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by [Fahad Abdallah](#) - Tuesday, 26 August 2025, 7:05 PM

The proliferation of multi-agent systems (MAS) in artificial intelligence has shown the utility of structured communications. Agents must not only be able to exchange data but also represent intentions, goals, and commitment. ACLs, especially the Knowledge Query and Manipulation Language (KQML), were developed to satisfy this need, whose protocol is based on speech act theory (Warstadt & Bowman, 2022). In contrast with regular programming calls, ACLs strive to reflect the semantics of interaction and not its syntax. The best advantage of ACLs is that they limit a heterogeneous environment. Agents programmed in various programming languages or developed to run on multiple systems will be able to interact with each other, provided that they work under the same communication standard (Kim et al., 2024). Besides that, ACLs can be semantically rich, because messages are performatives (except inform and request), such as converse or play-game, and the agent's intent is expressed (Zhang et al., 2024). Along with their advantages, ACLs have practical drawbacks. They impose the need to do meaningful reasoning on the agents, increasing the computational complexity. Besides, communication cannot be done without a shared ontology; otherwise, semantic inconsistency will arise. ACLs have overhead over lightweight calls and are therefore less applicable in real-time or performance-sensitive applications (Belda-Medina & Calvo-Ferrer, 2022). These limitations are why ACLs are still more typical in scholarly experimentation than commercial purposes, in which simpler mechanisms, such as an API or message queues, are more common. Calling methods in Python or Java is a straightforward, efficient, and predictable method of communication between software components. It is ideal for tightly coupled systems. ACLs, in turn, are preferable in open dynamic environments where agents are autonomous and require the interpretation of the goals of other agents (Liu et al., 2024). This generates some form of trade-off whereby method invocation is good in speed and ACLs are good in flexibility and knowledge-level communication.

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