Operationalizing Inferential Efficiency in Dialogue: A Resource-Rational Framework for Pragmatic Inference

Kiran Pala

University of Eastern Finland, Kuopio, Finland

Abstract

Pragmatic inference, the recovery of a speaker's intended meaning beyond literal words, is central to everyday conversation, yet it is typically evaluated by accuracy alone. We propose a resource-rational framework that characterizes inferential efficiency along three dimensions: response latency (computational cost), accuracy, and prior reliance (the weight on experiential knowledge vs. linguistic evidence). The framework is grounded in a geometric model that decomposes meaning into spatial, temporal, and experiential properties, and employs the Parts of Sense Inference (POSI) tags to quantify experiential priors. Its cross-linguistic validity is demonstrated with examples from English, Malayalam, Tamil, Hindi, and Finnish. An efficiency space reveals trade-offs among speed, accuracy, and prior dependence, captured by a scalar efficiency index. A computational simulation shows that three distinct inferential profiles (efficient, effortful, prior dependent) emerge naturally from bounded optimality. This account reframes variability in pragmatic reasoning as systematic adaptation, offering a bridge between formal semantics, dual process theory, and clinical applications.

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