

## A NOTE ON LOGIC WITH TRUTH VALUE GAPS

AMIT KUMAR SEN

Being dissatisfied with the accounts of the truth conditions of a conditional proposition of truth functional two-valued logic, some logicians have tried to develop non-truth functional two-valued logic which may be classified under two heads namely, Quasi Truth Functional Logic advocated by Reichenbach and others and Logic with Truth Value Gaps advocated by Quine, Strawson and others. The purpose of this paper is to throw some light on logic with Truth Value Gaps and the obvious off shoot of it.

In truth functional two-valued logic the truth conditions of a conditional proposition are expressed by means of truth table in the following way :

p	q	$p \supset q$
T	T	T
T	F	F
F	T	T
F	F	T

The table shows that a conditional proposition like 'if sugar is put in water, it dissolves' - would be false if we actually put sugar in water but it does not dissolve. Even a lay man would agree with this view that a conditional proposition is false if the antecedent is true and the consequent is false. But with regard to the other truth conditions of a conditional proposition he suspects and raises the famous problem of the paradox of material implication which can be stated as : A false proposition implies any proposition, true or false, and a true proposition is

implied by any proposition, true or false. This paradoxical situation can be expressed in a proposition like 'If the sea-water is sweet, then the earth is round'. In truth functional two-valued logic since the antecedent is false, the conditional statement 'If the sea-water is sweet then the earth is round' becomes true, no matter what the truth value of the consequent is (vide, third and fourth row of the truth table) and again since the consequent is true, the conditional statement is once again true, no matter what the truth value of the antecedent is (vide, first and third row of the truth table.) Thus both the propositions 'If  $2+2=5$  then Russell is a philosopher' and 'If  $2+2=5$  then Russell is not a philosopher' are true because the antecedents of them are false. Again 'If  $2+2=4$  then Russell is a philosopher' and 'If  $2+2=5$  then Russell is a Philosopher' - both these two propositions are true because the consequents of them are true. But one's common sense would revolt here on the ground of the question of relevance between the antecedents and the consequents of the above propositions. One cannot take the above propositions as true from the point of view of ordinary language. In truth functional logic notion of relevance is irrelevant but in the logic of ordinary language the notion of relevance is very much relevant. So from the point of view of logic of ordinary language a conditional proposition cannot be taken as true in the first, third and fourth row of the above truth table. Can a conditional proposition be false in those cases in the logic of ordinary language? No, because not to speak of truth functional logic, even in ordinary language logic a conditional proposition is false if and only if the antecedent of it is true and the consequent is false. As this condition of falsity is not satisfied in the first, third and fourth row of the truth table, a conditional statement cannot be false in those cases. Thus from the point of view of ordinary language logic, the first, third and fourth row of the above truth table should be kept BLANK, as in those rows neither T nor F can be inserted.

From this ordinary language point of view some philosophers have developed non-truth functional logic with truth value gaps. The names W.V. Quine, P.F. Strawson, Van Fraassen and K. Lambert are associated with this system of logic. But perhaps all of them have got the clue to this logical system from the philosophy of Gottlob Frege. Here we shall confine our discussion to Frege, Quine and Strawson.

In his 'On Sense and Reference' Frege expresses the view that (i) the reference of a sentence is its truth value and (ii) the reference of a compound sentence depends upon the references of its parts. So, if any part of a compound sentence lacks reference then the compound sentence as a whole lacks reference. Frege, however, ruled out the possibility of denotationless singular terms from the province of logically perfect language and consequently from his logical system. But as he could not claim that definite description be well-formed only if it has a denotation (because such a claim would require a logic to dictate ontology), he adopted an alternative strategy of providing a denotation for any well-formed expression some parts of which lack denotation. Frege thought that an expression must always be assured of reference by providing a purely ad hoc or conventional denotation e.g. by the convention that zero (null class) shall count as its reference, when the concept applies to no object at all.

According to W.V. Quine one conspicuous way in which ordinary language diverges from the language as reflected in logical forms is in the existence of what he calls truth value gaps. One illustration in his *Methods of Logic* is the conditional under ordinary usage in the indicative mood. Ordinarily, Quine thinks, the conditional is not thought of as true or false at all, but rather the consequent is thought of as conditionally true or false given the antecedent. Another example, Quine offers in his *Methods of Logic* is provided by the singular description. If the object which it purports to describe does not exist, then commonly the contexts of description are accorded no truth values under ordinary usage.

When Strawson maintained that 'The king of France (in a republican age) is bald' cannot have any truth value because the question of its truth or falsity does not arise at all due to the failure or the non-satisfaction of the presupposition requirement, he was also propagating truth value gaps logic. Now what is presupposition requirement? Strawson in his *Introduction to Logical Theory* has offered two solutions to the problem of existential import of categorical proposition raised by Leibnitz and others, one is the *ad hoc* formalistic solution and the other is the realistic solution. In realistic solution an interpretation of the doctrine of existential import is given in a way different from the orthodox interpretation. According to the orthodox interpretation a categorical proposition has existential import with respect to the subject term in the sense that it entails

existence of the object denoted by the subject term. But Strawson's interpretation is that a categorical proposition has existential import with respect to the subject term in the sense that it presupposes existence of the object denoted by the subject term. Strawson explains the difference between entailment and presupposition of existence by saying that in the case of entailment, existence of the object denoted by the subject term is a necessary condition of the truth only of the proposition in question, but in the case of presupposition, existence of the object denoted by the subject term is a necessary condition of both the truth and the falsity of the proposition in question.

One of the consequences of this difference is that under the first interpretation if the existence condition is not fulfilled, a categorical proposition would be false, but under the second interpretation if the existence condition is not fulfilled, a categorical proposition would be neither true nor false. Now if a proposition is neither true nor false, it may be called 'indeterminate'. Indeterminate is not a truth value, it is only a failure of truth value. So Strawson's logic is a non-truth value gap logic.

A substantial off-shoot of Strawson's reflexious on truth value gaps is a theory expounded by him in the article "On Referring" (Mind, 1950) in which a distinction is made between the referential role and the predicative role of singular terms. Normally, if the role of a singular term in a given statement is referential, the question of truth value of the statement does not arise at all in case the purported object of the term is found not to exist. Since formal logic closes all such truth value gaps, there is nothing in it to correspond to the referential role of singular term in Strawsonian sense. Strawson points out that proper names, so called by the formal logicians, are far from corresponding to the singular terms of ordinary language. And on this point Strawson finds the formal logic in a difficulty. To quote Strawson. "Now the whole structure of quantificational logic, with its apparatus of individual variables, seems, or has seemed to most of its exponents, to require, for its application to ordinary speech to be possible at all, that there should exist individual referring expressions that could appear as values of the individual variables". (*Introduction to Logical Theory*, Page - 216).

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