River Shape Design for Promoting Early Evacuation in Virtual Reality

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Abstract

Flood disasters have become more serious due to extreme weather in Japan. The record-breaking heavy rainfall in July 2018 caused huge damages in the western Japan due to landslide and river flooding. Evacuation is expected to be effective and feasible measures to avoid flood disasters. However, many people do not follow evacuation orders and fail to evacuate. This is possibly because they are affected by "status quo bias." It is a tendency that people prefer keeping current condition to taking any actions especially when they face difficult problems. The status quo bias may prevent people from starting evacuation. For overcoming status quo bias, previous studies revealed that perception of a large and rapid change of situation is effective. Thus, we can propose a nudge that river shape is designed to make river width rapidly quite wider when river water lever get over certain flood danger level. It is expected to change people's mindsets from normal mode to alarm mode at such timing.

This paper investigated effect of this nudge for promoting evacuation. We constructed two virtual circumstances along a river in Virtual Reality (VR). One is a baseline where river width gradually get wider as water level increases. The other is our nudge. Evacuation experiments were implemented with VR where subjects were asked to choose timing of their evacuation under one of two circumstances randomly chosen. We found that our nudge encouraged them to evacuate sooner compared to the baseline.