Studies in Talmudic Logic

Volume 6

Talmudic Logic

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Michael Abraham, Dov Gabbay and Uri Schild

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Andrew Schumann

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Talmudic Logic

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Preface

The Talmudic exegesis is constructed on special hermeneutic rules which interpret the text of the Torah within the limits of Judaism. The majority of these rules have a logical meaning in fact. On the basis of this meaning it is possible to speak about a special logical culture of the Talmud and to call the logic used there Judaic logic. Comparative researches in Judaic logic have carried out since the Middle Ages, when the Talmudic authorities began to compare the logical rules of the Talmud with Aristotle's dialectic and apodictic syllogisms. In the 19th century, H.S. Hirschfeld became the first scholar and Rabbi who suggested formalizing logical reasoning of the Talmud.

The contemporary interest in Judaic logic is related to the possibility of creating new logical approaches in modern computer science. Currently, computer science has been dealing with the logical systems formalizing multi-agent and interactive computing. Talmudic reasoning is just multi-agent and interactive, since it has been constructed by taking dissonant opinions and conflicting authorities into account. There is a complex system of Talmudic definitions of how and who wins in dispute. If we understood this massive-parallel, concurrent and multi-agent reasoning better, then it would provoke a true revolution in developing and implementing artificial intelligence.

Jewish logic has been generated on the basis of inference rules for expounding the Holy Script. Since the Middle Ages, it has been extended to other tasks, such as philosophical, scientific ones, formulated within the limits of the Jewish culture. The main difference is that this logic has never been Aristotelian from the very beginning. If we take the Aristotelian logic, then it is constructed by assuming that there are higher genera and there are their particular varieties, i.e. species. Thereby any reasoning is being

set up if we know a genus, its properties and transfer this knowledge down onto species. That is we move down from above in our reasoning, vertically. In Judaism, reasoning of this kind is unacceptable as a whole, because Judaic reasoning is constructed not vertically, but horizontally: from some species to other species and from some genera to other genera. As a result, there are assumed many points of view, different families of reasoning agents, i.e. a kind of multi-agentness.

Roots of Jewish logic are undoubtedly religious. Nevertheless, roots of the Western world-outlook and Aristotelian logic are in many respects religious, too. The point is that presuppositions of Jewish logic and Aristotelian one are too different. The assumption of Aristotelian logic consists in that there are many divine entities, gods, axioms. Consequently, from these axioms any particular knowledge is deduced. On the other hand, in Judaism it is supposed that there exists just one divine entity, God, the Lord. Therefore inferring from genera is a prerogative only of God. In their reasoning the Jews should move only horizontally. Now in computer science there is growing heightened interest in reasoning not from generals to particulars, but from some particulars to other particulars, i.e. massive parallelism. Thence knowledge which is entailed from religious premises of Judaism can really be useful in modern computer science.

Why do massive parallelism and interactivity awake such an interest of modern computer science? Let us reflect. Assume that we wish to design a robot that is able to understand semantics. On the one hand, to make so that the robot can understand real values (denotative meanings) is workable in general. It is sufficient to teach him to compare images of real objects with appropriate linguistic expressions. But how can we teach him to detect abstract values (connotative meanings)? That is the question.

In modern logic it is ascertained that abstract values as such are not present. They are a result of convention in this or that group of people. For this reason there are no universal abstract

values. It can easily be proved. For instance, we can ask a number of people to define love. After that we receive a huge family of ill-matched definitions. And if we ask representatives of different cultures to define love, in this case the distinction in results is even more appreciable.

It means that semantics is a part of pragmatics and abstract values are actually pragmatic values and not semantic ones. The robot can understand abstract values just in case he is able to know how to interact with people successfully, i.e. how to be a full member of human society. Pragmatic values appear results of interactions within the limits of massive parallelism of human behaviors.

The universal theory of activity which is while only planed to be obtained will become pure pragmatics. In this theory all pragmatic relations will be formalized. The Platonism in the European culture then will disappear as a whole. Any activity, any human interaction, any human conventions will become completely transparent for mathematicians and programmers.

But what will it cause? First of all radical transformations of all our society! For example, for a long time one has spoken about perspectives of creating an electronic government (e-government) when the role and right of officials and managers begin to be transferred to computer systems. And so, the universal theory of activity will allow us to realize the project of electronic government and electronic management as much as possible for all mankind. Then will an era of libertarian communism occur?

The *life-world* (daily occurrence) is an ultimate source of any objectiveness and any evidences for us. If we admit that there is only the life-world, space of our direct interactions, then automatically we admit that there are only individual agents of activity who cooperate with each other in the various way, i.e. they collaborate, compete or are just engaged in parallel things. Social groups, from family to state, are an outcome of massive-parallel interactions of many and many individual agents. Social groups as

such do not exist, therefore out of everyday contexts (live-world interactions) they are losing any meaning.

For mathematics the assumption of that there is only the life-world (i.e. only our everyday practice) would mean the requirement to construct *pure pragmatics* or *pure praxeology*, i.e. the requirement to clarify not only how game rules in mathematics are born, but also what the ultimate source of these rules is. Pure (formal) pragmatics is a horizon of any possible mathematics, the pragmatic limits of activity of any mathematicians, though ours, though belonging to extraterrestrials. At the same time, pure pragmatics is a logical theory about activity on a broader scale, about pragmatic estimations of any propositions in principle. Therefore it has not only theoretical meaning (as horizon of any mathematical designing), but also a special common sense (as ordering and algorithmization of any game rules of individual agents in any area).

The intuition of pure pragmatics came to mind of the late Wittgenstein. He assumed how this discipline should look. Wittgenstein's major thesis is *meaning as use*, according to which there is no independent sphere of meanings and values, all meanings are contextual and defined by direct aims of our activity. This thesis focuses on how we can consider lexical items (words, propositions) and semantic items (meanings of words and propositions) in pure pragmatics.

Thus, pure pragmatics is *anti-Platonic*. It supposes pure constructivism that there is no independent sphere of propositions, there is no initial integrity before its incarnation (accordingly, the eidetic/Platonic approach is senseless basically).

In Judaic logic we can find out an original approach to pure pragmatics and praxeology. Also notice that in Judaism, anti-Platonic assumptions are so brightly expressed and the existential significance of the life-world is postulated. In order to show inseparability of Judaic logic from the Talmudic tradition, this logic is said to be *Talmudic Logic*. The title of book refers to this philosophical context of pure pragmatics. In the book we will

consider logic of Jews from the standpoint of analytic philosophy and symbolic logic. We will show that philosophical and logical ideas of the Talmud are really actual and after a certain interpretation they can be considered as popular logical introduction to the theory of pure pragmatics and massive-parallel reasoning.

The perceptive reader might ask if Talmudic logic is so specific and esoteric in fact and how far it differs from general logic. My reply is that it is not esoteric, but it presents a unique logical culture that may be interesting from the point of view of analytic philosophy. The purposes of Talmudic logic consist in considering the Torah statements as axioms, initial data, the first premises of our reasoning and this logic aims to entail new data by using traditional Judaic hermeneutics containing some logical inference rules. Some of these rules have analogies in traditional logic, some others do not. However, the combination of these rules is unique indeed, which allows us to claim that there exists Talmudic logic different from other ones.

Notice that in the whole text the English translation of the Old Testament is quoted from

The Holy Bible. King James Version. New York: American Bible Society, 1999.

The English translation of the New Testament is quoted from

Murdock, James. *The Book of the Holy Gospel of Our Lord and Our God, Jesus the Messiah, a Literal Translation from the Syriac Peshito version*. New York: Robert Carter & Brothers; Massachusetts Bible Society, 1858.

The English translation of the Talmud is quoted from

Soncino Babylonian Talmud. Translated into English with Notes, Glossary and Indices under the Editorship of Rabbi Dr. I. Epstein. London: the Soncino Press, 1935—52.

Transliterations of Hebrew letters in the whole text as a rule satisfy the following table:

letter	*name*	*translite ration*	*letter*	*name*	*translite ration*
א	’alef	’	ל	lamed	l
ב	beyt	b, v	מ, ם	mem, *final* mem	m
ג	gimel	g	נ, ן	nun, *final* nun	n
ד	dalet	d	ס	samekh	s
ה	hey	h	ע	‘ayin	‘
ו	waw	w	פ, ף	pey, *final* pey	p, f
ז	zayin	z	צ, ץ	Ẓadi, *final* Ẓadi	Ẓ
ח	ḥet	ḥ	ק	quf	q
ט	ṭet	ṭ	ר	reš	r
י	yud	y	ש	šin, śin	š, ś
כ, ך	kaf, *final* kaf	k,kh	ת	taw	t

All main logical and mathematical ideas of this book were published in peer-reviewed journals such as (1) Journal of Multiple-Valued Logic and Soft Computing, (2) Journal of Cellular Automata, (3) Journal of Applied Non-Classical Logics, (4) Advances in Soft Computing, (5) Bulletin of the Section of Logic, (6) Studies in Logic, Grammar and Rhetoric, (7) Kybernetes, (8) Logic and Logical Philosophy, (9) *p*-Adic Numbers, Ultrametric Analysis, and Applications, (10) New Mathematics and Natural Computations, (11) Acta Analytica, (12) Journal of Uncertain Systems, (13) Argumentation, etc. The first logical books in English devoted to Talmudic logic are as follows:

Moshe Koppel. *Meta-Halakhah: Logic, Intuition, and the Unfolding of Jewish Law*. Jason Aronson, Inc., 1997.

Andrew Schumann (ed.). *Judaic Logic*. Gorgias Press, 2010.

Andrew Schumann (ed.). *Modern Review of Judaic Logic*. Special issue of History and Philosophy of Logic, Taylor & Francis, 2011.

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