus on the effect of social, economic and technological changes on gender and age differences in navigation strategy preferences.

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Disclosure statement: Xenia Gonda is recipient of the Janos Bolyai Research Fellowship of the Hungarian Academy of Sciences.

Keywords:

Ageing

Anxiety

Miscellaneous: basic