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On John Barker's "Creativity and Logic"

Professor Barker deals with three topics in his paper. First he says a few things about the nature of creativity; then he says quite a few more things about the nature of logic and the logician's task; and finally, he says a lot of things about areas of modern logic which offer rich opportunities for creative work. I will comment on each of these in turn.

Barker characterizes creative endeavor, at one point, as the exercise of four powers: 1) the imaginative proliferation of ideas, 2) originality leading to novelty, 3) efficient selection of the more promising ideas, and 4) the constructive adaptability of earlier ideas to later ones. He associates logic and reason with the last two powers, selective and adaptability, rather than with originality, novelty and the proliferation of ideas.

This four-fold list of powers seems a bit cut and dried to me as a characterization of creativity; and besides I think logic has a role to play in the exercise of all four of these powers, not just the last two. I am more drawn to a description of the creative act which Barker hints at later one: a creative act is a purposive transformation of materials into some new and worthwhile form. Consider the difference between discovery and invention. Invention is creative in a sense in which were discover is not. Both proceed from what is not known or given to something new; there is novelty in both cases. But we do not, in general, call a discovery as such, a creative act. Invention, on the other hand, is clearly a creative process. Materials at hand are put together in new ways to yield a result which is both novel and useful; it is a purposive activity in that inventions are created to serve a purpose, and this purpose is constantly before the inventor's mind. Not all creations are inventions, of course; we usually do not speak of musical compositions or poems or art-works as inventions, though clearly they are created through purposive transformations of given materials into new and worthwhile forms. However, inventing is a creative process and it is inventions I

wish to focus on, for I want to hold that formal logical systems are inventive creations intended to serve certain purposes.

This brings us to Barker's characterization of logic and the task of the logician. For Barker the objective of the logician is to discover - or at least come as close as possible to - the one true complete logical system. Like most other philosophers of logic and of science, he would agree that theories in logic (like theories in science) are beset by real epistemological difficulties. It is very difficult to decide whether or when a given theory corresponds to or accurately represents this true absolute logic; what he calls "real logic" is, he says, a fallible science - that is it a human result which may fail to encapsulate the true principles of correct reasoning, the ultimately true logic. Nevertheless, it tries to do this, he suggests, by determining what propositions would be true in all possible worlds, or, as he prefers, what principles of correct reasoning are presupposed in every epistemologically qualified empirical theory (whether it is true or false). But what is an epistemologically qualified theory? One, he suggests, which is either true or false, i.e., has a truth-value, i.e., is "truth-valued". OK, but then we must admit all inconsistent theories as epistemologically qualified, for they all assuredly have a truth-value, namely false. Did he mean to restrict epistemologically qualified theories to contingent theories? i.e., to theories that could be true and could be false? i.e., possibly true theories? OK, but then which of the many concepts of modal possibility and impossibility will he use? In other words, which logical system will he use to distinguish the epistemologically qualified theories from the non-qualified ones. It seems we are caught in a circle: To distinguish true princples of logic from false ones, he must investigate the set of epistemologically qualified theories to find the principles of reasoning common to all of them; but to determine which epistemological theories are qualified, he must already have in hand the correct principles of logical truth and logical possibility. Perhaps this difficulty is not sufficient to dispel the dream of an

absolute, true logic; but it seems to me to eliminate this particular plan for finding it.

Barker presents his realism, purportedly based on common sense, as standing in opposition to instrumentalism. I am an instrumentalist in my philosophy of logic, as I am in my philosophy of science. I view the creative task of logicians as that of inventing formal systems to serve specifiable types of human purposes. Different logical systems are and should be judged in terms of how well they serve the purposes they purport to serve. The modern logic of Frege and Russell enjoys the wide acceptance it does today because it is capable of doing great number of jobs that logic is supposed to do - particularly in the field of mathematics, but also in other fields - that Aristotelian or Scholastic incapable of doing. It was a better instrument - a better set of logical inference, a better set of devices for testing the validity of arguments and identifying inconsistencies and tautologies, and a much better way of explicating the structure and logical relationships of arguments and concepts. It is more efficient, with less primitive notions, more rigorous, and immensely more universal in its applications. But this classical logic of Frege and Russell is far from perfect in my view. There are many jobs which logic should be doing which it can't handle; it does not help with reasoning involving subjunctive or contrary-to fact conditionals, it can not handle synonyary, it can not handle the structure of value arguments in ethics or moral reasoning, and it cannot account adequately even for lawlike statements in science. These problems can not be solved by mere additions and extensions; what it needed are some basic revisions at the very heart of the system. Thus the grandest kind of creative projects in the field of logic still lie before us - the invention of new and better formal systems of logic, just as Aristotle and Frege each, in their time, invented new and better systems. There are many other less grand ways in which logic fits into the creative process, but none so exciting or important.

Barker claims that the instrumentalist has a difficult time dealing with truth; this is not the case though the history of pragmatism might make it appear so. I for one reject outright William James' proposal that the expression 'is true' means the same as the expression 'works'. This verbalism has done much to undermine the most important and useful common sense meaning of the word 'truth', namely, the concept of the correspondence of reality to the content of a statement or belief. I do not agree with James on this at all; on the contrary, I hold that correspondence concept of truth is one of the most useful and important instrumental concepts of man. Modern logic, with its truth-functional semantics has extended the utility of this concept even further. This does not involve abandoning intrumentalism, nor does it entail embracing or rejecting a metaphysical realism. The real message of James' pragmatism was not about words, but about the proper objectives of intellectual inquiry. James held on the one hand that the objective of finding, or demonstrating the truth about absolute reality (as opposed to experiential reality) was an unachievable objective. And he held on the other hand, the primary objective of philosophy and all intellectual disciplines, should be the development of ideas which would be instrumental and useful in human activity. I agree with him on both counts. Where I disagree is in his failure to see that the common sense concept of the actual world - of a single unique world in space and time populated by things, people, etc., in which our actions must take place - is the most useful of all concepts for humans, and correspondence concept of truth is the most instrumental concept in constructing this world-view. Thus the world-view and concept of truth which the common-sense realist uses, whether it be absolutely true or not, is undoubtedly useful, to layman, scientists and skeptics alike. And that's what counts.

Professor Barker mentioned a variety of areas in logic where creativity can take place. I agree with his examples. So far I have only touched on one -

the area of original invention of formal logic. But, as Barker mentioned, there are also the creative activities which go into extending principles of an established logic to new fields, into efforts to apply logic to scientific theories by formalizing them, and even the slightly less creative activities of finding new proofs or new formalizations within some established logic. All of these creative activities are activities of logicians qua logicians. More important - because more universal - is the use of logic by non-logicians in all sorts of ordinary or technical reasoning processes, not the least of which is the burgeoning area of computer programming and design. In such areas, as Barker suggested, logic aids the processes of selection and guidance throughout the creative process. But I would also add that the elements of novelty and imaginative proliferation of ideas are also aided by logic. Training in logic can be a positive aid in teaching us to elaborate all logically possible alternatives, freeing our imaginations from the fetters of habitual response and leading, sometimes, to novel and unexpected results.

I would like to conclude by illustrating my general position. Barker mentioned that I had developed a logical system which does not include the law of addition, that is,the law that "either p or q" follows logically from p by itself. My previous and present activity in this area is completely in line with my characterization of the logician's task as one of seeking instrumental conceptions. The purpose which first governed my investigations, and led to such systems, was governed by a desire to find a better set of logical rules for distinguishing valid from invalid arguments in ethics. I quickly found that the most widely discussed logical systems under investigation for ethics were beset by a variety of strange, unsatisfactory results. These systems tried to develop a logic of ought-statements from standard truth-functional logic by adding an operator,O, for "it ought to be the case that" and prefising this operator to standard truth-functional statements. The resulting logic was viewed as an extension of standard logic. Among the paradoxical results were Alf Ross's

paradox: according to this system from "you ought to mail this letter" it would follow logically that "you ought either to mail this letter or burn it". A related paradox was called the "Good Samaritan Paradox": according to these systems from "John ought not to be mugged" it follows that "It ought not to be the case that John is mugged and George helps John". A third paradoxical result, known as that of "Derived Obligation" is that this logic would make us say that from "One ought not to kill" it follows logically that "It ought to be the case that if one kills then one receives a reward of $1,000,000" Unbelievable as these may seem, these were in fact results of the first systems of deontic logic. To be sure, each of these unpalatable results could be explained away in a sense, if one paid careful attention to the somewhat unusual meanings associated with connectives in standard logic. But even so, it was clear that these systems fell far short of providing a new and better instrument for detecting validity or non-validity in ethical arguments that simple good common sense, however sloppy it might be. I found that these three paradoxes, and several others could be eliminated from the logic if the principle of addition was eliminated from standard logic. Of course there is one sense in which ordinary people can say that it follows from 'p'is true that 'either p or q' would be true; but there is also some senses in which we would not want to say that 'p or q' follows from, or is logically derivative from p by itself. Ordinary usage is like that - full of ambivalent shifting meanings. The logician's task as I see it is to bring order into this amorphous state of linguistic affairs. I found that dropping addition from standard logic also had other advantages; it eliminated all the"paradoxes of material and strict implication" that Barker mentioned, and makes possible a theory of synonymity and entailment which is quite impossible because of the latter paradoxes in standard logic. Later I found ways to yield all of the theorems of standard logic - construed as denials of inconsistencies - while rejecting the standard rules of inference

which would sanction some of the questionable inferences mentioned above. Thus it seems that we can retain all the advantages of the old system, while eliminating some of its worst disadvantages, thus extending the utility of a formal logic beyond its present limits. The system is not yet completely in place, and it is not by any means yet shown to be a better system to everyone's satisfaction. But the creative activity invovled, whether it be successful or not, has clearly fallen under the rubric of a search for a set of instrumental concepts and rules which would useful in certain types of human problems relating to the integrity of arguments which standard logic does not as yet handle. It fits the picture I gave of creativity in logic at this level, I think; its involves the purposive transformation of given materials (namely, the ordinary language and standard concepts of logical concepts and principles) into novel and useful forms (into new formal systems) which will serve the same purposes of sound argument we try to serve by our good sense and our standard systems of logic, but do the job better and more rigorously over a wider variety of cases. Such systems as I have devised, are I think, <u>inventions</u> - not replicas of some absolute logic. Several of my past inventions of this sort have turned out not to work very well. Whether the current one will constitute a better mouse-trap remains to be seen; but in any case, that's what this sort of creativity in logic is all about.

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