quantifiers in linguistics) are typically underspecified with respect to specificity. Other quantifiers, for instance, the negative and positive strong quantifiers, are always specific.

Such a classification proved to be crucial in explaining other phenomena, e.g., in differentiating between readings like absolute and comparative readings of superlatives (cf. [2], [5]). (The importance of distinguishing between quantifiers which have a different grade of specificity has been emphasised in [1] on the basis of independent reasons (backward quantification).)

The possibility to ascribe an event splitting reading to (1) but (2)/(3) is a result of the features of specific quantifiers in this approach.

The explanation is extended to the cases with (temporal) frame adverbials. At the end, it is mentioned that some lexical features of the subject/predicate can block the event-related reading.

REFERENCES

[1] K. BIMBÓ, *Cross-sentential quantification*, paper presented at the 9th *International Congress of Logic, Philosophy and Methodology of Science*, Uppsala, Aug. 7–14, 1991.

[2] K. É. KISS, *On the comparative and absolute readings of superlatives*, manuscript, 1992.

[3] E. KAAN and S. DE MEY, *Krifka on event-related readings*, Kas & Reuland & Vet (eds.) *Language and Cognition I*, University of Groningen, Groningen, 1991, pp. 157–169.

[4] M. KRIFKA, *Four thousand ships passed through the lock: object induced measure functions on events*, ***Linguistics and Philosophy***, vol. 13 (1990), pp. 487–520.

[5] A. SZABOLCSI, (1983). *A specifikus/nem specifikus megkülönböztetésről*, ***Nyelvtudományi Közlemények*** 85.k. 83–91.oo.

MARK A. BROWN, *A logic of consensus and dissent.*

Philosophy Department, Syracuse University, Syracuse, New York 13244.

Given any group of people—a nation, a faculty, a club, a union—we find we sometimes have occasion to speak of the beliefs of the group. Of course we recognize that the individuals in the group will in general have different beliefs, that the beliefs of one individual may be in conflict with those of another, that even single individuals may have conflicting beliefs, and that for some purposes beliefs may reasonably be thought of as propositional rather than linguistic in character.

In this paper I present a modal logic of consensus and dissent appropriate to the description of group beliefs under such conditions. I develop a semantics based on possible worlds, with the propositional content of individual beliefs represented by sets of possible worlds. The set of beliefs held by an individual member of the group is represented by a set of propositions, i.e., a family of sets of possible worlds. The array of belief sets exemplified in the group is then represented by a set of families of sets of possible worlds.

In any model, at any world α, there will be a relevant set $\mathbb{R}\alpha$ of families of sets of worlds. The two most important modal operators of the system, $\Diamond_1$ and $\Box_2$, will have truth conditions as follows:

$$\alpha \models \Diamond_1 A \quad \text{iff} \quad (\exists \mathbb{P} \in \mathbb{R}\alpha)(\exists \mathbb{B} \in \mathbb{P})(\forall \beta \in \mathbb{B})[\beta \models A],$$

$$\alpha \models \Box_2 A \quad \text{iff} \quad (\forall \mathbb{P} \in \mathbb{R}\alpha)(\exists \mathbb{B} \in \mathbb{P})(\forall \beta \in \mathbb{B})[\beta \models A].$$

Thus, the formula $\Box_2 A$ can express the claim that it is the consensus of the group that A, i.e., that every person in the group holds some belief that entails that A. Dissent from A is expressed by $\Diamond_1 \neg A$.

Six other operators are available in the system, with truth conditions which result from varying the choice of metalinguistic quantifiers. Each has its apt interpretation and its uses in the system. Together they enable us to represent various subtleties about group belief that might otherwise go unnoticed and unappreciated.

A complete axiomatization is given.

ALEXANDER CHAGROV and MICHAEL ZAKHARYASCHEV, *The Sahlqvist formulas are not so elementary.*

Tver State University, Zhelyabova 33, 170013 Tver.

Institute of Applied Mathematics, Russian Academy of Sciences, MiussKaya 4, 125047 Moscow, Russia.

A normal modal logic L is a *Sahlqvist logic* if

$$L = K + \varphi_1 + \cdots + \varphi_n,$$

where all ϕ_i are Sahlqvist formulas. By Sahlqvist's Theorem [3], each such logic L is canonical, and so Kripke complete, and the class of frames for L is elementary. The following results show that Sahlqvist formulas have rather great expressive power.

THEOREM 1. *There is a Sahlqvist formula φ such that $S4 + \varphi$ does not have the finite model property.*

Note that a Sahlqvist formula ψ such that $K + \psi$ lacks the finite model property was found in [1].

THEOREM 2. *The class of Sahlqvist logics (even above K4) is undecidable. More exactly, there is no algorithm which, given a formula χ, can recognize whether $K4 + \chi$ is a Sahlqvist logic.*

Using Kracht's description of first-order equivalents of Sahlqvist formulas [2] one can probably show that the class of Sahlqvist logics above $S4$ is also undecidable, and there are a continuum of logics (even above $S4$) with infinite sets of Sahlqvist axioms.

However, we know nothing of the decidability of Sahlqvist logics.

REFERENCES

[1] G. E. HUGHES and M. J. CRESSWELL, ***A companion to modal logic***, Methuen, London, 1984.

[2] M. KRACHT, *How completeness and correspondence theory got married*, ***Colloquium on Modal Logic 1991*** (M. de Rijke, editor), Dutch Network for Language, Logic, and Information, 1992, Amsterdam, pp. 161–185.

[3] H. SAHLQVIST, *Completeness and correspondence in the first- and second-order semantics for modal logic*, ***Proceedings of the third Scandinavian logic symposium*** (S. Kanger editor), North-Holland, Amsterdam (1975), pp. 110–143.

ANTONINO DRAGO, *The debate on the introduction of constructive mathematics in theoretical physics.* Group of History of Physics, Department of Physical Sciences, University of Naples, I-80125, Naples, Italy.

The debate on the foundations of mathematics presented a basic choice on infinity, e.g., the acceptability or not of Zermelo's axiom. Since then several theoretical physicists, mathematicians, and logicians guessed that rather than classical mathematics, which involves actual infinity, a reduced mathematics would be more suitable for theoretical physics inasmuch it has to refer to operative means. A recent bibliography on the subject [1] offers one dozen titles. As an improvement, I offer a synthetic table where any one of about forty scholars is characterized by a synthetic statement.

By scrutinizing the development of this debate one may suggest four periods: 1880–1923, the starting period with isolated contributions but resulting from an interaction between mathematicians and physicists; 1923–1950, a difficult period, where still isolated contributions are offered but, moreover, from eterodox persons; 1950–1980, a period of improvement of constructive mathematics, while physicists appear as isolated in their certainties, except for very few ones; 1980– on, the period which starts with Field's proof, according to which science may avoid at all numbers, and then cumulates both many decisive—although limited—results and some bridging mathematical techniques, e.g., cellular automata. In general, one remarks that the issue progressed by means of the advancements obtained by constructive mathematicians rather than by physicists' activity. The former ones were able to characterize undecidable problems on differential equations and at last to offer a well-manageable mathematics (1967). In the same year Bishop first settled a crucial case in theoretical physics—i.e., ergodic theorem—by a negative answer. Next, some more results were obtained by means of constructive mathematics. Nevertheless, by ignoring previous contributions some physicists discuss—even in present years—the eventuality of a new relation between theoretical physics and constructive mathematics. Moreover, in the last years some new mathematical techniques, e.g., catastrophe theory, cellular automata, chaos, etc., are introduced; they may be meant as attempts for reducing the power of classical mathematics or even for obtaining almost-constructive results without formally committing themselves to constructive mathematics [2].

Here a method for introducing constructive mathematics in a positive way is offered [3]. It accepts any experimental law inasmuch its formula always is an approximated formula. Rather the qualitative differences of constructive mathematics w.r.t. classical mathematics concern the versions of the principles of a particular formulation of a theory. As a consequence constructive mathematics essentially severs the several formulations of a theory in two sets, those showing decidable principles and those including undecidable ones. Because their origins were committed to the infinitesimals, most formulations of any particular physical theory result to be undecidable in some of their principles. As a result, the study for introducing constructive mathematics in theoretical physics requires to collect and then to analyze all formulations of a given theory that have been offered in past times and possibly to invent