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FACTORIAL STRUCTURE OF SPATIAL ABILITIES IN RUSSIAN AND CHINESE STUDENTS

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Spatial abilities (SA) are a robust predictor of STEM success and other life outcomes. A recent study of United Kingdom adults has suggested that SA has a unifactorial structure (Rimfeld et al., 2017). It remains unknown whether the structure of spatial ability is the same across different cultures. This study explored the factorial structure of spatial abilities in samples of 921 Russian, 229 Chinese and 839 United Kingdom university students. The same gamified spatial abilities battery (King's Challenge) as used in Rimfeld and colleagues (2017) was administered to all participants. The battery consists of 10 different domains of SA, including 2D and 3D visualization, mental rotation, spatial pattern assembly, spatial relations, spatial planning, mechanical reasoning, spatial orientation and spatial decision making speed and flexibility. The results of the factor analysis showed a somewhat different pattern for different samples. In the Russian sample, the Unifactorial structure, shown previously in the UK sample was replicated. A single factor explained 40% of the variance, similar to 42% explained in Rimfeld et al. (2017). In the Chinese sample two factors emerged: first factor explained 26% of the variance and the second factor, including only Mechanical reasoning and Cross-Sections tests, explained 14%. The results also showed that the Chinese sample significantly outperformed both Russian and the UK smples in 5 subtests (Cross sections, Pattern assembly, Mechanical reasoning, Paper folding and Shape rotation). Russian and UK students outperformed Chinese students in Elithorn mazes, 3D drawing and Perspective taking. In addition, Russian students outperformed the UK students in mechanical reasoning. The effects of all group comparisons were small. The findings are discussed in the context of methodological limitations, as well as potential cultural and educational differences among countries.