Risk theory: From perception to cognition

GA, UNITED STATES, September 10, 2025 /EINPresswire.com/ -- The paper proposes a generic risk theory that treats risk as information produced by human cognition. It introduces a quantitative descriptive model linking spontaneous risk perception and analytical risk cognition through disparities between target and realistic value expectations, outlines conditions for when perception occurs, and connects the framework to decision-making and potential AI-enabled implementations.

Risk response decision-making process.
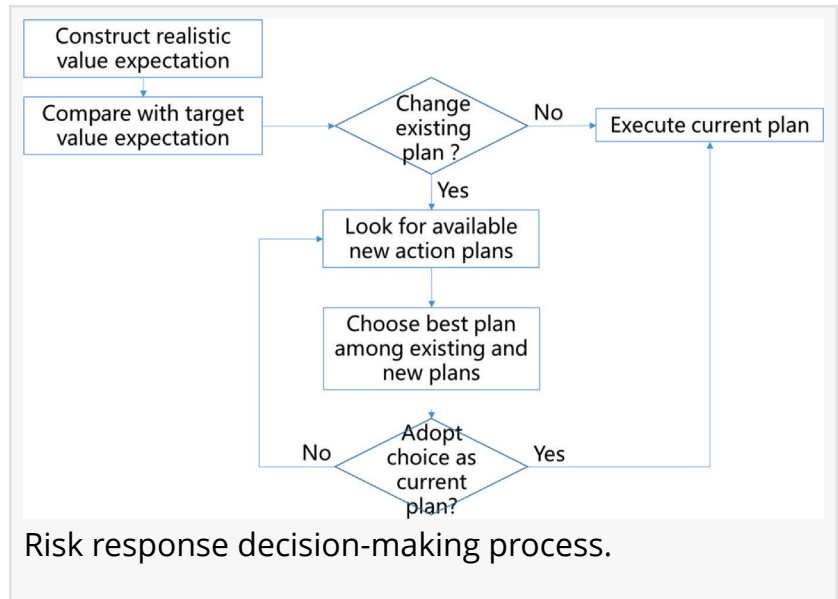
The concept of risk plays a central role in modern society, evident from its wide application in daily life. A quick internet search for "risk" yields millions of results, and the term has become part of everyday speech, used casually in informal conversations and extensively in formal contexts.

Institutions publish annual "Top Ten Risks" lists, and universities offer numerous courses on risk management. Entire journals, professional groups, and academic forums are devoted to the topic. The term also appears frequently in laws, regulations, and policy guidelines, with common expressions such as "guard against financial risks," "control security risks," and "make decisions based on estimated risks."

In a new study published in KeAi's journal Risk Sciences, sole author Duojia Lu proposed a unified, quantitative framework for understanding risk as a product of human cognition. "Risk is information produced by human thinking," says Lu. "More precisely, risk is the product of a specific human cognitive process."

At its core is a descriptive model that connects two stages—risk perception (often spontaneous and intuitive) and risk cognition (conscious and analytical)—through the disparity between target value expectations and realistic value expectations.

"This risk model can be used to describe most risks seen in real life with a unified underlying

logic," explains Lu. "It specifies necessary and sufficient conditions for risk perception and emphasizes that the evaluation of risk involves both global and local assessments of value disparity."

Additionally, it highlights the role of stakeholders: only self-aware stakeholders who sense the impact of risk on their own values can transform perception into cognition and make rational response decisions.

"This work of mine is based on quantitative, grounding elements "from risk perception to risk cognition" in formal logic and probability, which makes many questions computational," says Lu. "It also points to implementation pathways: LLMs alone are not proper for the implementation, but they can be combined with other AI technologies such as probabilistic knowledge graphs to provide more dynamic estimates of probability distributions."

In sum, the framework clarifies definitions and misconceptions across domains, including finance, environmental eesources management and security, and aligns with decision science to open doors to AI-enabled risk management.

References
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