'Upgrades' and 'Updates': from Degrees of Belief to the Dynamics of Epistemic Logic

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While standard epistemic logic described agents' knowledge states in some fixed situation, the Dynamic Turn' (Van Benthem) in the 1980s which also showed in AI and in linguistics, turned to belief revision theories and dynamic semantics, considering what holds, or what is known at different points of time. Along the lines of Ruzsa's intensional logic we should make a distinction between change of belief and change of the world, which has a consequence for the meaning of 'updates' of epistemic states and 'upgrades' of measures of uncertainty. In light of recent results in Dynamic Epistemic Logics we characterize epistemic updates as dynamic models of change in epistemic states as a result of epistemic actions (observation, learning, communication), and doxastic upgrades as changes in reasoning, (e.g., algorithms in game theoretic settings, revisions of plausibility or preference change), and argue for an extended framework and interpretation of multi-agent dynamic modal logics. The moral of the review of various approaches to 'update' and 'upgrade' logics is: the dynamic representation of agents' epistemic possibilities over factual changes remains a crucial question of the semantics of knowledge.

For Imre Ruzsa the semantic analysis of 'knowledge' was a major motivation for the development of modal logic. As one of the path-finders of probability logic, he was also interested in measures of belief in addition to formal representations of objective probability. He was aware of the limitations of Hintikka's epistemic logic that modeled static situations. Reconsidering some historical approaches to model epistemic events in probability logic, game theory and in linear-time temporal logics, I show that Ruzsa's ideas can be considered as forerunners of some important independent developments in modal and measure theoretic representations of epistemic concepts.