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Tamelo: Modern Logic in the Service of Law

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BOOK REVIEW

MODERN LOGIC IN THE SERVICE OF LAW. By Ilmar Tammelo. Springer-Verlag. New York 1978. Pp. 175.

It may be asked why a member of the legal community should have a background in (or even an understanding of) formal logic. If members of the legal community are concerned primarily with the art of persuasion, then a more practical background is rhetoric (or, for the more cynical, sophistry). However, the attorney not only must persuade but must also predict what a court, in the future, might decide. It is in light of making these predictions that an understanding of formal logic is beneficial (if not mandatory) for both the practitioner and the judge. One brief example will suffice to demonstrate the problems created by a failure to recognize the use of formal logic techniques.

In the landmark case, *International Shoe Co. v. Washington*,¹ the famous "minimum contacts" test was formulated as follows:

But to the extent that a corporation exercises the privilege of conducting activities within a state, it enjoys the benefits and protection of the laws of that state. The exercise of that privilege may give rise to obligations, and, so far as those obligations arise out of or are connected with the activities within the state, a procedure which requires the corporation to respond to a suit brought to enforce them can, in most instances, hardly be said to be undue.²

In attempting to determine the force of this passage, the following general principle appears reasonable.

If a corporation engages in business activity within a particular state, then that corporation will be deemed to have submitted to personal jurisdiction in that state for controversies arising from such activity.

This principle has been formulated as a conditional sentence. That is, a sentence of the form "if . . . , then" Whenever the antecedent portion is satisfied, there will be personal jurisdiction. Here, doing business within the state is said (by a logician) to be a sufficient condition for personal jurisdiction.

Another condition recognized by logic is the "necessary condition." Consider the conditions of "being unmarried" and "being a bachelor." The latter is sufficient for the former (if a person is a bachelor, then that person is unmarried) while the former is necessary for the latter (if a person is not unmarried, then that person is not a bachelor). It should be obvious that being a necessary condition is quite different from being a sufficient condition. (If a person is unmarried, is it guaranteed that that person is a bachelor? Certainly not if widowed and divorced persons are not bachelors.) Unlike a sufficient condi-

1. 326 U.S. 310 (1945).

2. *Id.* at 319.

tion, the satisfaction of a necessary condition will not guarantee the satisfaction of that for which it is said to be necessary. Rather, the absence of a necessary condition guarantees only the absence of that for which it is necessary. The point here is that the absence of a sufficient condition has no bearing on that for which it is sufficient, and the presence of a necessary condition has no bearing on that for which it is necessary.

Given this distinction (and the correctness of the formulation of the minimum contacts principle), one might be led to believe that a state court could appropriately exercise personal jurisdiction over a foreign corporation even in the absence of minimum contacts. However, such a belief would be incorrect given the reformulation of the minimum contacts test found in *Hanson v. Denckla*.³

However minimal the burden of defending in a foreign tribunal, a defendant may not be called upon to do so unless he has had the "minimal contacts" with that State that are a prerequisite to its exercise of power over him.⁴

Here, it appears clear that there can be no personal jurisdiction absent minimum contacts—minimum contacts are explicitly treated as a necessary condition.

While problems of personal jurisdiction will continue to plague first year law students, the examples provided above should suggest that some (if not most) confusion arising from judicial opinions (as well as from legislation) could be avoided if the writers of such opinions and of legislation employed some of the techniques which are available from formal logic.

Ilmari Tammelo, in *MODERN LOGIC IN THE SERVICE OF LAW*, presents a systematized method for applying the tools developed by formal logic to some of the problems faced by members of the legal community in both evaluating and creating arguments. Formal logic is primarily concerned with the study of the structural relationships which may or may not obtain between premises (which are reasons) and conclusions. From a formal point of view, the substance of an argument is immaterial. In addition to its formal aspect, legal reasoning, according to Tammelo, has a "zetetic" aspect the function of which is to, inter alia, determine the substance or content of legal principles.⁵ While Tammelo explicitly recognizes these various aspects of argumentation, this work is limited to applications of formal logic to legal argumentation—the reader who desires a quick course in the "art of persuasion" is directed to look elsewhere.

In coming to the book, the reader must leave any biases against symbols behind. While it may be possible to use fewer symbols than Tammelo em-

3. 357 U.S. 235 (1958).

4. *Id.* at 251. It should be noted that this passage cites the above quoted passage from *International Shoe*.

5. I. TAMMELO, *MODERN LOGIC IN THE SERVICE OF LAW* at 2-3 (1978).

ploy, it is certainly not possible to accomplish Tammelo's goal without them at all. To quote from the Preface,

A reader not accustomed to symbolic expressions (which of necessity abound in this book) is likely to experience aversion to them and may even ask whether legal logic *must* be *symbolic* logic. The answer is emphatically affirmative. There can be no efficiently workable logic without an extensive use of symbolic expressions as there can be no efficiently workable mathematics without them.⁶

Tammelo suggests that an acquaintance with some recent work on general logic is advisable.⁷ He is correct.

In addition to leaving behind one's prejudices against symbols, the reader must bring to the book an understanding of what formal logic is in order to avoid leaving with a feeling of bewilderment. To repeat, Tammelo is concerned here only with an analysis of structural (rather than substantive) problems. Finally, to appreciate Tammelo's contribution, his bifurcated account of legal reasoning (*i.e.*, structure versus content) must not be forgotten.

With these ground rules in mind, the reader can legitimately expect to take from MODERN LOGIC IN THE SERVICE OF LAW an appreciation of what benefits a formalized approach to legal reasoning can confer. These benefits, minimally, will take the form of an ability to apply Tammelo's techniques in solving certain legal problems. Moreover, by keeping the structure-content distinction in mind, the diligent reader can come away from this book with an ability to distinguish between the two types of errors, structural inadequacy and substantive inadequacy, and, hence, a capacity for identifying the proper approach to correcting (and avoiding) such errors.

Tammelo offers both a system of propositional logic⁸ and a system of predicate logic.⁹ Each system is introduced axiomatically. While this method of presentation may be readily understood by readers with a background in formal systems, most readers will probably find it difficult to work through the book without constant back reference. Additionally, Tammelo's choice of Polish notation appears unwise in that the vast majority of logic students (*i.e.*, those who have taken an undergraduate course in symbolic logic at some time) has not been exposed to such notation.¹⁰ Finally, Tammelo's extremely lim-

6. *Id.* at *x*.

7. *Id.* at *ix*.

8. Propositional logic concerns itself with the study of arguments whose basic elements are statements. For example: If today is Friday, then tomorrow will be Saturday. Today is Friday. Hence, tomorrow will be Saturday.

9. Predicate logic concerns itself with the study of arguments whose basic elements are terms. For example: All men are mortal. Socrates is a man. Hence, Socrates is mortal.

10. The following chart represents a "translation scheme" from Tammelo's symbolization to a popular American symbolization (*i.e.*, the one used in merely all the logic texts cited in Tammelo's bibliography).

ited use of examples may frustrate a conscientious reader who is lacking sufficient background.

Once the two logical systems have been introduced, Tammelo presents three methods for evaluating any given argument—the derivation (or proof) method, the tabular (or truth-table) method, and the counter-formula method. Tammelo is to be commended for including in this section of the book an explicit statement of the two different ways in which an argument can go wrong. While all logic texts spend considerable resources discussing *validity*, few (if any) introductory texts even mention the notion of *solidity*. The notion of validity is purely formal—an argument is valid just in case the conclusion necessarily follows from the premises. Solidity, on the other hand, relates not only to formality but, to a degree, also to the contents of the premises. An argument is solid just in case it is valid and its premises are mutually consistent. In evaluating arguments in the legal sphere, especially, a means for discovering contradictions within the premises (whether implicit or explicit) is a must.

The derivation and tabular methods receive limited attention. This should pose little difficulty for a reader with some background in logic as most introductory logic courses devote substantial time to such methods. There could be, however, more resources devoted to the tabular method for a different reason. The axiomatic approach taken by Tammelo does not readily adapt itself to “translation problems” (*i.e.*, how to symbolically render English arguments). The tabular method depends upon the use of truth-tables. If Tammelo had included a more detailed presentation of the truth-table definitions of the connectives he employs along with some discussion of the truth-conditions of English connective expressions, it is more likely that the translation problems which are generally encountered when attempting to apply formal methods to English arguments will be overcome.

The counter-formula method receives extensive treatment (probably) because it is a relatively new procedure. This method is used to determine ques-

Tammelo's symbolization	Popular equivalent
\bar{p}	$\sim p$
Cpq	$p \supset q$
Apq	$p \vee q$
Kpq	$p \cdot q$
Dpq	$q \supset p$
Epq	$p \equiv q$
$\bar{C}pq$	$(p \supset q)$
$\bar{A}pq$	$(p \vee q)$
$\bar{K}pq$	$(p \cdot q)$
$\bar{E}pq$	$(p \equiv q)$
$\bar{D}pq$	$(q \supset p)$

tions of both validity and solidity in a formal context, and it is the process Tammelo primarily employs in his treatment of arguments (and problems) taken from the legal sphere. His use of examples in presenting the counterformula method, while not extensive, should be found to be quite helpful to both the experienced and inexperienced reader (unlike, perhaps, the lack of sufficient examples in his treatment of other procedures).

In Part II of the work ("Legal Logic in Action"), Tammelo devotes some time to a discussion of the problem of getting from English arguments to the symbolic language. As mentioned above, the use of truth-tables and a discussion of truth-conditions would be helpful. Additionally, it is at this point that his superficial treatment of some philosophical problems may cause difficulties. At the outset, Tammelo mentions his adoption of a two-valued logic without an in depth explanation. Readers without a background may experience difficulty in applying the distinction between a sentence's having a truth-value and discovering what that truth-value is.¹¹ Some discussion of this distinction would prove quite beneficial.

The above remarks should not be taken to suggest that Tammelo is insensitive to the translation problem. On the contrary, substantial space is devoted to various problems which may be (and usually are) encountered; and he offers insights as to how they can be overcome—the most significant of which are his emphasis on context dependence¹² and his treatment of suppressed premises.¹³

No review of this work would be complete without reference to some of the problems taken either from court decisions or from (what might be termed) common practice. Tammelo has selected several interesting arguments and demonstrates how application of the various techniques either uncovers logical flaws or dissolves merely apparent flaws. Also, he presents some problems and demonstrates how those problems can be readily solved through application of his techniques. One example should suffice to show that formal techniques do have significance within the legal realm:

Consider the following problem: There is a gift of property on trust for the grandchildren of A. In which of the following situations is the gift valid?

- (a) A is alive and there is at least one grandchild of his alive?
- (b) A is dead, but there is at least one grandchild of his alive?
- (c) A is alive, but no grandchild is alive?
- (d) A is dead and no grandchild of his is alive?

The relevant propositions of law are as follows:

- (1) If there is a grandchild of A alive at the time of the gift then the gift is valid, the class of beneficiaries closes, and A's grandchildren alive

11. In a two-valued system, every indicative sentence is either true or false notwithstanding an inability on our part to discover which it is.

12. TAMMELO, *supra* note 5, at 81.

13. A suppressed premise is one whose inclusion is necessary to make the argument "work" and has not been explicitly stated in that argument.

- at the time of the gift participate in the gift and no grandchild of A born after the time of gift participates.
- (2) If there is no grandchild of A alive at the time of the gift then if and only if the property must vest within the perpetuity period then the gift is valid and if the gift is valid then all A's grandchildren participate in the gift; if it is invalid then none of A's grandchildren participate in the gift.
 - (3) If and only if all A's grandchildren are ascertained within 21 years of relevant lives-in-being then the property must vest within the perpetuity period.
 - (4) If a grandchild of A may be born more than 21 years after relevant lives-in-being then it is not the case that all A's grandchildren are ascertained within 21 years of relevant lives-in-being.
 - (5) If and only if A is dead at the time of the gift then A's children are relevant lives-in-being.
 - (6) If all A's children are relevant lives-in-being then A's grandchildren are ascertained within 21 years of relevant lives-in-being.
 - (7) If A is alive at the time of the gift then A may beget another child and a grandchild of A may be born more than 21 years after relevant live-in-being.

...

Thus the result of the above logical testing is that the gift is invalid only if at the time of the gift A is alive, but no grandchild of his is alive. In the other situations, the gift is valid.¹⁴

The steps to reaching the conclusion are omitted—not as a ploy to encourage sales of the book—because a reproduction of the symbolic treatment here would be pointless absent a significant recapitulation of the entire book.

In summary, *MODERN LOGIC IN THE SERVICE OF LAW* is a significant step in providing the legal community with access to the various tools of argumentation which can be found in formal logic. As has been suggested several times above, a reader with some background in formal logic should find its contents both beneficial and interesting. While this particular work is not readily adaptable to use as a text in a "legal methods" course, its mere existence will (hopefully) encourage some similar enterprise which will result in a textbook which can convey to the legal community—both practitioners and students—an understanding of argumentation.

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14. TAMMELO, *supra* note 5, at 119-23.

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