

# Positive Accounting Theory and Science: A Comparison

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# Positive Accounting Theory and Science: A Comparison

## *Abstract*

*Positive accounting theory (PAT) has been one of the most influential accounting research programs during the twentieth century. This paper examines the development of PAT and compares it with three standard accounts of the development of science. This paper shows that there are important similarities between PAT and sophisticated falsificationism, Kuhn's (1996) account of science and the Lakatosian research program. There are important dissimilarities among them also.*

## **1. Introduction**

This paper compares the positive accounting theory<sup>1</sup> (hereinafter PAT) with three standard accounts of science. PAT has been one of the most influential accounting research programs during the last three decades. It would be interesting to see how this literature developed over time and how it compares with science. This is because Watts and Zimmerman (hereinafter W & Z only) (1986: Chapter One) have appealed to the sameness of their view of theory and that in science to promote their theory.

It is interesting to note that not many articles compared the development of PAT with different accounts of science in spite of the fact that W & Z appealed to science as a way of promoting

their theory. Mouck (1990) is the notable exception. He likened PAT to the Lakatosian research program. Others (e.g., Christenson, 1983; Sterling, 1990) criticized PAT not for following the methodological dictates of Popper. This paper chooses Popper (1959), Kuhn (1996) and Lakatos (1970) for comparison purposes. Though these accounts are a little old, this paper chooses these three accounts of science because W & Z (1986) cite these sources and these accounts do not give the same account of the development of science.

This paper relies mainly on W & Z's 1986 book and 1990 paper and the empirical accounting literature of accounting choices. The first two sources contain some methodological discussion by the two protagonists of PAT and the empirical accounting literature is surveyed to determine how it developed during the last three decades.

This paper disagrees with the conclusion of Mouck (1990) and argues that PAT shares similarities with both Popper and Kuhn and there are important dissimilarities among these. Specifically, the analysis in this paper reveals that PAT holds that data are not the final arbiter of a theory. Rather there is a complex interplay between theory and data. Thus, anomalous evidence does not automatically lead to the rejection of a theory. A theory is to be abandoned only when a competing theory with greater explanatory power emerges. Thus, the choice between theories is rational and accounting knowledge is cumulative in nature.

However, this paper raises future challenges to be resolved by PAT researchers. It is argued here that holding that a theory is replaced when a competing theory with greater explanatory power emerges does not resolve the theory choice problem rationally. Specifically, choosing between competing theories rationally is problematic when a new theory explains some aspects of the old problem and some new problems not explained by the old theory.

The analysis in this paper is expected to be useful to research students who are doing empirical research. As Feyerabend (1993) and Chalmers (1999) show, science does not follow the conventional belief that it (science) is based on data only. PAT does not follow that either. Complex value judgments enter the process. Students will do well if they remember that in science there is a complex interaction between data, theory and value judgments.

The rest of this paper is structured as follows. The next section provides a brief sketch of the development of positive accounting theory and then the development of the PAT is compared with three standard accounts of the development of science in the third section. The last section contains the summary.

## **2. Development of PAT<sup>2</sup>**

PAT started with examining some assumptions underlying normative accounting prescriptions during the 1960s. Two sets of empirical studies<sup>3</sup> were conducted. One set of studies (e.g., Ball and Brown 1968; Beaver 1968; Foster 1977; Beaver, Clarke and Wright 1979; Beaver, Lambert and Morse 1980; Grant 1980; McNichols and Manegold 1983) examines the association between accounting earnings numbers and stock prices. Results indicate that earnings numbers reflect factors (e.g., cash flow, risk, etc.) relevant to stock valuation. This, according to W & Z (1986), undermined the claim in normative accounting literature that accounting earnings numbers are meaningless because they are computed using multiple valuation bases. The second set of studies (e.g., Kaplan and Roll 1972; Sunder 1973, 1975; Ricks 1982; Biddle and Lindahl 1982) attempts to discriminate between two competing hypotheses- the no-effects hypothesis and the mechanistic hypothesis.<sup>4</sup> Evidence in these studies is mixed and could not successfully discriminate between the competing hypotheses.

The above sets of studies have used the EMH and CAPM as their underlying foundation. Furthermore, it was assumed that contracting costs<sup>5</sup> were zero. Overall, these studies raised doubts about the empirical descriptiveness of the following assumptions underlying normative prescriptions during the 1960s: (a) there is only one source of information about a company, (b) earnings numbers are useless because they were not prepared according to a single basis, and (c) it is possible to mislead the stock market by manipulating the earnings number through accounting choices. Information content studies reveal that these assumptions are unlikely to be descriptive of the real world. The EMH implies that there is competition for information. There are alternative sources of information about the firm such as information releases by management, interviews of corporate personnel by analysts, etc. The observed association between unexpected earnings and abnormal rate of return reveals that earnings number reflects factors relevant to the valuation of stock despite not being calculated on a single basis. Furthermore, the believers in EMH and CAPM argued that it is not possible to systematically mislead the market by accounting changes. The market differentiates between accounting changes having cash flow effects and changes with no cash flow effects. Thus, the mechanistic hypothesis was unlikely to be descriptive of the real world.

As noted above, early studies could not successfully discriminate between the no-effects hypothesis and the mechanistic hypothesis. This did not lead to the rejection of the no-effects hypothesis. Instead the results led the researchers to examine the methodological aspects of those studies and question the empirical validity of one important assumption (i.e., zero contracting costs) underlying the tests. This has led to a breakthrough in accounting research. It has long been held in economics that contracting costs are non-zero (Coase 1937). Accounting researchers abandoned the assumption of zero transaction and information costs.

This breakthrough opened the door to possibilities for explanation and prediction of variation of accounting practice across firms. The major idea behind this literature is that the firm is a nexus of contracts and accounting methods constitute an integral part of this set of contracts. Accounting numbers are used to write, monitor, and enforce contracts. Viewed in this way, accounting can affect firm value via their impact on contracts. Accounting is no longer mere form as was assumed under the EMH and CAPM regime. Under the EMH and CAPM regime, accounting is mere form and does not affect cash flow except the switch to the LIFO inventory method that affects tax. The dropping of the assumption of zero contracting costs has shown that accounting methods have the potential to affect the cash flow to the contracting parties. It thus provides incentives to the contracting parties to influence accounting methods.

Though the above idea is general, early empirical studies of accounting choices investigated the impact of variables related to earnings-based bonus plans, debt, and the political process affecting the firm. Three major hypotheses tested are: (a) the bonus plan hypothesis, (b) the debt-equity hypothesis, and (c) political cost hypothesis. The bonus plan hypothesis states that firms with bonus plans choose accounting methods so as to increase current period earnings. The debt-equity hypothesis says that firms with higher debt-equity ratios choose accounting procedures so as to shift earnings from future periods to the current period. The argument is that the higher the debt-equity ratio, the closer the firm is to the debt covenant constraints. The closer the firm to the debt covenant constraints, the higher the possibility is of technical default. And technical defaults are costly. Firms choose accounting procedures to loosen the constraints. The political cost hypothesis says that large firms rather than small firms choose accounting methods so as to shift earnings from the current period to future periods. Size has been used as the proxy variable for political attention in early studies (e.g., W & Z 1978). Underlying all these hypotheses is the assumption of non-zero contracting costs. Empirical evidence is generally consistent with these hypotheses<sup>6</sup> (See W & Z 1986: Chapter Eleven; Christie 1990).

After the initial studies of earnings management, empirical studies have investigated different hypotheses. For example, some have examined earnings management around specific events (e.g., management buyouts (DeAngelo 1986), labor negotiation (Liberty and Zimmerman 1986), proxy contests (DeAngelo 1988), import relief investigation (Jones 1991), non-routine executive changes (Pourciau 1993), and initial public offerings (Teoh, Wong and Rao 1998)). Still others have investigated the linkage between corporate governance characteristics and earnings management. For example, Bushee (1998) finds that high turnover and momentum trading by institutional investors encourages managers to reduce R&D investment to reverse earnings decline when institutional ownership in the firm is high; otherwise institutional investors perform a monitoring role in checking myopic R & D investment behavior. Again, Reitenga and Tearney (2003) find evidence of earnings management during the departing CEO's final years, with the evidence being stronger when the CEO retained his/her board seat. They further find that independent directors and CEO stockholdings mitigate earnings management, while institutional stockholders seem to exacerbate it.

### **3. PAT and Science**

Popper (1959) gives one of the most famous accounts of science. He is a falsificationist. Lakatos (1970) describes three brands of falsificationism: dogmatic, naive and sophisticated. Dogmatic falsificationism says that all theories are conjectural and science cannot prove, it can disprove. They demand that once a theory is disproved, it must be unconditionally rejected. This means that science grows by the repeated overthrow of theories by hard facts. (Lakatos 1970: 97). Naive falsificationism is similar to dogmatic falsificationism except that some methodological decisions<sup>7</sup> need to be taken in naive falsificationism. Lakatos (1970: 115) mentions two characteristics common to both dogmatic and naive falsificationism: (a) a test is- or must be

made- a two-cornered fight between theory and experiment, and (b) the only interesting outcome of this confrontation is refutation of the theory. PAT researchers do not subscribe to this methodological dictate of falsificationism<sup>8</sup> W & Z (1986: 10) propose that anomalies need not lead to the abandonment of a theory. A theory is not discarded merely in the presence of inconsistent observations (W & Z 1990: 150). No theory ever predicts all the phenomena successfully. The data-theory fit is never perfect. What leads to the abandonment of a theory is the emergence of an alternative theory with greater explanatory power (W & Z 1990: 140). In an important sense, this position resembles both Kuhn's (1996) and that of sophisticated falsificationism. Kuhn's (1996: 77) study of the history of science suggests that a paradigm is declared invalid when an alternative paradigm emerges to take its place. The decision to abandon a paradigm is simultaneously a decision to accept an alternative paradigm. That decision involves a comparison between alternative paradigms and between the paradigms and nature. According to sophisticated falsificationism, a scientific theory  $T_0$  is falsified if another theory  $T_1$  has emerged with the following characteristics: (a)  $T_1$  has excess empirical content over  $T_0$ , i.e.,  $T_1$  predicts novel facts, (b)  $T_1$  explains the previous success of  $T_0$ , and (c) some of this excess empirical content of  $T_1$  has been corroborated (Lakatos 1970: 116).

Accounting-based stock market anomalies illustrate the attitude of PAT researchers towards anomalies. Ball and Brown (1968) reports evidence on post-earnings-announcement drift (PEAD) and since then other studies (e.g., Sloan 1996; Hirshleifer, Hou, Teoh and Zhang 2004; Taffler, Lu and Kausar 2004) documented other accounting-based anomalies. As Nichols and Wahlen (2004) note, PEAD remains one of the most puzzling anomalies in accounting-and finance-based capital market efficiency tests. Yet capital market-based accounting researchers have not abandoned the Efficient Market Hypothesis. Rather researchers have looked at the data and statistical tests more critically, redefined market efficiency, suggested alternative explanations for anomalies and further research opportunities. Basu (2004) is an example.



Every observed fact is fact in the light of an ‘interpretative theory’ (Lakatos 1970). Thus, when any observed fact clashes with a theory, that clash may be between the theory under test and the ‘interpretative theory’. Thus, the clash between facts and the theory need not indicate that the theory under test be eliminated, rather it may indicate the need for reviewing the interpretative theory. Both Lakatos (1970: 128-29) and Feyerabend (1993) tell us that this happened in the history of science and this has happened in the history of PAT. For example, when studies of earnings management in which accruals have been used as the dependent variable failed to come up with evidence consistent with earnings management hypothesis, the whole program has not been overthrown. When accruals are used as the dependent variable, they are used as proxy of discretionary accruals. Thus, accruals data are discretionary in the light of a theory. There may be problems with that theory. Thus if accruals data fail to confirm earnings management, the failure need not indicate that the theory under test (i.e., earnings management) be rejected, rather it may indicate the need for review of the accrual models. Indeed, PAT researchers have invested considerable energy and time in constructing different models of accruals. And it is to be noted that this investigation of accruals models started without any significant anomaly. In fact, Healy’s 1985 paper, which used accruals in investigating earnings management for the first time and came up with evidence consistent with the hypothesis, caused Kaplan (1985) to raise questions about the appropriateness of his (i.e., Healy’s) accruals model.

Lakatos (1970) admits that there have been crucial experiments in the history of science and those experiments led to the rejection of a theory. But he shows that the elimination process is slow and sometimes takes decades. He further argues that crucial experiments become crucial after the emergence of a better theory (Lakatos 1970: 158-59). Hindsight plays an important role in this regard. Furthermore, it has been noted in the history of science that with the passage of time anomalies have turned into corroboration of the theory under test (Lakatos 1970:137).

The response of positive researchers to the failure of early studies to discriminate between the competing hypotheses- the no-effects hypothesis and the mechanistic hypothesis- illustrate the attitude of positive researchers towards data and theory. The failure of early studies to discriminate between the competing hypotheses did not lead them to reject the EMH. This is because tests of the no-effects hypothesis are tests of the joint hypotheses of EMH, CAPM, and zero contracting costs. The failure might be due to the empirical non-descriptiveness of any one assumption- EMH, CAPM, or zero transaction cost. Success of EMH in finance seems to have had also its impact on the positive researchers' attitude. As noted earlier, instead of rejecting the EMH and CAPM, researchers started to raise question about the descriptive validity of zero transaction costs and finally dropped the assumption. This suggests that positive researchers do not regard empirical evidence as the final arbiter of a theory. Both data and theory have influence over each other. Complex value judgments enter the process. Success of a theory in contiguous disciplines may lead researchers to ignore certain contrary evidence. This has happened in this case. Success of EMH and CAPM in finance and accounting may have played a role in this regard. It is to be noted that the dropping of the zero contracting cost assumption led Mouck (1990: 236-237) to consider PAT as resembling the Lakatosian research program. The validity of this argument is suspect, because the dropping of the zero contracting costs led to the emergence of a research program distinct from capital market-based accounting research. The new line is the research in accounting choices. It is true that dropping the zero contracting costs assumption enables positive researchers to explain accounting choices. But the two research programs address different issues. The new research program addresses different questions, let alone explaining the success of the capital market-based accounting research program. This developmental pattern does not fit the Lakatosian program, because, according to this program, adjustments are made in the protective belt to accommodate new facts (Lakatos 1970:133-37).

After adjustment, the research program continues to explain the unrefuted content of the earlier version of the theory.

There is another important similarity between the development of PAT and Kuhn's account of science. What Kuhn calls 'normal science'<sup>9</sup> characterizes the development of PAT in important aspects. Normal science involves detailed efforts to articulate the paradigm with the aim of improving the match between it and nature. A paradigm will always be sufficiently imprecise and open-ended to leave plenty of that kind of work to be done. Kuhn depicts normal science as a puzzle-solving activity governed by the rules of the paradigm. The puzzles will be of both a theoretical and experimental nature.

Normal scientists must be uncritical of the paradigm in which they work. It is only by being so that they can concentrate their efforts on the detailed articulation of the paradigm and to perform esoteric work necessary to probe nature in depth.

PAT defines the legitimate problems and methods for the researchers. The problems that concern the positive researchers are: Why does management choose certain accounting methods, not others? Why does management switch from one accounting method to another? What incentives and constraints does management face in making accounting choices? These questions have occupied the positive accounting researchers since the publication of W & Z's 1978 paper. The property rights literature has served as the theoretical foundation for PAT.

W & Z's 1978 paper propagated the idea that management's incentives determine their lobbying position on an accounting standard. Later researchers expanded this idea and developed many hypotheses linking an agent's incentives and his/her accounting choice behavior. Since the

publication of W & Z's 1978 paper, PAT researchers have engaged themselves in the expansion and articulation of this theory.

Two examples illustrate the above point. The first one is the measurement of the dependent variable (i.e., opportunistic accounting choice by management) in studies of earnings management. Early researchers (e.g., Deakin 1979; Hagerman and Zmijewski 1979; Dhaliwal 1980) investigated the choice of a single accounting procedure (e.g., depreciation methods, inventory costing methods, etc.) at a time. This led to the criticism that managers manipulate earnings number not through a single accounting procedure but by a number of accounting procedures that are available to management. This led Zmijewski and Hagerman (1981) to investigate a portfolio of accounting procedures. Healy (1985) went further and used accounting accruals as the dependent variable to capture the effects of a host of discretionary decisions- both accounting and real- by management. While accruals provide a summary measure of managerial discretion and a possible improvement over previous studies, it suffers from certain shortcomings. Healy (1985) uses total accruals as a proxy for discretionary accruals. The major question that researchers (e.g., Kaplan 1985; McNichols and Wilson 1988) have asked is whether total accruals are all discretionary in nature. This then engages positive researchers to design better models of discretionary accruals. DeAngelo (1986), Jones (1991), Dechow, Sloan and Sweeney (1995), Dechow and Sloan (1991), Teoh et al. (1998), and Kothari, Leone and Wasley (2005) develop different models of discretionary accruals.

As mentioned earlier, the three most tested hypotheses are the bonus plan hypothesis, the debt-equity hypothesis and the size hypothesis. Early studies used crude proxies of variables representing managerial bonus, debt covenant constraint, and political cost. However as time passed, researchers refined both theory and the variables. For examples, early researchers used (1,0) dummy variable to represent the existence of bonus plan to test the bonus plan hypothesis.

Later researchers (e.g., Healy 1985) examined the details of bonus plan and generated hypotheses linking bonus plan details and direction of earnings management. We observe similar efforts (e.g., Duke and Hunt 1990; Press and Weintrop 1990) in articulating the debt/equity hypothesis. Again, early researchers (e.g., W & Z, 1978) used size as a proxy for political cost. This was criticized on the ground that size might proxy for variables other than political cost. Later studies examine managers' accounting choice behavior in response to situations that reflect firms' sensitivity to specific political situation. Jones (1991) is an example. She investigates the accounting choice behavior of managers of domestic producers that would benefit from import protection.

The above two examples illustrate how one study builds on previous studies. Studies were conducted to improve on previous studies. These two examples also illustrate how PAT defines the particular questions addressed and keeps a group of researchers occupied.

However, there is an important difference between PAT and Kuhn's (1996) account of science. W & Z's (1990: 140) position that a theory is abandoned when an alternative theory with greater explanatory power emerges indicates that the competition between rival theories can be decided rationally. The theory with greater explanatory power is selected. This indicates that PAT researchers consider knowledge cumulative in nature. Popper (1970: 56-57) subscribes to this idea. He believes that a critical comparison between competing frameworks is always possible. However, Kuhn (1996: 103) suggests that rival paradigms are incommensurable. Thus the debate over rival paradigms cannot be settled by logic or experiments alone (Kuhn 1996: 148-150). Persuasion is used to convert the supporters of the old paradigm to the new one (Kuhn 1996: 154). One of the most important features of Kuhn's account of science is that science is not cumulative in nature. This contrasts with PAT researchers' position. Thus, PAT researchers'

methodological position does not fit neither Popper's nor Kuhn's position completely. Nor does it fit the Lakatosian program. It contains elements of all the three.

#### **4. Summary and Discussion**

This paper compared the development of PAT with three standard accounts of science: Popper, Kuhn and Lakatos. This paper shows that there are important similarities between PAT and Popper's falsificationism, Kuhn's (1996) account of science and the Lakatosian research program. There are important dissimilarities among them also. Table 1 summarizes the methodological positions of PAT and compares them with three accounts of science.

Table I Here Please

However, PAT's methodological position regarding theory choice runs into difficulty when an old, established theory is compared with a new one. A competing theory with greater explanatory power does not emerge on all a sudden as W&Z (1990) seem inclined to admit in the case of PAT itself. It develops over time. So the question is: how to decide the fate of a newly emerging theory when it explains some aspects of the old theory and some new phenomena not explained by the old one? In other words, how to decide rationally whether to give chance to a new theory or allow it to die away in its infancy? Doubtless to say, a rational decision is much easier to take in Situation A below than in Situation B.

Figure 1 Here Please

Though there is contact between the theories in Situation B, the overlap is not complete. One possibility is that a host of strategies, rhetoric included, will be used to attract followers to the respective camps. Though there is no overlap between the types of questions addressed by PAT and normative accounting theory, the debate between these two camps may be instructive in this regard.

## Notes

1. There is some confusion about what PAT is. If the definition of accounting theory (i.e., accounting theory seeks to explain and predict accounting and auditing practice) given in Watts and Zimmerman's (W & Z) 1986 book is taken to mean PAT, studies of accounting choices and auditing practices constitute PAT. This theory is discussed in Chapters 8-14 of W & Z (1986). However, W & Z (1986: 1) says that their book seeks to explain the economics-based empirical literature in accounting and their book describes, in addition to accounting choice studies, capital market-based accounting research. W & Z (1986: 37) further say that Ball and Brown's 1968 paper initially popularised positive research in accounting. This seems to suggest that PAT includes both capital market-based accounting research and research in accounting choices. This paper takes PAT to include both research programs.

2. This section is largely based on W & Z (1986).

3. Watts and Zimmerman (1986: Chapter Three and Four) review some early studies of this literature.

4. The no-effects hypothesis says that no stock price changes are associated with voluntary changes in accounting procedures unless they have any cash flow impacts. This hypothesis is based on EMH, CAPM, and zero contracting costs. The mechanistic hypothesis, which underlies much of the accounting prescriptions, posits a mechanical relation between accounting changes and stock price changes. This hypothesis states that managers can systematically mislead the stock market by manipulating the earnings number through accounting changes. The no-effects hypothesis, on the other hand, says that the market can see through the earnings number. See W & Z (1986:72-76). The mechanistic hypothesis is similar to but different from the functional fixation hypothesis. The difference is that the mechanistic hypothesis is about aggregate (e.g., market) behavior while the functional fixation hypothesis is about the behavior of individual investors (W & Z 1986: 160, footnote 1). The Fallacy of Composition says that the market may be efficient even if individual investor behavior may indicate otherwise.

5. Contracting costs denote the amalgam of transaction costs, information costs, agency costs, renegotiation costs, and bankruptcy costs (W & Z 1990: 134-135).

6. There have been problems of interpretation of the empirical regularity observed in positive accounting research. Especially it has been argued that omitted variables may be responsible for the evidence gathered in accounting choice



studies. Thus, it may be erroneous to attribute the regularity to the contracting variables related to management compensation, debt and the political process. See W & Z (1990) for this and other criticisms of the positive accounting literature.

7. One such decision is to demarcate the theory under test from the unproblematic background knowledge. (Lakatos 1970: 107).

8. Some (e.g., Christenson 1983; Sterling 1990) have criticized PAT because it does not follow the methodological dictates of Popper. Christenson refers to naive (methodological) falsificationism and Sterling refers to either dogmatic or naive falsificationism. As argued in this section, this criticism is misplaced. Anomalies abound in science (Lakatos 1970). Chalmers (1991: 91) probably gets it right when he says that theories that are considered as being among the best examples of scientific theories would never have been developed if they had been rejected in their infancy. In a similar vein, W & Z (1990: 149) argue, in response to Hines' (1988) criticism of laxity in W & Z's 1978 paper, that if all the methodological dictates were applied to a single paper, no research paper would ever be published. Popper (1970: 55) later admits that dogmatism has an important role to play in science. If scientists give in to criticism too easily, they shall never find out where the real power of theories lies.

9. Popper (1970: 52) acknowledges the existence of normal science. However, his attitude towards normal science is strikingly different from Kuhn's. While Kuhn views normal science as essential to scientific progress, Popper considers the uncritical attitude of normal scientists unfortunate.

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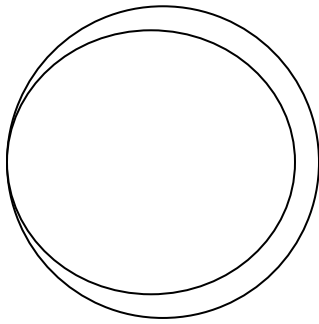


Table 1

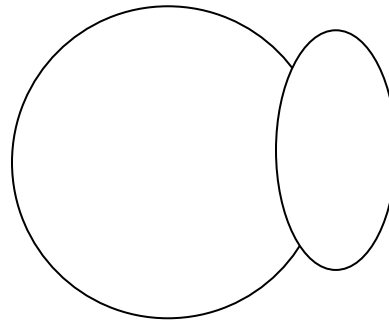
Methodological positions of PAT compared with three accounts of science

| <b>PAT</b>  | <b>Popper</b> | <b>Kuhn</b> | <b>Lakatos</b> |
|---|---------------|-------------|----------------|
| Data are not the final arbiter of a theory.                           |               |             | √              |
| Anomalies should not automatically lead to the rejection of a theory. |               | √           |                |
| A theory should be abandoned only when an alternative theory emerges. |               | √           |                |
| Knowledge is cumulative.  | √             |             | √              |
| Resembles normal science in important respects.                       |               | √           |                |

(Please insert the above table in page 14 in the text )



Situation A: The new theory explains all of the old theory and some new phenomena



Situation B: The new theory explains some of the old theory and some new phenomena.

Figure 1 Two possibilities of the relation between an old, established theory and a new one

(Please insert the above figure in page 14)