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Plurivalent Logic for Multi-Agent Systems

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Dynamic Epistemic Logic is versatile in knowledge representation, however, its Kripke semantics requires a huge number of possible worlds, and furthermore, the combinatorial number of access relations complicates the description and is not intelligible. On the contrary, sometimes we need more to express; e.g, we want to distinguish between legible information and illegible one, and so on. To solve such problems, we employ many-valued logic to the multi-agent system. We extend the semantics of epistemic logic to 4-valued one to distinguish the public propositions and private propositions. Plurivalent Logic provides multiple valuation functions; one strictly refers to logical truth and so do others to various agent's epistemic states. Therefore the logic simply simulates epistemic logic with a pair of truth values. Furthermore, paired semantics can simulate classical logic, weak Kleene logic, and paraconsistent Kleene logic, with simple designated-value changes.