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ATMOSPHERE EFFECT IN SYLLOGISTIC REASONING IN RELATION TO DEPENDENCE PRONENESS

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Abstract

The Relationship between dependence proneness and atmosphere effect in Syllogistic reasoning explored in the present study. Dependence proneness has been conceptualised as an extension and generalisation of field-dependence dimension of cognitive style. It was hypothesised that subjects high on dependence-proneness would be more vulnerable to atmosphere of the syllogistic in judging the correctness of a conclusion as compared to the subjects low on the same attributes. A 2 x 4 mixed factorial design was used. Results confirmed the hypothesis, findings have been explained on the basis of cognitive characteristics of a dependence-prone person and the cognitive competence required in solving syllogistic problems. ***International Journal of Social Science and Public Policy, 1998:1(2) pp 135-144)***

Introduction

Frequent errors made in solving syllogism are no longer accepted as indicative of faulty reasoning. Researches carried out in the area consider erroneous reasoning as functions of a variety of factors such as difficulty in deciding what task a subject has to perform (Richter, 1957), understanding of the material, inherent ambiguity of the material, and subject's ability to store representation in memory (Chapman & Chapman, 1959; Henle, 1962; Whimbey & Ryan, 1969; Ceraso & Provitera, 1971; Erickson, 1974 and Revlis, 1975a, 1975b) and illogical reasoning processes of a quasi-rational human being (Chapman & Chapman, 1959; Frase 1966a, 1966b, 1968; Pezzoli and Frase, 1968; and Dickstein, 1976). There is yet another group of researchers in Social Psychological tradition that maintains that man is irrational as far as syllogism is concerned. These researchers (Wilkin's 1928, Janis & Frick, 1953; Morgan & Mortan 1944; Winthrop, 1946; Lefford, 1946; Gordon, 1953; Janis & Terwilliger, 1962; Feather, 1965; Wilson, 1965; Kaufman & Goldstein, 1967; and

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Parrott, 1967) have concluded that untrained reasoners are not strictly logical intheir inferences and that they base their decisions primarily on personal knowledge and biases. They do not depend on the logical form of the arguments but rather on the believ-ability of the conclusions. It has been stated that most of the traditional studies as well as the studies of the social-psychological trend support the view of man as an irrational reasoner. The concept of atmosphere effect lies on the same line. Woodworth & Sells (1935) and Sells (1936) first formulated the atmosphere hypothesis in an attempt to explain syllogistic errors. They proposed that the "global impression" or atmosphere of the premises is an important factor in erroneous reasoning. While deducing inferences from the given premises of syllogism, presumably one quickly becomes set for the global impression of the given information and responds accordingly. Accurate reasoning demands an analysis of what is given. Attention should be focused on understanding the interrelation among bits of information. Almost the same explanation of atmosphere effect has been given by Revlis (1975), and Revlis and Lefrer (1978), in their conversion model of composite representation of extracted information. The atmosphere effect is a set which arises within the individual and which is derived from and specific to a particular problem (Sells, 1936). It occurs in problems or situations in which there are closed series of responses related to a single task. In such tasks an individual makes a response (an inference or judgement) which is most similar in quality to the general trend or tone of the whole task situation set up. This is a psychological determiner of an individual's response in a situation. A good number of literature review on atmosphere effect, show that the way in which a reasoner appreciates the syllogistic premises, and extracts his logical meaning as causal entity is not devoid of erroneous reasoning. Sells has concluded that it is the global impression of given premises which leads to syllogistic errors.

Dependence-Proneness has been conceptualised as a personality characteristic that underlines a class of behaviours (Sears, McCoby & Lewin, 1957; Harlow, 1958; Wiggins & Winder, 1961; Kagan & Moss, 1962; Geuirtz, 1967; and Sinha, 1968). Tiwari (1981) has conceived dependence-proneness as an extension and generalisation of individuals' field dependent type of cognitive style. his results have revealed that a socially dependence-prone person exhibits his cognitive functioning as that of a field dependent person.

According to the atmosphere hypothesis (Sells, 1936) of erroneous syllogistic reasoning, it is intuitively clear that atmosphere is a sort of contextual background created by given premises which eventually influence the reasoning processes and that person who is more susceptible to external contexts is more likely to be influenced by the syllogistic wordings and consequently to make relatively more erroneous

deductions. The cognitive characteristics of a dependence prone person should lead him to be easily swayed by the surroundings and thus, committing more errors due to atmosphere effect in a categorical syllogistic task. In view of the Sell's interpretation of atmosphere effect and cognitive characteristics of a dependence-prone person, it may be predicted that when subjects are provided with categorical syllogisms, the correctness of their logical deductions should be influenced by the degree of their dependence-proneness: Less dependence-prone subjects would be more resistant to the global impression of given premises, less confused and extracting the meaning of the word "some" and the interrelationship between two premises leading towards significantly lesser atmosphere effect as compared with more dependence prone persons.

Not only this, if the dependence-proneness has to do anything with syllogistic reasoning, it should influence not only a particular form of syllogism but all possible variations of categorical or conditional syllogism to the extent they create general contextual conditions from information required for reasoning. The present study aims at ascertaining, whether there is any relationship between the dependence-proneness of the subject and atmosphere effect in solving categorical syllogisms of all possible moods of each of the four different possible figures.

Method

Subjects

The subjects were 60 male students enrolled for Social Psychology course of the Department of Sociology, University of Calabar. For selection of subjects, Dependence-proneness scale (Tiwari, 1981) was administered to 120 students who stated in response to a question that they had not dealt with syllogistic reasoning at any stage of their studies. On the basis of their dependence-proneness scores, individuals were classified into three groups, Profiles were arranged in order of increasing dependence-proneness scores. Those thirty persons (25% of the total group) securing highest dependence-proneness scores were classified as high dependence-prone group and those lowest thirty-person obtaining dependence-proneness scores were put into low dependence-prone group. These two extreme groups only served as subjects in the present experiment. They were significantly different with respect to their dependence-proneness scores ($F[1,58] = 602, 55$; $P < .01$).

Stimulus Materials

A syllogism test constructed by (Tiwari, 1981) consisted of all the possible 45

invalid categorical syllogisms. Out of these 45, there were 12 syllogisms of figure 1, 11 of figure II, 10 of figure III and 12 of figure IV. Two syllogisms from figure I and the one from figure II and two from figure IV, were discarded randomly, in order to make the number of syllogism equal, for all the four figures. Thus in the final form of the test, there were forty syllogistic items, 10 from each figure. A complete list of figures and moods of items are given in Table 1.

TABLE 1: Complete list of forty syllogisms with their moods, figures and conclusions given in the syllogistic reasoning test.

Item No.	Mood	Fig.	Concl.	Item No.	Mood	Fig.	Concl.
12	AA	II	A	22	IA	II	I
2	EE	I	E	21	IE	I	O
13	EE	II	E	8	IE	II	O
4	EE	III	E	24	IE	III	O
26	EE	IV	E	36	IE	IV	O
39	II	I	I	32	IO	I	O
33	II	II	I	23	IO	II	O
25	II	III	I	7	IO	III	O
6	II	IV	I	5	IO	IV	O
40	OO	I	O	9	OA	I	O
34	OO	II	O	20	OA	IV	O
35	OO	III	O				
15	OO	IV	O				
38	AE	III	E	10	OE	I	O
				11	OE	II	O
29	AO	III	O	37	OE	III	O
				18	OE	IV	O
28	EA	IV	E				
1	EI	I	O				
27	EI	IV	O				
31	EO	I	O				
30	EO	II	O	16	OI	I	O
3	EO	III	O	19	OI	II	O
14	EO	IV	O	17	OI	III	O

With each syllogism, a conclusion was also given, the correctness of which was to be judged by subjects. The conclusions given were of that type which would have

been derived by subjects if atmosphere effect would occurred. A given conclusion was one of the four possible types of conclusions (A,E,I and O type). Logically, none of the four possible conclusions was correct since all the syllogisms of the test were invalid. The selection of the conclusion was done on the basis of principles laid down by Sells (1936). Four alternative judgements, "absolutely correct", "partially correct", "indifferent", and "absolutely wrong", were provided. Subjects had to judge the correctness by endorsing one alternative which they thought as most applicable. Since all the syllogisms of the test were invalid, the correct answer for the subjects was 'absolutely wrong'.

Dependence-proneness scale was used for the dependence-proneness of the subjects. This scale which consists of 21 Yes/No type of items (Tiwari, 1981) was presented and standardised by the investigator before it was employed.

Design

Two independent variables: Dependence proneness and type of syllogism were manipulated in a 2 x 4 mixed factorial design. Dependence-proneness was manipulated through subject selection technique with two levels: high dependence-proneness and low dependence-proneness. The other independent variable, type of syllogism, was actively manipulated with four levels by having syllogistic problems pertaining to all four possible figures. The syllogisms of all the four figures were given to all subjects. Thus the total data obtained in this experiment were correlated in one direction and uncorrelated in the other.

Instructions

While giving syllogism test, subjects were given the following instructions: "This is a test of your reasoning capacity. I shall give you test-items of reasoning and you will be allowed to solve them in as much time as necessary for you. Most people normally do it within two hours, but, please rest assured that this is not a limit imposed upon you. You can take your time, first of all, I am giving you answer sheets. (One answer sheet was given to each subject). Please write down your name, age and class at the proper place indicated on the upper left corner of this answer sheet."

After having instructed the subjects, experimenter gave the syllogistic test. An example of first figure syllogism was given which specified the subject's task of giving his judgements about correctness of the given conclusion. In addition to the instruction discussed the meaning of the word 'some' as in the promise 'some A's are B's'. The word 'some' was to mean that some and would not necessarily mean that some A's are not B's.

Scoring

Only the fourth alternative judgement about the correctness of given conclusion for the forty syllogisms was correct while the other three were not. A respondent endorsing first alternative (absolutely correct), was awarded a score of 3 and a score of 2 was awarded if he endorsed the second alternative judgement (partially correct). A score of I was given if he was indifferent about the given conclusion and no score was given if he ascertains it as absolutely incorrect. The judgement 'absolutely correct' was the judgement which was most likely to be given under the effect of syllogism atmosphere. The total score obtained by a subject was treated as the quantitative estimate of atmosphere effect.

Results and Discussion

The analysis of variance was applied keeping in view the repeated measures on one factor. Table 2 presents the summary of analysis of variance (ANOVA) for dependency proneness and figures of Syllogisms.

The analysis of variance revealed significant main effect of dependence-proneness [$F(1,58) = 17.76$; $P < .01$]. The main effects of figure of syllogism and the interaction between the two variables were not significant. The results obtained in the present experiment make it obvious that there is positive relationship between dependence-proneness and tendency to derive erroneous conclusions from categorical

TABLE 2: Summary of analysis of variance

Source of Variance	SS	df	MS	F	P
Between Subjects	4453.50	59			
Rows (Dependence Pron.)	1044.26	1	1044.26	17.76	<.01
Subjs. within gps. (Error I)	3409.24	58	58.76		
Within Subjects	5256.75	180			
Columns (Figs. of Syll.)	145.69	3	48.57	1.68	N.S.
Rows x Columns (Error II)	5055.12	174	29.06		

syllogistic problems and the effect of dependence-proneness on atmosphere effect is not dependent on particular figure of syllogism used.

The results have been obtained in predicted direction, the hypothesis that the effect of general atmosphere of the syllogism leading to an invalid conclusion would be more for high dependence-prone persons than for less dependence-prone is

confirmed. The results can very well be interpreted and explained in the light of the dynamics under the personality characteristics and field-dependent perceptual - cognitive style of a dependence-prone person and the dynamics under the processes through which a reasoner arrives at conclusion of syllogistic problem.

Dependence-proneness has been conceptualized as a cognitive style dimension which is a generalization of individual's field-dependence - field-independence dimension of perceptual style in those behavioural situations where social stimuli are involved. According to this conceptualization, initially the individuals whose perceptual discriminatory responses were dominated by external reality of the world later become high dependence-prone in their social behavioural response patterns as dominated by cues produced by external social reality. While individuals whose perceptual discriminatory responses were dominated by external reality of the world later become high dependence-prone in their social behavioral response patterns as dominated by cues produced by external social reality. Again individuals whose perceptual discriminatory responses were dominated by cues derived from the internal representational content of external reality later turn out to be less dependence-prone in social situation by acquiring response patterns dominated by cues derived from internal representation of external social reality. It has been shown how a high dependence prone person approaches and handles different stimulus situations, is very different from how a low dependence prone person does (Tiwari & Sinha, 1977; Tiwari, 1978; and Tiwari, 1981). A low dependence-prone person handles a stimulus situation in analytical manner deriving cues from the internal representational content of external reality and, thus, he is less vulnerable to the traps and deceptions of irrelevant external cues leading to a more objective approach as compared to high dependence-prone person who, depending upon the external cues only, adopts a nonanalytical or global approach leading to a disparity from objectivity.

Syllogistic problems are specific types of problems in which an individual has to comprehend the correct and logical meaning of the given premises, to observe the logical relationship between premises and then to arrive at the valid conclusion. The task in itself is very difficult. The derivation of a logically valid conclusion from given premises of a categorical syllogism demands certain basic personality and cognitive style characteristics in a subject. One should be analytical enough about the meaning of the premises and their interrelationships, i.e, one should not totally depend upon the general atmosphere of the syllogism created by external cues provided by premises but he should make use of the cues from the internal representation of the problem, consequently reducing the deluding effect of atmosphere. The results obtained in the present experiment has been interpreted in

the light of dependence - proneness dimension of cognitive style and its concomitants on the one hand, and cognitive competence required for deriving logically valid conclusion of a syllogism irrespective of its figure on the other.

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