Variety and Experience: Learning and Forgetting in the Use of Surgical Devices

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Abstract:
A tremendous variety of medical devices is available to surgeons today. In this environment, a surgeon’s ease in using a device version that he has never previously used has important implications for cost and quality. Further, high device variety increases the time gap between repeat uses of any particular device version by a surgeon. This can result in forgetting over time of device-version-specific knowledge. While forgetting is inevitable, the impact of such forgetting over time at the level of specific tasks has not been examined previously. We use a unique, hand-collected dataset to examine learning and forgetting in hip replacement surgery as a function of a surgeon’s experience with specific surgical device versions and the time between their repeat uses. We also develop a generalizable method to correct for the left-censoring of device-version-specific experience variables that is a common problem in highly granular experience data, using MLE with simulation over unobservables conditional on observables. Even for experienced surgeons, the first use of certain component versions can result in about a 26% increase in surgery duration, hurting quality and cost. Also, with the passage of time, surgeons forget knowledge gained about the use of certain components. A three-month time gap between repeat uses of a component version in surgery can result in about a 50% drop in the time saving gained from past experience. We discuss implications for practice.

Bio:
Professor Kamalini Ramdas is an expert in the innovation arena. Her current research examines new ways to create value through innovation, including: service innovation, operational innovation and business model innovation. She has also examined the amount of product variety and component-level variety that firms should offer, and how variety can be managed effectively through design.
She has served as co-principal investigator on a $1.2M grant to model and implement profitable cardiac preventive care via delivery innovation. She has also examined delivery innovation in an array of service industries supported by a grant from the UK Economic and Social Research Council.

Professor Ramdas’s work has been published in Management Science, Manufacturing & Service Operations Management, Harvard Business Review, and other journals. She has served as Departmental Editor of the Entrepreneurship & Innovation Department of Management Science.

Her expertise has seen her consult on innovation and operations management in a variety of industries, including healthcare, telecoms, consumer packaged goods and assembled products. She teaches a course on Business Model Innovation, as well as courses on Entrepreneurship, Operations Management, and Empirical Research Methods. She has taught at the University of Virginia, University of Texas at Austin, The Wharton School, and the Indian School of Business, Hyderabad.