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II THOUGHTS

Thinking Critically And Teaching Critical Thinking

by George S. Maccia

At the outset I wish to acknowledge that the argument employed in this paper is derived from *The Idea of a Social Science* by Peter Winch.¹ Extensions relate to what I believe is the significance of the argument for critical thinking and teaching critical thinking.

I shall set forth the argument and its significance as answers to the following questions:

1. What does it mean to say that one follows a rule?²
2. What does it mean to say that one knows a rule?
3. What is the context for critical thinking?
4. What are some criteria of critical thinking?
5. What might we do in teaching critical thinking?

In answering the first question I shall attempt to show that rules are contextual and obligatory. In answering the second question I shall argue that following a rule as a matter of course beyond what has been taught is to know, to think, and to think critically. In answering the third question I shall suggest that there are contexts for critical thinking, and that one rule does not transfer generally to all contexts. In answering the fourth question I shall attempt to signify some meta-rules — rules of a rule or criteria — employed in critical thinking by noting kinds of thinking people do. Finally, I shall suggest what my argument implies for teaching critical thinking.

What does it mean to say that one follows a rule?

To follow a rule is to apply a given formula in an appropriate context. If we consider this statement, it is apparent that I assume that a rule is understood and that certain actions follow from it. Both of these assumptions are inherent in all statements which manifestly conduce action. With such statements the actor is obligated to act in one way and not in another. In the context of everyday life such statements are usually presented as a command or moral maxim: “Shut the door!” “Thou shalt not kill!” It seems clear that commands or maxims or statements of these rules and the obligation to follow them is readily apparent to persons in this culture. It may not be equally apparent that all meaningful statements implicitly contain an obligation to act in a certain way, for not all statements are stated as rules; yet all statements which are meaningful intend to communicate something to be done. The terms “meaning” and “communication” suggest that the business of making

statements is social and what one does he does within a social context. For statements to have meaning and for communication to occur, there must be at least two persons. The conjunction of the one with the other produces the obligation. Are you obliged to make sense of what I am saying? Of course, you are. You are at this meeting. Am I obliged to make sense? Of course, I am. I am here with you. The context of this meeting requires certain behavior from each of us. Much of your thinking in the next several minutes will be devoted to the sense of what I am saying. In the period which follows the presentation of my paper much time in our discussion will be spent to ascertain what sense I have made. You hold that I am obligated to follow the rule of philosophical discourse. You will be seeking regularities in my discourse. Any irregularities that you find will signal that I have not followed a rule and that I have made a mistake. You will hold me responsible for my mistakes. Some of you may not be very gentle in calling my attention to such mistakes. Your action and mine point up the obligation. A rule must be followed correctly.

In this talk of you and me I have indicated that to follow a rule is to engage in ordered action which is error free. To follow a rule is not to make mistakes. It would make no sense to talk of mistakes unless there were two of us. If I were by myself, what sense would it make to talk of mistakes? Clearly a rule requires a context, and the basis for that context is you and I. In elaborating the argument that it takes two — at least in principle — to have a rule, I have borrowed from Wittgenstein.

Imagine someone using a line as a rule in the following way: he holds a pair of compasses, and carries one of its points along the line that is the “rule”. . . And while he moves along the ruling line he alters the opening of the compasses, apparently with great precision, looking at the rule the whole time as if it determined what he did. And watching him we see no kind of regularity in this opening and shutting of the compasses. We cannot learn his way of following the line from it. Here perhaps one really would say: “The original seems to *intimate* to him which way he is to go. But it is not a rule.”³

Before moving further with the example, I wish you to note that the decision of the observer assumes a context. The terms “compasses” and “line” help denote that context and also suggest the purposes for opening and shutting the compasses. Note also, please, the entire description makes sense only if both the draftsman and observer are in the same context. In this example the observer is correct to expect the draftsman to follow a rule, for he is moving within a context as if he understood it. To use the now very trite analogy of the game, the draftsman behaved as if he knew the game he was playing.

The term we might employ in designating the behavior of the draftsman is “haphazard.” In the context of our language haphazard behavior is not regular. It is not rule governed, for logically regularity is separable from haphazardness. If, however, we suppose the draftsman is following a rule, irregular behavior would indicate that he is mistaken. To say that one is following a rule, therefore, is to say that the behavior has been evaluated. Even when only one behaves — if there is a rule being followed-in principle there is another to grasp the rule. It makes no sense to suppose that an individual can establish a personal rule of action, if he never had contact with other persons with socially established rules. It really does take two to Tango. My statements here may seem so outrageous to some of you that I shall take the time to cite two⁴ of many instances which illustrate the degree to which being human rests upon a social context.

A girl named Anna lived for six years virtually without contact with other humans. She was kept in an attic room with only enough care to keep her alive. Evidence suggested that she was seldom moved from one position to another and had received no instruction. When Anna was discovered she could not walk, talk, or do anything that indicated intelligence. Anna was placed in an institution for retarded children. Four years later, just before she died, the institution reported that Anna could follow directions. She could string beads, identify some colors, distinguish between attractive and unattractive pictures, and talk in phrases. Furthermore she regularly washed her hands and brushed her teeth and tried to help other children. She walked well and could run.

Isabelle, a girl born one month later than Anna, was subject to almost the same isolation as Anna. She too was discovered when she was six years old. Those who found her said, “She was apparently utterly unaware of relationships of any kind.” They thought that Isabelle was “wholly uneducable and that any attempt to teach her to speak, after so long a period of silence, would meet with failure.” Isabelle’s Stanford-Binet I.Q. score was that of one 19 months old. Through a carefully designed program centered in pantomime and dramatization, Isabelle’s I.Q. Score trebled in one and one half years, and was that of an average child of six.

These cases, not only point up that rules are social, they also indicate that grasping a rule and following it is symbolic activity. Regularities (rules) of movements of matter and in the behavior of non-humans or of humans can be grasped only by humans. It is the human who formulates the regularity as a rule and exemplifies it in behavior. Thus, it can be said that only persons know a rule.

What does it mean to say that one knows a rule?

The term “knowing” includes its negation, “not-knowing.” Behavior according to rules not known I call “conditioned.” I shall explain what it means to know a rule by beginning with an example of conditioning. Let us consider the case of a dog which has been conditioned to bark a series — on cue it barks once, then twice,

and three times. The dog barks on cue very much the way in which a child might continue a series of numbers on cue; but the dog barks according to a rule and does not know the rule, for it cannot continue the series as a matter of course beyond what it had been taught. The terminus of three is set in its conditioning. Not even in principle can the dog follow a rule. It does not have the symbolic context from which rules obtain their meaning. A child who follows a rule beyond what he has been taught knows the rule, even though he cannot formulate the rule. To know a rule does not require necessarily the formulation of the rule, but knowing a rule does require going the way the rule is to go. The behavior which follows the rule when the rule is known follows that rule as a matter of course. Such knowing does not make mistakes, but going the right way cannot occur unless judgment is involved in knowing the rule. Mistakes must be avoided or corrected in fulfilling the obligation to follow a rule. In following a rule knowing is thinking, and thinking is critical since judgment is involved. Since there are rules only in a context, the context for rules is the context for critical thinking.

What is the context for critical thinking?

Judging from what I have said thus far, the context for critical thinking is the symbols and the connections between symbols which conduce to one action rather than another. Yet it is not the symbols and connections alone that provide the substance of contexts. The connections between symbols are related to intentions that something be done. It is true that the motions of matter are ascribed to a discipline called physics, but there would be no context for physics unless there were the intention to explain the motions of matter in relation to measured observables. It would not be sufficient that a person formulate a rule of motion. The purpose to explain the motions of matter in relation to measured observables requires a distinction between a right and a wrong way for formulating such rules. Such a distinction permits us to sort out the physicist from the quack.

Contexts are social. Although contexts are social, there is a context only when one and another agree in purpose. Again the analogy of the game! There is a game only when all the players play it. There is, therefore, a context for critical thinking only when some public connects symbols so that something is to be done. That which is to be done is a rule of rules in the context. It is the imperative for following a rule. It is a criterion employed in following the rule.

Since the same symbols may have different connections, the contexts are many. Since contexts are formed through the intentions of persons and the intentions of persons are many, there is no one rule for all contexts. If there is no one rule for all contexts, there is no rule which transfers generally to any context and there is more than one way to think critically. Transfer of rules can occur only in the regions in which contexts are the same. Our experience tells us that there are such regions, because contexts are changed through other contexts in which the rule imperatives are the same.

What are some criteria of critical thinking?

The obligation to follow a rule without making mistakes points up the critical side of thinking, for in order to follow a rule correctly one must judge or evaluate what one is doing. Also to follow a rule correctly there must be a context in which the rule is appropriate. Consequently, critical thinking is related to the rule and the context. Since a rule is no rule without a context and a context is no context without a purpose, thinking critically stated simply as following a rule is no simple task. Due to the plurality of social relations, very few of a man's purposes are universally agreed upon. Very few contexts are defined unambiguously.

Examples may serve to illustrate different ways in which critical thinking focuses on the rule and on the context. Suppose a student in mathematics is confronted by a context in which the rule of interpolation is appropriate. For the student the context and the rule are given. His critical thinking centers on ascertaining whether he is mistaken. On the other hand, suppose a mathematician is extending the rule of mathematics. His context is squared circles and he seeks to formulate the rule of squaring circles. In applying criteria of proof he finds no rule may be formulated and rejects the context of squared circles. For the mathematician his broader context is mathematics, and the rule he follows has him center his critical thinking on the small context with which he began. The example of the mathematician shows how following a rule eliminates ambiguity in a context.

I shall illustrate now that critical thinking focuses also upon the intention which forms a context. Suppose two persons are playing tennis and one player can always ace the other. If both are to continue to play, the purpose of the game must be altered. If they agree on the purpose that both hit the ball, the context of the game is no longer tennis and there is no purpose to defeat one's opponent. The rule is to hit the ball so that the other can hit it back.

The examples and illustration surely have pointed out the difficulty of stating criteria. However, Winch further emphasizes the difficulty; hence, I shall quote him.

Putting the point generally, even if it is legitimate to speak of one's understanding of a mode of social activity as consisting in a knowledge of regularities, the nature of this knowledge must be very different from the nature of knowledge of physical regularities. So it is quite mistaken in principle to compare the activity of a student of a form of social behavior with that of, say, an engineer studying the workings of a machine; and one does not advance matters by saying with Mill, that the machine in question is of course immensely more complicated than any physical machine. If we are going to compare the social student to an engineer, we shall do better to compare him to an apprentice engineer who is studying what engineering — that is, the activity of engineering — is all about. His understanding of social phenomena is more like the engineer's understanding of his colleagues' activities than it is like the engineer's understanding of the mechanical systems which he studies.⁵

Since one might be able to think critically without being able to formulate criteria, as my analysis has indicated, why bother to attempt to state criteria? This question deserves an answer. My analysis does admit of systemic as well as systematic critical thinking. In systemic or non-discursive critical thinking one judges and so follows the rule correctly, but one does not in his thinking proceed in a step-wise manner. There is no deliberate and self-conscious use of a criterion or criteria. Systematic thinking, on the other hand, is discursive. It involves the use of formulated criteria. Other things being equal, however, systemic thinking cannot be taught as directly and in as short a time as systematic thinking. The teaching of systemic critical thinking probably would require a longer exposure to situations requiring judgment which are being handled by expert judges, such as much of the teaching in art. Consequently, there is an attempt to state criteria, so that systematic critical thinking can be taught.

Criteria of critical thinking have been formulated as rules of logic. These rules have been characterized traditionally as falling within deductive and inductive logic. Charles S. Peirce has suggested that traditional formulations of the rules of induction are mistaken, and that the rules relate to determination whether an instance is a member of a class of instances. The rules of sampling as employed in probability theory provide examples of Peirce's reformulation of the realm of inductive logic. Peirce also revived Aristotle's abduction, which he called "retroduction." For Peirce retroduction is thinking which employs rules from one context as analogs for formulating rules in another context. Recently E. S. Maccia has begun an explication of retroduction as the use of one context as a non-representational model for devising another context.⁶ I shall not dwell on these logical realms in which criteria are to be found, but turn to marking off other logical realms to explore for criteria of critical thinking.

When a person seeks to establish a trend, he uses some variant of a criterion of continuity. In determining a trend he ascertains some rule of succession between each event, and he follows that rule until some intended terminus is reached. In a number context the rule of succession is one form of progression. In a context of lines and numbers the rule is extrapolation. In an historical context not only is some rule of succession used, but also some rule of significance. Since the context for history is not as well understood as the context for mathematics, the meaning of significance in history is more varied than any criterion of significance for mathematics. Ambiguity of a criterion of significance occurs both in the disciplines called "social sciences" and in ordinary social formulations. These ambiguities can be removed only through clarification of the context. Since such a realm of logic has not been noted generally, I suggest the term "tendention" be used to signify it.

Another realm of logic to which I would like to call your attention, I shall term "referention." Referention is used when a person seeks to locate place or position of some instance or some event. In determining the place, a person takes the beginning and end terms of the context as given and fixed. In locating the place he

uses some criterion of continuity as he follows a rule of referral. Contexts for referention are illustrated by a card file, the process of interpolation in mathematics, chronology in history, the status of an individual or a group, and map reading.

The final realm of logic which I shall consider in this paper, I call "inflation." Inflation is used when one wishes to convince another that some action is desirable. Some rules for inflation have been formulated. They number among the well known logical mistakes called "fallacies." The rejection of the use of fallacies in deductive logic rests on the intention in deduction to obtain valid conclusions. In inflation the intention is entirely different. The purpose is to persuade one to act. Validity in its usual sense is not a criterion. The criterion used in inflation relates to persuasion. Selling, politics, and propaganda are contexts in which inflation is used.

In suggesting inflation as a way of critical thinking, I have insisted in perhaps a shocking manner that the criteria of rightness have been restricted unduly. Logic has been unduly narrowed. How far logic should be broadened I take to be systemic.

What might we do in teaching critical thinking?

If thinking is rule governed behavior, if man is obliged to follow rules, all thinking is critical. Since rules are rules only in a context and to be in a context is to agree in purpose, the teacher of critical thinking must help students to grasp the context in which the rule is appropriate. The content as well as the process must be learned. No single formulation of rules for thinking is applicable to any context. There are not five basic rules or six or seven or any particular number in critical thinking. We are mistaken when we teach one set of rules applicable in one context as if it were applicable to all contexts. In so far as the human is concerned, contexts are there. They have been given in his social relations as he has developed as a social being. There cannot be an entirely new context, for the game is already formulated. The time developed practice of teaching as subjects those contexts which are understood and having students learn to follow appropriate rules must continue, but the past and present neglect of contexts for which rules are appropriate need not continue. The mistake to which I am referring is exemplified in teaching for daily living. In teaching arithmetic, for example, the algorithms are taught as slices of pie or some such thing. The mistake is one of context. Slicing pie and putting together slices of pie is not the same as dividing and adding. Dividing and adding are done entirely with different symbols and different behaviors. When dividing and adding are transferred to pie cutting and pie summing, the rule is not the same. That the rules of mathematics are not the same as other linguistic rules becomes evident in what is done in solving problems stated in words. In solving word problems rules of translation from word symbols to mathematical symbols are followed. Only after such translation is the problem solved, and it is always solved in mathematics. Please note that translations of words to numbers and operational symbols in mathematics is quite different from slicing pies and mixing nuts, but in the usual teaching of mathe-

matics for life any sorting is left to systemic thinking by the student. Is it any wonder then that many students become hopelessly confused in arithmetic and understand mathematics as getting the right answer?

If the student learns to follow rules, he does so only when they are appropriate to a context. Nor does it follow from what I said that we should not teach rules of application. It does follow that rules of transfer must be grasped and that they can be followed only as rules of transfer and not as rules of the discipline from which they are transferred. Our failure to teach for transfer seems to result from the mistake of treating different contexts as the same. If we are going to be able systematically to teach for transfer, we shall have to grasp these rules and formulate them so that they can be taught.

I am not advocating a return to any “traditional” rote learning — if there ever was such a practice in teaching — but advocating that something like the *philosophy of* be included in teaching the disciplines. And the *philosophy of* should be extended beyond that of science and mathematics. Rules are to be found in logical realms other than deduction and induction. Is there merit in tentionation, referention, and influention?

FOOTNOTES

- 1 Peter Winch, *The Idea of a Social Science* (New York: Humanities Press, 1960).
- 2 It is my intention to use the term “rule” in its most general sense. It stands for a rule, a set of rules, or sets of rules.
- 3 Ludwig Wittgenstein, *Philosophical Investigations* (New York: The Macmillan Co., 1953), 87^c: 1, 237.
- 4 Kingsley Davis, “Final Note on a Case of Extreme Isolation,” *American Journal of Sociology* (March, 1947), 52.
- 5 *Op. cit.*, p. 88.
- 6 E. S. Maccia, “Models and the Meaning of ‘Retroduction,’” Occasional Paper 62-110, The Bureau of Educational Research and Service, The Ohio State University, 1962.