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Is metacognition indispensable for decision-making in design?

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Abstract

This paper presents a theoretical and methodological description of metacognition in architectural design. In a design task, participants were required to think aloud and report confidence levels in judgment at equal intervals over the course of design. Their verbal protocols were transcribed into semantic data. This was further coded into declarative, conditional, and procedural metacognition. The semantic data was further modelled into a linkograph, and few measures such as centrality betweenness, entropy and number of critical design moves (distinguishing clusters of design moves that link distant actions) as measures or indicators of metacognition. Evidence on metacognition indicates potentials for a higher order understanding of causalities and consequences of design actions. Confidence levels reported by participants were further modelled to highlight how and when architects operationalize metacognition at different degrees of confidence to navigate and switch between different problem spaces. The semantic data was further coded in terms of design constraints, and design constraints were modelled into knowledge graphs, in order to expose how architects navigate the conceptual problem space, and selectively utilize knowledge to construct the solution space. This type of coding would enable us to judge on whether metacognition is indispensable for problem solving in design, and how far confidence levels are deterministic in terms of number and range of problems solved within each design episode. An understanding of the role of metacognition and confidence levels in design would enable us to discursively illuminate the parts-whole structure of problem decomposition and solution synthesis that characterizes design activity.