An Application of Formal Topology to the Choice of Standards for a Reporting Language

Jack Stecher*

19 марта 2005 г.

The problem of information exchange among agents who see the world subjectively arises in many contexts, ranging from computer science [1] to linguistics [4] to financial accounting [2]. One aspect of this problem is the choice of whether to use a standardized terminology among all agents or to use different languages for different audiences; this has been of particular interest in international accounting contexts [3, 7].

This talk uses formal topology, in the original approach [5] and the "basic picture" approach [6], to model both an agent's subjective perceptions of given ontological states and an agent's private understanding of terminology in a given language. It turns out that an agent's perceptions are dual to the agent's use of the terminology. Conditions are then stated for two agents to use a language in the same way. A standardized language among a given set of agents is thus a language that all agents use in the same way; this is formalized as a cocone in an appropriate category.

In this framework, a trade-off emerges between the use of a standardized language and using decentralized communication. In general, less information can be exchanged in a standardized language, since parties engaged in communication are restricted to messages that all agents can correctly interpret. However, while decentralized communication increases the amount of information that agents can exchange, it does so at the cost of requiring messages to be passed through intermediaries.

Список литературы

[1] R. M. C. Ahn. *Agents, Objects, and Events: A Computational Approach to Knowledge, Observation, and Communication.* PhD thesis, Technische Universitiet Eindhoven, 2000.

[2] H. G. Avery. Accounting as a language. *The Accounting Review*, 28(1):83–7, 1953.

*Correspondence: Carlson School of Management—University of Minnesota, Department of Accounting, Room 3-122, 321–19 Avenue South, Minneapolis, MN 55455. E-mail: jstecher@csom.umn.edu

[3] E. Bartov, S. R. Goldberg, and M.-S. Kim. Comparative value relevance among german, u.s., and international accounting standards: A german stock market perspective. Working Paper, New York University, Grand Valley State University, and University of Missouri-Columbia, 2002.

[4] J. A. W. Kamp. A theory of truth and semantic representation. In J. Groenendijk and M. Stokhof, editors, *Formal Methods in the Study of Language*, pages 277–322. Mathematisch Centrum, 1981.

[5] G. Sambin. Intuitionistic formal spaces—a first communication. In D. G. Skordev, editor, *Mathematical Logic and Its Applications*, pages 187–204. Plenum, 1987.

[6] G. Sambin and S. Gebellato. A preview of the basic picture: A new perspective on formal topology. In *Types and Proofs for Programs*, volume 1657 of *Lecture Notes in Computer Science*, pages 194–207. Springer-Verlag, 1998.

[7] T. L. Wilkinson. Can accounting be an international language? *The Accounting Review*, 39(1):133–9, 1964.