

## Investigation of the Cognition Factors of Fire Response Performances Based on Survey

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**Abstract :** The design of an indoor navigation system for fire evacuation support requires not only physical feasibility but also a relatively thorough consideration of the human factors. This study has taken a survey to investigate the fire response performances (FRP) of the indoor occupants in age of 20s, virtually in an environment for their routine life, focusing on the aspects of indoor familiarity (spatial cognition), psychological stress and decision makings. For indoor familiarity, it is interested in three factors, i.e., the familiarity to exits and risky places as well as the satisfaction degree of the current indoor sign installation. According to the results, males have a higher average familiarity with the indoor exits while both genders have a relatively low level of risky place awareness. These two factors are positively correlated with the satisfaction degree of the current installation of the indoor signs, and this correlation is more evident for the exit familiarity. The integration of the height factor with the other two indoor familiarity factors can improve the degree of indoor sign satisfaction. For psychological stress, this study concentrates on the situated cognition of moving difficulty, nervousness, and speed reduction when using a bending posture during the fire evacuation to avoid smoke inhalation. The results have shown that both genders have a similar mid-level of hardness sensation. The females have a higher average level of nervousness, while males have a higher average level of speed reduction sensation. This study has assumed that the growing indoor spatial cognition can help ease the psychological hardness and nervousness. However, it only seems to be true after reaching a certain level. When integrating the effects from indoor familiarity and the other two psychological factors, the correlation to the sensation of speed change can be strengthened, based on a stronger positive correlation with the integrated factors. This study has also investigated the participants' attitude to the navigation support during evacuation, and the majority of the participants have shown positive attitudes. For following the guidance under some extreme cases, i.e., changing to a longer path and to an alternative exit, the majority of the participants has shown the confidence of keeping trusting the guidance service. These decisions are affected by the combined influences from indoor familiarity, psychological stress, and attitude of using navigation service. For the decision time of the selected extreme cases, it costs more time in average for deciding to use a longer route than to use an alternative exit, and this situation is more evident for the female participants. This requires further considerations when designing a personalized smartphone-based navigation app. This study has also investigated the calming factors for people being trapped during evacuation. The top consideration is the distance to the nearest firefighters, and the following considerations are the current fire conditions in the surrounding environment and the locations of all firefighters. The ranking of the latter two considerations is very gender-dependent according to the results.

**Keywords :** fire response performances, indoor spatial cognition, situated cognition, survey analysis

**Conference Title :** ICSCCS 2020 : International Conference on Spatial Cognition and Cognitive Science

**Conference Location :** Madrid, Spain

**Conference Dates :** March 26-27, 2020