Peer Response

by Ali Yousef Ebrahim Mohammed Alshehhi - Tuesday, 2 September 2025, 1:45 AM

Thanks Saleh for your brief and organized post. I think you did a great job on showing how ACLs like KQML are based on speech act theory, which places semantic richness at a higher regard than more rudimentary modes of communication. I also appreciated your explanation of applying them in real-life contexts like supply chains and e-commerce, which shows that research in agents can apply, somewhat directly, to real-world and large systems.
There is a part of your post that I think could be developed a little further, which is the discussion of performance constraints. You mention that parsing and interpreting performatives is resource intense, and that puts a serious constraint on using ACLs, natural language or not. An interesting angle here is to consider the idea of scalability - in very large systems, overhead involved in reasoning about a message can greatly reduce the throughput. One means researchers have addressed such issues is by designing hybrid architectures that use lightweight communication for routine tasks and leave the use of ACLs for more complicated negotiations (Singh and Huhns, 2005). If you also considered such mechanisms you could further support your point on efficiency.
I also agree with your comparison of ACLs and method invocation.Another perspective to consider is trust and openness. Method invocation, by definition, assumes a controlled and cooperative environment; ACLs were designed to face trust-related and reject obstacles in situations where agents may not trust another agent completely or might have conflicting goals and objectives (Jennings, Sycara and Wooldridge, 1998). This also provides another rationale for why ACLs have more value, regardless of their complexity.
In general, I have found your argument to be thought-provoking and practical. By simply implying how some weaknesses of ACLs could be addressed, your post would present a more balanced conclusion on the place of ACLs in regards to the use of multi-agent systems.

References
Jennings, N.R., Sycara, K. and Wooldridge, M. (1998) 'A roadmap of agent research and development', Autonomous Agents and Multi-Agent Systems, 1(1), pp. 7–38.
Singh, M.P. and Huhns, M.N. (2005) Service-oriented computing: Semantics, processes, agents. Chichester: Wiley.

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Peer Response

by Abdulrahman Alhashmi - Thursday, 4 September 2025, 10:45 AM

Saleh, your post offered great insights. It clearly explained KQML's theory. You focused on meaning and context in agent talk. Your point was that KQML goes beyond just sending messages. It builds meaning into conversations. This is vital for different systems working together. This helps them connect. It's a big plus for areas like online shopping. It also helps supply chains. Agents on different systems must work well. (Singh and Huhns, 2005).

Your point about computing cost and difficulty is vital. Advanced thinking needs significant system power. As you noted, slow speed can prevent real-time use. This often makes calling Python or Java methods seem better. This is true where predictable and fast action is key.(Bellifemine, Caire and Greenwood, 2007).

Ontologies are crucial for effective ACLs. A common vocabulary prevents confusion and communication errors (Wooldridge, 2009). Method invocation offers a simpler approach. This clarity avoids ambiguity but sacrifices adaptability.

The comparison reveals no single answer. ACLs grant independence and scale in open systems. Method calls work best in unified, linked systems. Future study could explore mixed systems. These would blend ACLs' deep meaning with method calls' speed.

The examination effectively highlights the main discussion. It also prompts consideration of real-world uses.

References

Bellifemine, F., Caire, G. and Greenwood, D., 2007. Developing multi-agent systems with JADE. John Wiley & Sons.

Singh, M.P. and Huhns, M.N., 2005. Service-oriented computing: semantics, processes, agents. John Wiley & Sons.

Wooldridge, M., 2009. An introduction to multiagent systems. 2nd ed. Wiley.

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Peer Response

by Martyna Antas - Sunday, 28 September 2025, 9:30 PM

Saleh, thank you for your meaningful contribution. I found your post both clear and practical, especially in the way you linked the theoretical basis of ACLs in speech act theory to applications such as e-commerce and supply chains. I also share Abdulrahman's view that the computational cost you mention is a central issue, and like Ali I agree that efficiency deserves further reflection.

One perspective that could extend your post is the question of security. In open systems, inter-agent communication may be subject to manipulation or interception. Recent work has shown that adversarial strategies can disrupt the flow of information in multi-agent environments, particularly in LLM-based systems, which highlights the need for safeguards in protocol design (He et al., 2025). This suggests that the barriers to scalability are not just computational but also resilience related.

Another area worth considering is monitoring and accountability. While method calls can be logged and traced easily, it is more difficult to observe and verify the semantics of ACL-based interactions. Kaminka, Pynadath and Tambe (2001) proposed plan-recognition techniques based on "overhearing" agents, which remains an important line of thought for ensuring transparency in distributed communication.

Finally, I would have liked to see your perspective on how ACLs are evolving today. Ehtesham et al. (2025) discuss modern interoperability protocols such as the Model Context Protocol and the Agent Communication Protocol, which are designed to overcome some of the implementation and maintenance challenges you raise. Similarly, Charalambous and Pappas (2025) argue that goal-oriented communication can reduce overhead by ensuring that agents exchange only task-relevant content. Together, these perspectives suggest that efficiency and semantic richness need not be mutually exclusive

References:

Charalambous, T. and Pappas, N. (2025) *Toward goal-oriented communication in multi-agent systems: An overview*. arXiv preprint. Available at: https://doi.org/10.48550/arXiv.2508.07720 (Accessed: 28 September 2025)

Ehtesham, A., Singh, A., Gupta, G.K. and Kumar, S. (2025) *A survey of agent interoperability protocols: Model Context Protocol (MCP), Agent Communication Protocol (ACP), Agent-to-Agent Protocol (A2A), and Agent Network Protocol (ANP)*. arXiv preprint. Available at: **https://arxiv.org/abs/2505.02279** (Accessed: 28 September 2025)

He, P., Lin, Y., Dong, S., Xu, H., Xing, Y. and Liu, H. (2025) *Red-teaming LLM multi-agent systems via communication attacks*. Findings of the Association for Computational Linguistics. Available at: **https://aclanthology.org/2025.findings-acl.349** (Accessed: 28 September 2025)

Kaminka, G.A., Pynadath, D.V. and Tambe, M. (2001) *Monitoring teams by overhearing: A multi-agent plan-recognition approach*. Journal of Artificial Intelligence Research, 17, pp. 83–135. Available at: **https://arxiv.org/abs/1106.1816** (Accessed: 28 September 2025)

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Re: Initial Post

by Shaikah Salim Mohammed Alkhaayyal Alharthi - Monday, 13 October 2025, 3:53 PM

Your elaboration on the semantic intricacies and the collaborative potential of ACLs is congruent with the conceptual inception of KQML and the other languages. As you pointed out ACLs transcend the capabilities of mere message passing, as intention and context are incorporated within the communication of the agents, and it becomes a tool for reasoning an coordination. This ability, based on speech act theory, allows the agents to not only communicate one with another, but negotiate, plan, and act on the same agenda (Finin et al. 199 ACLs as collaborative problem-solving instruments within agent frameworks capture your description well, especially with the requisite autonomy and dynamism.

The issue you raised with regard to separation of ontologies and the problem of ACLs is perhaps one of the most problematic on the issue of scalability. Even in cases where agents adhere to the communication protocol as with KQML, the semantic and communication gaps, subsequently leading to breakdowns in communication, are well documented (Labrou a Finin 2000). I share your opinion on the JADE problem and hybrid frameworks i.e. JADE, as they serve as a useful link from a pragmatic standpoint. The focus of JADE on the combination of FIPA-ACL with traditional programming elements shows either side of the debate well, and the expectations of efficiency and the pragmatic side of message interchar are seemingly at odds. Indeed, the theory of agent autonomy hinges on the reasoning in message interchange as they preserve autonomy on message interchange (Bellifemine et a 2007).

In the same vein, the intricacy involved in the maintenance of full semantic reasoning might become a computational burden that limits scalability. As noted by Shaolong and Qiang (2010), the more resource-intensive components of parsing and interpreting performatives render ACLs impractical for systems that require high-speed or real-time operations. This the case where relevance of method invocation is retained—it balances predictability and efficiency, which is still a benefit in tightly coupled systems, even if reasoning is sacrificed.

Overall, your comment on hybridization is a testament to the focus of current inquiries: the integration of the semantic richness of ACLs with the straightforwardness of procedural communication in order to design agent systems that are both intelligent and efficient.

References

Bellifemine, F., Caire, G. and Greenwood, D., 2007. Developing multi-agent systems with JADE. John Wiley & Sons.

Finin, T., Weber, J., Wiederhold, G., Genesereth, M. et al., 1993. Specification of the KQML agent-communication. DARPA Knowledge Sharing Effort.

Labrou, Y.K. and Finin, T., 2000. History, state of the art, and challenges for agent communication languages. Informatik/Informatique.

Shaolong, Z. and Qiang, W., 2010. A Conversation Protocol Design between Heterogeneous Agents Using KQML. IEEE International Conference on E-Business and E-Government pp.1–4