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The occurrence of animistic thinking as a function of sentence context and set factors.

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THE OCCURRENCE OF ANIMISTIC THINKING
AS A FUNCTION OF SENTENCE CONTEXT
AND SET FACTORS

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INTRODUCTION

Historical Background

Dennis (6) has traced casual and unsystematic descriptions of animistic thought from the Greeks through Hume to nineteenth-century figures such as Comte. Systematic observation of the occurrence and development of animistic concepts, however, was not undertaken until 1921, when Piaget (20,21,22,23) began his now classical investigations of the language, reasoning, and concepts of the child. Using materials obtained from observations of spontaneous speech and conversations, from interviews, and from explanations of phenomena in experimentally devised situations, Piaget defined animism as the tendency to regard inanimate objects as living and endowed with will. Within this broad definition he distinguished four stages in the evolution of the use of such concepts toward rational distinctions. For Piaget the first manifestation of animistic thought in the child was the belief that everything active is conscious. The second stage was the attribution of consciousness to things that can move, and to them only. In the third stage only objects which moved of their own accord were endowed with consciousness. Finally, Piaget considered the fourth stage, in which children of 10 to 12 attribute consciousness to the animal world alone, to mark the beginning of rational

thought.

Dennis and his collaborators (7,10,16,27), Hazlitt (14),
Bruce (4), and Deutsche (11) have attempted to refine Piaget's
methods as well as to confirm and extend his findings. In
general, one or more of several different methods of eliciting
animistic concepts of test objects or words resulted in re-
sponses on the part of white, Negro, and Indian children
which could be classified in terms of Piaget's four develop-
mental stages. But, because many 12-year-olds characterized
objects animistically, it seemed desirable to investigate
animistic thinking in high school seniors (28), in college
and university students with diverse backgrounds in the
sciences (8), and in senescent adults (over 70 years of age)
(9). The lowest incidence of animistic concepts was found in
a group of 68 college sophomores which was completing the
third semester of an integrated science course in which the
distinctive attributes of living things had been emphasized
(8). Only 12 per cent of the subjects of this group at-
tributed life to one or more of the inanimate test items.
Animistic responses were obtained from 37 to 45 per cent of
the subjects of the other groups, one of which was a second
class of college students. These students, however, had not
had specific instruction in criteria of life. On the basis
of these findings Dennis (8) concluded that animistic re-
sponses are not limited to primitive groups and children but

also occur among older adolescents and adults of more so-
phisticated societies. This view concurs with Piaget's
opinion that "the intellectual tendencies of the child are
very marked in the so-called primitive and that even with us,
if the superficial coating which education has left on our
minds be scratched ever so little, we find the same charac-
teristics, at least in the matter of mental orientation"
(19, p. 534).

Statement of the Problem

Although they are valuable as descriptions of animistic
thinking in various classes of people, the studies of Piaget,
Dennis and collaborators, and others (18,29) have contributed
little to an understanding of the relationships between ani-
mistic responses and antecedent learning conditions. That
such relationships may be important explanations of animism
or the rejection of it is indicated by the finding, noted
above, that exposure to a special science course decreased
animistic responses. This possibility has also been con-
sidered by Mead (17), whose examinations of ethnological data
led her to conclude that animistic notions were due to social
habit or custom rather than of "spontaneous origins." Also,
laboratory studies (18,24,25,26,29) of the acquisition of
various concepts lead to the generalization that animistic
responses may be functions of (a) the stimulus-response
sequences in which such responses occur, (b) the frequency of

occurrence and reinforcement of those sequences, (c) the similarity of the stimulus-response components of such sequences to those of other sequences, (d) set factors, and still other experimental conditions.

Relationships between animistic responses and antecedent learning conditions can be investigated by comparisons of the incidence of animistic responses in groups of Ss who have different experiential backgrounds. But since such procedures rarely permit assessment of the effects of specific variables, the manipulation of potentially relevant variables in the laboratory would seem the more promising procedure for isolating relationships between responses and learning conditions.

To this end, the present investigation has been designed to study the occurrence of animistic responses as a function of various combinations of two conditions. The first of these conditions was the presentation to Ss of different sentence contexts in which the stimulus words of the animistic test were embedded. These sentence contexts were scientific statements, or animistic suggestions in the form of poetic metaphors, or a combination of both. The instructions administered prior to the test of animism were also varied. Specifically, Ss were given either regular instructions or regular instructions with the additional requirement that they were to respond as scientists or poets.

Sentence contexts were varied in an attempt to isolate and systematically manipulate frequently occurring differences in stimulus conditions to which $\underline{S}$s would have been exposed previously in less standardized fashion. Osgood (18) has stressed the role of verbal mediational processes or "sets" in conceptual behavior. This emphasis, coupled with the author's previous work on animistic thinking in schizophrenics suggested that variation in sets might be an important determinant of animistic responses. Accordingly it seemed desirable to manipulate the set factor experimentally by means of different instructions.

EXPERIMENTAL METHOD

Subjects

The Ss were 263 students from the course in introductory
psychology at the University of Massachusetts. All were
naive with respect to the psychological literature on animis-
tic thinking. Although the Ss had varying backgrounds with
respect to the type and number of science courses taken, all
Ss had or were completing at least nine hours of various
college-level science courses. The Ss were pre-assigned
randomly to the 12 experimental groups.

In order to use a factorial analysis of variance one
must keep the number of Ss within groups proportional.
Therefore, eight Ss were randomly eliminated from five groups
to make the Ns within all groups 20, 25, or 30. Data are
reported on the remaining 255 Ss.

Stimulus Materials and Apparatus

Animistic responses were tested by a list of 10 words.
This list, which is a modification of Dennis' list of 21
words and objects, has been employed previously in research
on schizophrenic thought at Butler Hospital (Providence,
Rhode Island). The 10 words were listed in the first of five
columns on a single sheet of paper thus: Sun, clouds, sea,
lightning, wind, stars, earth, match, pearl, and gasoline.
Places for "yes" and "no" responses to the question "Is the

object referred to living?" were provided in the second and third columns respectively and the Ss were asked also to give reasons for their responses in the fourth column.

In order to ascertain the influence on animistic responses of the contexts in which animistic test words were presented, three different sets of sentences were constructed (see Appendix). The first set, hereafter designated as the scientific sentences or contexts, consisted of 40 statements, four involving each of the 10 stimulus words. These scientific descriptions of the objects referred to by the words, were drawn from various scientific sources (5,12, 13). Two of the four sentences for each word were selected randomly to make up a training list of 20 sentences. Five different random orders of these 20 sentences were then established. These 20 were combined with the remaining 20 in random order to form a 40-word list to be used in a recognition test list.

In the second set, animistic sentences or contexts, each of the 10 words appeared in four sentences characterizing the objects referred to animistically. These sentences were drawn from literary sources (1,2,3,15). Two randomly selected sentences for each word appeared in five different orders of a training list of 20 sentences. The recognition test list consisted of the original 40 animistic sentences in

a random sequence.

The third set of 40 statements was a mixture of the scientific and animistic statements. Specifically, two subsets of scientific-animistic sentences were constructed. The first subset was formed by the random selection of 10 of the 20 sentences from the scientific training lists and an equal number from the animistic training lists. Five random sequences of these 20 scientific and animistic sentences served as the new, composite training list. Ten additional scientific and 10 more animistic sentences, drawn randomly from the 20 scientific and 20 animistic sentences, but now those used only for the scientific and animistic recognition test lists, were combined with the 20 training sentences to make up a 40 sentence list for the recognition test. The 20-sentence training list of the second subset consisted of the previously unselected sentences in the scientific and animistic training lists. Five random orders of these scientific and animistic sentences were then prepared. These sentences and the 20 previously unselected sentences of the scientific and animistic recognition test lists then comprised the 40 sentence recognition test list of the second subset.

The five random orders of the scientific, scientific-animistic, or animistic training sentences plus the appropri-

ate recognition list were typed on a continuous sheet of white paper which was wound on a feeding spool. The paper passed from the feeding spool through a wooden mat with a 1 1/2 x 6 in. exposure slot to a rotating drum geared to an electric motor. The drum was geared to pull the paper so that each sentence would be exposed for four seconds. There was a 30 second interval between trials. An opaque projector was used to project the sentences onto a screen in the front of the experimental room. The use of the projector permitted testing Ss in groups.

Subjects in each group were seated in widely separated chairs arranged in several concentric 60° arcs with 30° of each arc on each side of a line perpendicular to the screen at the center. During the periods of training and recognition testing, the room was generally dark except for light emanating from the projector and "gooseneck" student lamps so arranged as to provide sufficient illumination for the Ss to check recognition test scoring sheets. The normal overhead lights were on at other times.

Procedure

Table 1 summarizes the experimental design in which each of four different types of experiences prior to the test of animistic responses was combined with each of three different sets of pre-test instructions. The S-S, S-P, and S-No groups

Table 1

Summary of Experimental Design

Group	Abbreviation for Group	N	Types of Sentence Experience Prior to Animistic Test	Type of Set Inducing Instructions for Animistic Test
Scientific-Scientist	(S-S)	20	Five learning trials and recognition test with scientific sentences	Scientist
Scientific-Regular	(S-R)	20		Regular
Scientific-Poet	(S-P)	20		Poet
Scientific-Animistic-Scientist	(S-A-S)	20	Five learning trials and recognition test with scientific-animistic sentences	Scientist
Scientific-Animistic-Regular	(S-A-R)	25		Regular
Scientific-Animistic-Poet	(S-A-P)	20		Poet
Animistic-Scientist	(A-S)	20	Five learning trials and recognition test with animistic sentences	Scientist
Animistic-Regular	(A-R)	20		Regular
Animistic-Poet	(A-P)	20		Poet
Control-Scientist	(C-S)	20	No pre-animistic test experience with the 10 words	Scientist
Control-Regular	(C-R)	30		Regular
Control-Poet	(C-P)	20		Poet

were given five trials to learn the 20 scientific sentences; their learning was tested by administrating the 40 sentence recognition test list immediately after the fifth learning trial. After the sentence recognition test, the animistic response test sheet was distributed to the S̲s (see Appendix). The S-S group was introduced to the animistic response test by means of instructions which required them to respond to the words of the list as "scientists" (see Appendix). The S-P group was told to respond as "poets". The S-No group was given the animistic test with regular instructions. The animistic test requires that the S̲ make a check in the "yes" column if he thinks that the object referred to is "living", to place a check in the "no" column if he thinks that the object is "not living." Then the S̲ writes the reason or reasons for each of his answers.

The A-S and SA-S, A-P and SA-P, and A-No and SA-No groups were also given five trials and a recognition test with either animistic or scientific-animistic training and recognition test lists. After receiving the animistic test sheets, the scientific, poetic, or regular instructions were administered to the groups designated by S, P, or No respectively.

The 20 S̲s of each group were tested in two sub-groups of about 10 S̲s each. One of each of the sub-groups of the

12 combinations was treated before the second sub-group was called. The order of appearance of the first sub-group for each of the 12 combinations was randomly determined as was the order of the second sub-group. As for the groups receiving scientific-animistic sentences, the first sub-group of the SA-S, SA-P, and SA-No conditions was given one of the two subsets of the training and recognition-test sentences. The second sub-group of each of these conditions was given the other subset of sentences.

RESULTS

Sentence Learning.

Table 2 summarizes the means and standard deviations of the number of sentences checked correctly on the recognition test trial for each of the nine sentence experience groups. Analysis of variance was used to test the hypothesis of no differences among these means; the differences varied from 14.3 to 18.7 (Table 3). Since the F of 6.09 was significant at the 1% level, it was concluded that the groups differed with respect to amount of learning as measured by correct responses on the recognition test.

A further analysis yielded F's of 15.75 for sentence contexts and 4.25 for interaction of sentences and sets, both of which were also significant at the 1% level. The F for sentence contexts reflected the greater number of sentences recognized by Ss administered animistic or scientific-animistic sentences. Since differences among sets could be due only to assignment procedures, it is not surprising that the F for this condition was an insignificant 0.92.

Because of the differences in correct recognition responses among the nine groups and sentence context conditions, recognition and animistic test scores were correlated for Ss in all groups combined and for Ss in the three

Table 2

Means and Standard Deviations of Number of Sentences

Recognized on the Recognition Test Trial

Sentences	Sets					
	Scientist		Regular		Poet	
	M	SD	M	SD	M	SD
Scientific	14.3	3.02	15.9	1.89	16.5	2.58
Scientific-Animistic	18.7	1.49	17.6	1.62	17.2	2.99
Animistic	17.9	2.41	18.6	2.13	16.8	3.41

Table 3

Analysis of Variance of Recognition Test Scores

Source	df	SS	ms	F
Cells	8	309.25	38.66	6.09*
Sentence Contexts	2	199.75	99.87	15.75*
Sets	2	11.61	5.805	.92
Sentences x Sets	4	211.36	26.97	4.25*
Within	176	1116.31	6.34	
Total	184	1425.56		

* Significant at beyond the 1% level for appropriate df.

sentence conditions separately. The r for all Ss of -.10
was not significant. Values of r of .14 (p > .05), -.30
(p = .02), and -.25 (p = .05) were obtained for Ss in the
scientific, scientific-animistic, and animistic conditions,
respectively.

Animistic Responses.

The amount of animistic thinking was scored as the
frequency of "yes" responses given to the 10 stimulus words
of the animistic test. Examination of the means of fre-
quencies of animistic responses for the 12 experimental
groups in Table 4 indicates marked variation between extremes
of 1.05 animistic responses for Ss of the Animistic-Scientist
group and a mean frequency of 7.25 for the Animistic-Poet
group. The F of 23.67 (p < .01) for cells indicates that the
differences among the means of the 12 groups cannot be at-
tributed to chance (Table 5). When analyzed further to
determine the effects of sentence contexts, sets, and inter-
action of sentences and sets, only the F of 122.05 (Table 5)
for sentences was significant at the 1% level. The markedly
higher frequencies of animistic responses of Ss given the
"poet" instructions accounted for the significant effect of
the set condition. This increase in animistic responding
due to "poet" instruction held for all sentence contexts and
for the control condition. The failure to obtain a signifi-
cant F for sentence contexts suggests that the particular

Table 4

Means and Standard Deviations of Frequencies of

Animistic Responses for the 12 Experimental Groups

Sentences	Sets					
	Scientist		Regular		Poet	
	M	SD	M	SD	M	SD
Scientific	1.60	2.33	.85	1.65	6.15	2.61
Scientific-Animistic	1.55	2.62	1.44	2.08	6.10	1.81
Animistic	1.05	1.83	2.70	2.53	7.25	2.00
Control	2.25	1.67	1.40	2.01	5.60	2.60

Table 5

Analysis of Variance of Animistic Responses

Source	df	SS	ms	F
Cells	11	1286.66	116.97	23.67*
Sentences	3	29.14	9.71	1.96
Sets	2	1205.87	602.94	122.05*
Sentences x Sets	6	51.65	8.61	1.74
Within	243	1199.46	4.94	
Total	254	2486.12		

* Significant at beyond the 1% level for appropriate df.

familiarization experiences of five learning trials and the recognition trial with the different contexts had no effect on frequency of animistic responses. Although the groups differed with respect to the extent to which they had learned the sentences, an analysis of covariance to adjust the means of test responses for these initial differences was deemed unnecessary because of the insignificant correlation of -.10 between recognition and animistic test scores and the negative r's for the scientific-animistic and animistic sentence groups.

Animistic responses were elicited from at least 40% of the $\underline{S}$s of every group. Every $\underline{S}$ in the Animistic-Poet, and Scientific-Animistic-Poet groups gave at least one animistic response. Thus, "poet" instructions led to more $\underline{S}$s making more animistic responses.

Table 6 summarizes frequencies of animistic responses for each of the test words for all $\underline{S}$s and, because of the significant effect of the set condition, for $\underline{S}$s given scientist, regular, or poet instructions. "Sea" was responded to animistically over three times as frequently as "gasoline", the word which elicited the fewest number of animistic responses. By and large, the rank-order of the words was the same for each of the set conditions, thus suggesting that the effect of the "poet" instructions was simply to increase the frequency of animistic responses to each word.

Table 6

Frequency of Animistic Responses to Test
Words for all Ss and for Ss in Set Conditions

Word*	All	Set Conditions**		
		Scientist (N = 80)	Regular (N = 95)	Poet (N = 80)
Sea	124	21	29	74
Earth	111	21	30	60
Sun	99	16	21	62
Stars	80	12	18	50
Pearl	79	13	19	47
Wind	72	8	8	56
Lightning	68	13	12	43
Clouds	64	6	7	51
Match	53	11	7	35
Gasoline	37	8	7	22

* Arranged in order of decreasing frequency for all Ss.

** Since the number of Ss in each condition were approximately equal, only frequencies are presented.

Reasons for Animistic Responses.

The categories employed to analyze the reasons given by the Ss for their animistic responses were based on Piaget's analysis of reasons which children gave for animistic responses and the author's observations of the animistic thinking of schizophrenics. The specific categories employed, each of which is accompanied by an example of a response scored as falling in that category, are reproduced in Table 7. Table 8 summarizes the frequencies with which each of these reasons was employed for each word and for all words. "Containing and supporting life" and "movement" were the reasons used most frequently. The former reason, however, was restricted to "earth" and "sea" and was much less frequently used to account for "life" in the "sun". The latter ("movement") was not used as frequently for any one word, but was an important reason for the attribution of life to objects named by all but three words.

Animistic Responses and Background Factors.

Sex, religion, and amount of education in physical and biological sciences are among the background variables which might be related to animistic responses. Accordingly, although they are not the primary occasion for this study, relationships among these factors and frequency of animistic responses were investigated.

In groups of from 10 to 16 the percentages of males (in

Table 7

Reason Categories with Examples of Animistic Responses

which were Scored as Falling into These Categories

Category	Abbreviation	Examples
Contains and/or supports life	C&S	Home of living things. It is made up of living organisms. It supports life. Has living matter in it.
Movement	M	Darts across the sky quick and powerful like a weasel. Constant motion.
Changes and/or grows	C&G	Always changing and always differently shaped. Grows from a piece of sand to full size.
Produces effects	E	Cause physical changes. It produces effects on nature. It produces sensations at times.
Force and/or power	F&P	It has a force of energy. It has power cause in itself it can move objects. Because of its strength and force. Potential power.
Heat and/or light	H&L	Daily supplies us with heat. Gives off light. Warm like a body. They twinkle and are always winking.
Beauty	B	Because of its awe and splendor and the mystery that lies behind it. It is peaceful and beautiful.
Product of living thing	PL	Come from living organisms. Formed by a living object.

Table 8

Number of Reasons for Animistic Responses to Each Word

Separately and Combined which were Scored as

Falling in the Reason Categories*

Objects	Reasons							
	C&S	M	C&G	E	F&P	H&L	B	PL
Sun	17	22	8	17	15	35	4	0
Clouds	2	29	22	5	0	0	1	0
Sea	49	29	28	9	11	0	0	0
Lightning	1	25	4	10	17	2	0	0
Wind	0	15	17	20	10	0	0	0
Stars	6	13	7	2	3	21	4	0
Earth	76	15	4	1	2	1	0	0
Match	0	0	5	8	6	9	0	5
Pearl	0	0	15	0	0	0	26	19
Gasoline	0	2	0	6	10	3	0	5
Total	151	150	110	78	74	71	35	29

* Some of Ss responses were impossible to categorize into these reasons while some responses contained more than one reason.

the 12 groups) ranged from 50 to 80 (Table 9). Variations
in numbers and hence percentages of males also appear in the
sentence contexts and set conditions. Tests of the hypothe-
sis of homogeneity of sexes within the 12 groups and in the
sentence contexts and set conditions resulted in Chi-squares
of 9.16 ($p = .60$; $\underline{df} = 11$), 3.12 ($p = .40$; $\underline{df} = 3$), and 2.20
($p = .40$; $\underline{df} = 2$), respectively. Since none of these values
was significant, it was concluded that the groups and con-
ditions had been satisfactorily equated for sex. The means
of animistic responses for all males and for all females were
2.83 with a standard deviation of 3.09 and 3.20 with a
standard deviation of 3.13, respectively. The $\underline{t}$ of 0.93 for
the differences between these means was clearly not signifi-
cant. Thus, sex was not related to frequency of animistic
responses. This conclusion was supported by a Chi-square of
6.72 for these two variables, which was not significant for
3 $\underline{df}$.

Table 10 summarizes the numbers of males and females
and the totals of $\underline{Ss}$ within each of the 12 groups and in
sentence and set conditions who were Catholic, Jewish,
Protestant, or unaffiliated. To determine whether religious
affiliation influenced frequency of animistic responses,
analysis of variance was used to test the hypothesis of no
difference among the means of animistic responses for the
four religious categories (Table 11). Because the F of

Table 9

Males and Females in Each Group and in Sentence Context and Set Conditions

Sentences	Sets											
	Scientist			Regular			Poet			Total		All Sets
	M	F	Both	M	F	Both	M	F	Both	M	F	
Scientific	11	9	20	12	8	20	16	4	20	39	21	60
Scientific-Animistic	10	10	20	15	10	25	11	9	20	36	29	65
Animistic	15	5	20	11	9	20	15	5	20	41	19	60
Control	12	8	20	16	14	30	12	8	20	40	30	70
All Sentence Contexts	48	32	80	54	41	95	54	26	80	156	99	255

Table 10

Religious Affiliation of Males and Females, Separately and Combined,

in each Group and in Sentence Context and Set Conditions

Group	Religious Affiliation											
	Catholic			Jewish			Protestant			Other		
	M	F	Both	M	F	Both	M	F	Both	M	F	Both
Scientific-Scientist	3	1	4	2	0	2	6	8	14	0	0	0
Scientific-Regular	4	3	7	2	2	4	6	3	9	0	0	0
Scientific-Poet	6	0	6	1	1	2	8	3	11	1	0	1
Scientific-Animistic-Scientist	3	2	5	0	1	1	7	6	13	0	1	1
Scientific-Animistic-Regular	4	4	8	1	1	2	9	5	14	1	0	1
Scientific-Animistic-Poet	5	4	9	1	2	3	5	3	8	0	0	0
Animistic-Scientist	5	2	7	2	0	2	7	3	10	1	1	1
Animistic-Regular	6	4	10	1	1	2	4	4	8	0	0	0
Animistic-Poet	3	4	7	2	1	3	7	0	7	3	0	3
Control-Scientist	4	5	9	1	1	2	5	2	7	2	0	2
Control-Regular	4	7	11	2	1	3	10	5	15	0	1	1
Control-Poet	3	4	7	0	1	1	7	3	10	2	0	2
Scientific	13	4	17	5	3	8	20	14	34	1	0	1
Scientific-Animistic	12	10	22	2	4	6	21	14	35	1	1	2
Animistic	14	10	24	5	2	7	18	7	25	4	0	4
Control	11	16	27	3	3	6	22	10	32	4	1	5
Scientist	15	10	25	5	2	7	25	19	44	3	1	4
Regular	18	18	36	6	5	11	29	17	46	1	1	2
Poet	17	12	29	4	5	9	27	9	36	6	0	6
Total	50	40	90	15	12	27	81	45	126	10	2	12

Table 11

Means and Standard Deviations

of Frequency of Animistic Responses for

the Four Religious Categories

Religion	M	SD
Catholic	3.28	3.14
Jewish	2.24	2.97
Protestant	2.87	3.05
Other	5.46	.509

0.78 (Table 12) was not significant, it was concluded that animistic responding did not vary with religion.

Dennis' findings (8) suggested that extent of scientific background, especially in the biological sciences, would be related to degree of animistic thinking. Most Ss had taken in high school or the University one or more semesters in various basic sciences and were currently studying such a science. Because University courses are generally more difficult than high school courses, courses at the two levels were given different weights. Specifically, one semester of college-level science was weighted 1 in contrast to .5 for a semester of high school work. To obtain the final index of amount of a particular science, the scores for the number of semesters of high school and college courses were summed. Only a small number of Ss had had appreciable amounts of social science, geology, or applied science. Accordingly, extent of scientific background was determined for only three science areas both separately and combined. These were chemistry, physics, and biological sciences (other than psychology, in which all Ss were enrolled at the time of the experiment). The means of the weighted scores for scientific background are presented in Table 13. The combined score is the sum of the weighted scores for the three science areas. Chi-squares were used to test the hypothesis of independence of frequency of animistic responses and scientific back-

Table 12

Analysis of Variance of

Animistic Responses for Religious Groups

Source	df	SS	ms	F
Between	11	82.47	7.50	0.78
Within	245	2335.97	9.53	
Total	256	2418.44	9.45	

Table 13

Means of Weighted Scientific Backgrounds

in Biology, Chemistry, and Physics Separately and Combined

Groups	Biology	Chemistry	Physics	Combined
Scientific-Scientist	2.33	2.80	.85	5.98
Scientific-Regular	2.75	1.68	.85	5.28
Scientific-Poet	2.02	1.98	.78	4.78
Scientific-Animistic-Scientist	1.93	2.30	.62	4.85
Scientific-Animistic-Regular	2.08	3.12	.56	5.76
Scientific-Animistic-Poet	2.58	2.75	1.05	6.38
Animistic-Scientist	2.45	2.60	.63	5.68
Animistic-Regular	1.93	2.95	1.10	5.98
Animistic-Poet	3.23	3.37	1.30	7.90
Control-Scientist	2.58	2.38	.72	5.68
Control-Regular	1.75	2.28	1.02	5.05
Control-Poet	3.03	2.38	.72	6.13
Scientific	2.37	2.15	.83	5.35
Scientific-Animistic	2.19	2.75	.73	5.67
Animistic	2.54	2.97	1.01	6.52
Control	2.35	2.34	.85	5.55
Scientist	3.10	3.36	.94	7.40
Regular	2.09	2.52	.88	5.49
Poet	2.72	2.62	.96	6.30
Total	2.36	2.55	0.85	5.76

ground. The values of 3.48 ($df = 3$) for physics, 6.35 ($df = 6$) for Biology, and 9.44 ($df = 6$) for the combined sciences were not significant at the 5% level. The Chi-square of 13.00 ($df = 6$) for chemistry was significant between the 5% and 2% levels. But an examination of the contingency table for which this Chi-square was computed revealed no simple, meaningful relationship between animistic responses and weighted scores for chemistry.

DISCUSSION

Sentence Learning.

The scientific-animistic and animistic groups recognized significantly more sentences than $\underline{S}$s who were exposed to the scientific contexts. This difference in recognition scores is probably due to the presence of somewhat less technical and more familiar words in the animistic sentences. Moreover, there were fewer words and topics in common in the scientific-animistic and animistic sentences by which they could be distinguished. Greater discriminability usually leads to more rapid learning (18). Thus, both similarity and discriminability may have contributed to the better recognition of the scientific-animistic and animistic sentences. Although there were no relationships between recognition and animistic test scores for $\underline{S}$s in all groups combined and for $\underline{S}$s who learned scientific sentences, significant negative $\underline{rs}$ were obtained for the scientific-animistic and animistic sentences. These negative $\underline{rs}$ indicate that the better the recognition of the sentences of the latter two conditions the less frequent the animistic responses. At the present time no reasonable explanation of the negative direction can be given.

Animistic Responses.

The differences among the sentences had no differential effect on animistic responding. The "poet" instructions, however, led to marked increases in frequencies of animistic responses, regardless of variations in experiences with the sentences.

It is possible that five learning trials and a recognition test trial did not constitute sufficient experience for the animistic contexts to bring about an increase and the scientific contexts a decrease in animistic responses as compared with the scientific-animistic and control conditions. This explanation might be tested by increasing the number of sentence learning trials. Correct recognition of approximately 80% of the sentences after five trials indicated a fairly high level which could not be markedly improved by further trials. Therefore, it seems unlikely that any additional trials would lead to significant sentence effects.

The scientific sentences themselves provide a more plausible explanation of the failure of experience with these sentences to reduce the frequency of animistic responses. The scientific sentences did not stress general criteria of life, nor did they apply such general criteria to specific objects. Instead, the test words were merely characterized

by various properties of the objects to which the words referred, without reference to more general principles. Accordingly, under the conditions of the test, exposure to the scientific contexts was probably a relatively ineffective way to reduce animistic thinking.

Finally, Ss were not explicitly instructed to use the sentence experiences as bases for responding in the animistic test. Therefore, even if there had been some effect of sentence learning on animistic responding, this effect might not have been carried over to the test situation.

Insufficient experience with the animistic sentences and/or no explicit instructions to apply this learning to the animistic test probably account for the failure of experiences with these sentences to produce an increase in frequency of animistic responses.

The set-inducing instructions to respond "as if you were a scientist" led to no fewer animistic responses than the regular instructions. To explain this result it should be recalled that the mean composite score for scientific background was nearly 6. For the average S this probably represents four semesters of college level physical and biological science and two years of high school science in the same areas. Because of this fairly extensive background it might be hypothesized that many Ss given regular

instructions were in effect responding as scientists. But, the occurrence of animistic responses in a substantial percentage of both "scientist" and regular-instruction Ss plus the lack of correlation between scientific background and animistic responses indicate that scientific background could have been a significant factor for some Ss only.

One explanation may be the nature of instruction in physical and particularly biological science. In physics and chemistry little or no stress is placed on criteria of life. In biology courses, the focus is on living things and their characteristics without explicit instruction in the distinction between living and inanimate objects. That is, the student is taught to recognize and know the features of living things but is not given experience in the comparison of animate and inanimate objects in terms of these criteria. Therefore, even with a fairly extensive scientific background, it is not surprising that many Ss did not transfer these experiences to all words of the animistic test. Most Ss given regular or "scientific" instructions who responded animistically, did so to only one or two words. Only one of the 185 Ss in these conditions gave an animistic response to all 10 words. Thus, although it did not operate in all Ss for all words, it is probable that scientific background did have some influence on Ss' responses.

Why did "poet" instructions increase frequency of animistic responses? A possible explanation stems from the popular conception that poets should characterize objects with relative freedom from the limitations of scientific fact. Therefore, the "poet" instructions may have led to Ss' abandonment of scientific criteria of life as bases for responding to the test words. Moreover, because Ss were familiar with the animistic metaphors of poetry, these instructions were probably interpreted as directives to provide such metaphors. In this connection it is interesting to note that a fairly extensive search for animistic metaphors for "match" and "gasoline" was unsuccessful. The E then made up such metaphors. It is probable, therefore, that the virtual or complete absence of such metaphors in poetic and probably also popular expressions may in part account for the fact that these two words elicited the fewest animistic responses.

Animistic responses were given most frequently to "earth" and "sea." The most frequently cited reason was that "earth" and "sea" contain and support life. Both words have probably occurred in discussions of the environment of living things and of the properties of living things countless times in each S's past experiences. Thus, associations between these words and living phenomena probably account

for the animistic responses. Such responses represent a failure on the part of a S to break this association by means of a discrimination between environment and life in the environment. More explicit instructions emphasizing this distinction might result in marked reduction of animistic responses to sea and earth.

Living phenomena move, change and grow, and produce effects by force. These same characteristics were often given as reasons for animistic responses to sun, clouds, lightning, wind, and stars. Therefore, it is probable that these labels or phrases, which are frequently applied to both living things and these inanimate objects, prompted the generalization of the "yes" or "living" responses from living things to sun, clouds, lightning, wind, and stars. To some degree, however, experience in differentiating between the properties of living things and those of these inanimate objects should reduce this response-mediated generalization.

"Beauty", "product of a living thing", and "change and growth" were cited as reasons for designating pearl as living. These, too, are properties of living things and because of these common properties some response-mediated generalization probably mediated the generalization of the animistic responses to "pearl."

"Gasoline" and "match" rarely occur in sentences which

associate them with living things. Moreover, they share few properties with living things. Therefore, it is not surprising that the fewest animistic responses were made to these words.

Background Factors.

Frequency of animistic responses was not related to sex. Since there is no reason to believe that there is marked difference between the sexes in environmental conditions relevant to animistic thinking, this lack of relationship is not surprising. Similarly, it is doubtful that there are marked differences among religions in usage of animistic metaphors or other bases for animistic associations. As a consequence, there seems to be no apparent reason to question the finding that religious affiliation had no significant effect on animistic thinking.

Amount of background in physics, chemistry, and biology separately or combined was not significantly related to frequency of animistic responses. As noted previously, teachers of physics and chemistry seldom discuss criteria of life and the emphasis in biology is likely to be upon the characteristics of living species rather than upon the absence of these characteristics in non-living objects. Accordingly, it is probable that amount of scientific background is largely irrelevant to amount of experience in distinguishing between living and non-living things. No relationship

between extent of background and animistic responses could then be anticipated.

These results are not consistent with those of Dennis (8), who found that exposure to courses in science decreased animistic responses. This discrepancy is not surprising, however, since it should be noted that the Ss employed by Dennis were completing the third semester of an integrated science course in which the distinctive attributes of living things had been emphasized.

SUMMARY

Piaget's and Dennis' descriptions of animistic thinking provide little information concerning relationships between animistic responses and specifiable antecedent conditions. This study investigated frequency of animistic responses as a function of combinations of two specific antecedents: (a) sentence contexts of animistic test words and (b) set-inducing instructions.

Two hundred and sixty-three undergraduates were randomly assigned to 12 groups of from 20 to 30 Ss.

Ten of Dennis' words were used to test degree of animistic thinking. Before being tested, Ss were exposed to combinations of sentence contexts and set-inducing instructions. The former consisted of three different lists of 20 training sentences in which each test word appeared in scientific, animistic (poetic metaphors), or mixed scientific-animistic contexts. The Ss were familiarized with these contexts by being presented the lists of sentences at the rate of 4-sec. for each sentence in 5 different random orders; then by means of 40 sentence lists tested for degree of recognition of the training sentences. Controls had no familiarization experiences. Following these experiences, Ss were introduced to the animistic test with regular

instructions or with set-inducing instructions.

Differences among set-inducing instructions yielded on F significant at beyond the 1% level. This was due to markedly higher frequencies of animistic responses with "poet" instructions. Since the F for sentence contexts was not significant, it was concluded that the particular familiarization experiences employed did not affect frequency of animistic responses.

The 10 words elicited at least one animistic response in 64 per cent of Ss, thus confirming Dennis' observations of the occurrence of animistic thinking in college students. Word-by-word analysis revealed that "sea" elicited over three times as many animistic responses as "gasoline", the word which elicited the smallest number of animistic responses. Analysis of the reasons given for these animistic responses indicated that the two most frequently cited reasons were "contains and/or supports life" and "movement."

Although they were not the primary interest of this study, investigation of the relationships between animistic thinking and sex, religious affiliation, and amount of education in biology, chemistry, and physics, separately and combined, resulted in the conclusion that none of these background factors had a significant effect on the frequency of animistic responses.

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APPENDIX

Sentences

Scientific Training

Gasoline is a combustible liquid made up of a mixture of hydrocarbons.

A match is a short, slender piece of wood tipped with a mixture, by means of which fire is produced by friction.

A cloud is a visible mass of particles in the air or in a gas.

Gasoline is an inflammable liquid made by the hydrogenation of coal or water gas.

A star is any self luminous body composed of flaming gases which gives off heat and light.

Wind is air in natural motion along the earth's surface.

The sea is that part of the earth's surface which consists of salt water.

Lightning is a discharge of electricity from one cloud to another cloud or to the earth.

Lightning consists of a flashing illumination, electrical in origin, occurring in the sky.

A pearl is an organic product built up of alternate layers of conchiolin and crystallized calcium carbonate.

The sun is a burning mass which is composed of hydrogen, helium and oxygen.

Wind is moving air caused by a difference in pressure areas on the surface of the earth.

A pearl is a hard, smooth, often highly lustrous concretion.

The earth consists of a largely solid crust with a center of molten iron and other substances.

A match is a substance provided with a tip which ignites by friction.

A star's radiance is due to thermo nuclear reactions.

The earth is a rotating mass of condensed and solidified gases in the form of an elleptoid sphere.

A cloud is a suspended mass caused by the union of particles forming a compound.

The sun is a star made up of a vast concourse of atoms in violent movement.

The sea is a body of water that occupies the earth's surface in basin-like depressions.

Scientific Recognition

Lightning is an electrostatic phenomenon causing a flashing of light in the atmosphere.

A star consists of atomic nuclei, electrons and radiation.

The sun is a star made up of a vast concourse of atoms in violent movement.

The earth consists of a largely solid crust with a center of molten iron and other substances.

A cloud is a visible mass of condensed vapor in the form of a fog or haze.

The sun is that luminous celestial body from which the earth and other planets receive light and heat.

Lightning is a discharge of electricity from one cloud to another cloud or to the earth.

The sun is a burning mass which is composed of hydrogen, helium and oxygen.

Wind is air in motion with any degree of velocity.

Wind is air artificially put in motion by any force or action.

Lightning is the electrical potential resulting from a loss of electrons in a cloud.

The sea is the ultimate reservoir for the material eroded from continents.

The earth is a rotating mass of condensed and solidified gases in the form of an elleptoid sphere.

The sun is made up of atomic nuclei, electrons and radiation.

A pearl is formed by the secretion of the mantle of certain bivalve mollusks.

Gasoline is a liquid fuel derived from petroleum by direct distillation or by cracking.

A cloud is a body of either liquid or solid, hanging in the air at some height above the earth.

A match consists of a wick or cord prepared to burn at a uniform rate.

A star's radiance is due to thermo nuclear reactions.

Gasoline, a fraction of crude oil, is a volatile liquid used as a solvent.

The sea is a body of water that occupies the earth's surface in basin-like depressions.

A match is a substance provided with a tip which ignites by friction.

The sea is a cause of erosion and a place of deposition.

Gasoline is a combustible liquid made up of a mixture of hydrocarbons.

The earth is the only planet in the universe definitely known to support life.

Wind is air in natural motion along the earth's surface.

A match is a piece of material which has been dipped in melted sulfur to make it ignitable by tinder.

Wind is moving air caused by a difference in pressure areas on the surface of the earth.

A cloud is a visible mass of particles in the air or in a gas.

The self-luminescence of the stars results from nuclear fusion.

A cloud is a suspended mass caused by the union of particles forming a compound.

A pearl is an organic product built up of alternate layers of conchiolin and crystallized calcium carbonate.

The earth is the fifth largest planet in the solar system.

A match is a short, slender piece of wood tipped with a mixture, by means of which fire is produced by friction.

Gasoline is an inflammable liquid made by the hydrogenation of coal or water gas.

A pearl is an abnormal growth within the shell of some bivalve mollusks.

A pearl is a hard, smooth, often highly lustrous concretion.

The sea is that part of the earth's surface which consists of salt water.

A star is any self luminous body composed of flaming gases which gives off heat and light.

Lightning consists of a flashing illumination, electrical in origin, occurring in the sky.

Scientific-Animistic I Training

The warm sea laid his dimpled face as if asleep against the land.

A pearl is an organic product built up of alternate layers of conchiolin and crystallized calcium carbonate.

The match raised his head as flames to challenge tyrant night.

A cloud is a visible mass of particles in the air or in a gas.

The very clouds have wept and died and only God is in the sky.

The sea is that part of the earth's surface which consists of salt water.

Earth felt the wound, and Nature from her seat gave signs of woe that all was lost.

Lightning consists of a flashing illumination, electrical in origin, occurring in the sky.

A match is a short, slender piece of wood tipped with a mixture, by means of which fire is produced by friction.

Winter wind is not so unkind as man's ingratitude.

Like a proud patriarch, the sun himself grows dim with age.

Wind is air in natural motion along the earth's surface.

With the deep-throated roar of an angry beast, the gasoline rushed and tumbled into the tank.

Gasoline is a combustible liquid made up of a mixture of hydrocarbons.

Like a Latin danger, the lightning's rhumba held the center of heaven's stage.

The sun is a burning mass which is composed of hydrogen, helium and oxygen.

A star is any self luminous body composed of flaming gases which gives off heat and light.

The earth is a rotating mass of condensed and solidified gases in the form of an elleptoid sphere.

When morning cometh, the stars hide their diminished heads.

As an immortal child of nature, the pure pearl shows no trace of age.

Scientific-Animistic I Recognition

Earth proudly wears the Parthenon as the best gem upon her zone.

Like the human soul, each layer of the pearl unfolds a greater secret.

A pearl is an organic product built up of alternate layers of conchiolin and crystallized calcium carbonate.

As an immortal child of nature, the pure pearl shows no trace of age.

One voice is there, of the sea. A mighty voice.

The sun is made up of atomic nuclei, electrons and radiation.

A star is any self luminous body composed of flaming gases which gives off heat and light.

When morning cometh, the stars hide their diminished heads.

Like the teamster's voice with tired team, the flaming match goaded the lazy peat to life.

The free winds told him what they knew.

A match consists of a wick or cord prepared to burn at a uniform rate.

The earth is a rotating mass of condensed and solidified gases in the form of an elleptoid sphere.

Haste to salute the sun, that for the day's chase, like a huntsman, cometh over the mountain.

Only the drunken lightning knows its errant path.

Lightning consists of a flashing illumination, electrical in origin, occurring in the sky.

A pearl is formed by the secretion of the mantle of certain bivalve mollusks.

The self-luminescence of the stars results from nuclear fusion.

The sea is the ultimate reservoir for the material eroded from continents.

Wind is air artificially put in motion by any force or action.

Like a Latin dancer, the lightning's rhumba held the center of heaven's stage.

Lightning is the electrical potential resulting from a loss of electrons in a cloud.

The sea is that part of the earth's surface which con- sists of salt water.

That full star with silent throb ushers in the evening.

A match is a short, slender piece of wood tipped with a mixture, by means of which fire is produced by friction.

Earth felt the wound, and Nature from her seat gave signs of woe that all was lost.

The earth is the only planet in the universe definitely known to support life.

The sun is a burning mass which is composed of hydrogen, helium and oxygen.

Like a proud patriarch, the sun himself grows dim with age.

The very clouds have wept and died and only God is in the sky.

With the deep-throated roar of an angry beast, the gasoline rushed and tumbled into the tank.

When dying clouds contend with growing light, this battle fares like to the morning's war.

Gasoline is a combustible liquid made up of a mixture of hydrocarbons.

Winter wind is not so unkind as man's ingratitude.

Gasoline is a liquid fuel derived from petroleum by direct distillation or by cracking.

The match raised his head of flames to challenge tyrant night.

Wind is air in natural motion along the earth's surface.

The warm sea laid his dimpled face as if asleep against the land.

A cloud is a visible mass of particles in the air or in a gas.

Gasoline, that potent giant, holds its power in leash, awaiting its call to duty.

A cloud is a visible mass of condensed vapor in the form of a fog or haze.

Scientific-Animistic II Training

As a madman, the violent, unreasoning sea held us helpless in his grip.

A pearl is a hard, smooth, often highly lustrous concretion.

Like a wrathful God the gasoline spewed flames at the hapless firemen.

Earth is here so kind, that just tickle her with a hoe and she laughs with a harvest.

Like a vain child in response to its reflection in the mirror, the match burned more brightly still.

And he called loudly to the stars to bend from their pale thrones and comfort him.

A star's radiance is due to thermo nuclear reactions.

The earth consists of a largely solid crust with a center of molten iron and other substances.

Like a hungry octopus, the many-armed lightning crushed the giant oak.

Gasoline is an inflammable liquid made by the hydrogenation of coal or water gas.

The little pearl, the Narcissus of the sea, was entranced by her iridescent beauty.

The sea is a body of water that occupies the earth's surface in basin-like depressions.

Wind is moving air caused by a difference in pressure areas on the surface of the earth.

Hugged and embraced by the strumpet wind.

The sun is a star made up of a vast concourse of atoms in violent movement.

The sun's a thief, and with his great attraction robs the vast sea.

A match is a substance provided with a tip which ignites by friction.

Rapid clouds have drunk the last pale beam of evening.

A cloud is a suspended mass caused by the union of particles forming a compound.

Lightning is a discharge of electricity from one cloud to another cloud or to the earth.

Scientific-Animistic II Recognition

A pearl is an abnormal growth within the shell of some bivalve mollusks.

The sea swept on and cried her old cry still, rolling along in dreams from hill to hill.

The little pearl, the Narcissus of the sea, was entranced by her iridescent beauty.

A cloud is a suspended mass caused by the union of particles forming a compound.

A match is a piece of material which has been dipped in melted sulfur to make it ignitable by tinder.

And he called loudly to the stars to bend from their pale thrones and comfort him.

The earth consists of a largely solid crust with a center of molten iron and other substances.

As a madman, the violent, unreasoning sea held us helpless in his grip.

The sun is that luminous celestial body from which the earth and other planets receive light and heat.

Like a vain child in response to its reflection in the mirror, the match burned more brightly still.

Lightning is a discharge of electricity from one cloud to another cloud or to the earth.

As thought without action, the lightning's sterile without thunder.

Gasoline is an inflammable liquid made by the hydrogenation of coal or water gas.

Earth is here so kind, that just tickle her with a hoe and she laughs with a harvest.

The sea is a body of water that occupies the earth's surface in basin-like depressions.

Like a hungry octopus, the many-armed lightning crushed the giant oak.

The sun's a thief, and with his great attraction robs the vast sea.

Like a wrathful God the gasoline spewed flames at the hapless firemen.

A match is a substance provided with a tip which ignites by friction.

Away! the gathering winds will call the darkness soon.

The earth's a thief that feeds and breeds by a composture stolen from general excrement.

Gasoline, a fraction of crude oil, is a volatile liquid used as a solvent.

Hugged and embraced by the strumpet wind.

With defiant flame, the match fought the wind and encroaching darkness.

The sun is a star made up of a vast concourse of atoms in violent movement.

Rich honesty dwells like a miser, sir, in a poor house as your pearl in your foul oyster.

A cloud is a body of either liquid or solid, hanging in the air at some height above the earth.

Star that dances in it as mad with agony.

The sea is a cause of erosion and a place of deposition.

The earth is the fifth largest planet in the solar system.

And walk on earth as the sun walks in the sphere.

A pearl is a hard, smooth, often highly lustrous concretion.

Wind is air in motion with any degree of velocity.

Clouds of hanging judgment and the cloud that weeps for me.

Lightning is an electrostatic phenomenon causing a flashing of light in the atmosphere.

A star's radiance is due to thermo nuclear reactions.

A star consists of atomic nuclei, electrons and radiation.

Rapid clouds have drunk the last pale beam of evening.

Wind is moving air caused by a difference in pressure areas on the surface of the earth.

Oh, impending death, thinks the gasoline, the captive of merciless combustion.

Animistic Training

Like a proud patriarch, the sun himself grows dim with age.

Winter wind is not so unkind as man's ingratitude.

The sun's a thief, and with his great attraction robs the vast sea.

Earth felt the wound, and Nature from her seat gave signs of woe that all was lost.

With the deep-throated roar of an angry beast, the gasoline rushed and tumbled into the tank.

The match raised his head of flame to challenge tyrant night.

Rapid clouds have drunk the last pale beam of evening.

As a madman, the violent, unreasoning sea held us help-less in his grip.

Like a Latin dancer, the lightning's rhumba held the center of heaven's stage.

The little pearl, the Narcissus of the sea, was entranced by her iridescent beauty.

Like a hungry octopus, the many-armed lightning crushed the giant oak.

Like a wrathful God the gasoline spewed flames at the hapless firemen.

Hugged and embraced by the strumpet wind.

Earth is here so kind, that just tickle her with a hoe and she laughs with a harvest.

The very clouds have wept and died and only God is in the sky.

Like a vain child in response to its reflection in the mirror, the match burned more brightly still.

The warm sea laid his dimpled face as if asleep against the land.

As an immortal child of nature, the pure pearl shows no trace of age.

When morning cometh, the stars hide their diminished heads.

And he called loudly to the stars to bend from their pale thrones and comfort him.

Animistic Recognition

Like a proud patriarch, the sun himself grows dim with age.

The free winds told him what they knew.

The sun's a thief, and with his great attraction robs the vast sea.

The very clouds have wept and died and only God is in the sky.

Gasoline, that potent giant, holds its power in leash, awaiting its call to duty.

As a madman, the violent, unreasoning sea held us helpless in his grip.

And walk on earth as the sun walks in the sphere.

Like the human soul, each layer of the pearl unfolds a greater secret.

Winter wind is not so unkind as man's ingratitude.

Star that dances in it as mad with agony.

Earth felt the wound, and Nature from her seat gave signs of woe that all was lost.

That full star with silent throb ushers in the evening.

The match raised his head of flames to challenge tyrant night.

Like the teamster's voice with tired team, the flaming match goaded the lazy peat to life.

With defiant flame, the match fought the wind and encroaching darkness.

Clouds of hanging judgment and the cloud that weeps for me.

And he called loudly to the stars to bend from their pale thrones and comfort him.

Oh, impending death, thinks the gasoline, the captive of merciless combustion.

With the deep-throated roar of an angry beast, the gasoline rushed and tumbled into the tank.

As thought without action, the lightning's sterile without thunder.

When morning cometh, the stars hide their diminished heads.

The warm sea laid his dimpled face as if asleep against the land.

The little pearl, the Narcissus of the sea, was entranced by her iridescent beauty.

Rapid clouds have drunk the last pale beam of evening.

Haste to salute the sun, that for the day's chase, like a huntsman, cometh over the mountain.

The earth's a thief that feeds and breeds by a composture stolen from general excrement.

Only the drunken lightning knows its errant path.

Like a hungry octopus, the many-armed lightning crushed the giant oak.

One voice is there, of the sea. A mighty voice.

Away! the gathering winds will call the darkness soon.

Earth proudly wears the Parthenon as the best gem upon her zone.

When dying clouds contend with growing light, this battle fares like to the morning's war.

The sea swept on and cried her old cry still, rolling
along in dreams from hill to hill.

Like a Latin dancer, the lightning's rhumba held the
center of heaven's stage.

Like a vain child in response to its reflection in the
mirror, the match burned more brightly still.

Rich honesty dwells like a miser, sir, in a poor house
as your pearl in your foul oyster.

As an immortal child of nature, the pure pearl shows no
trace of age.

Earth is here so kind, that just tickle her with a hoe
and she laughs with a harvest.

Like a wrathful God the gasoline spewed flames at the
hapless firemen.

Hugged and embraced by the strumpet wind.

NAME: _____   DATE: _____

AGE: _____   SEX: _____

OBJECTS	RESPONSE		REASONS
	Yes	No	
1. Sun			
2. Clouds			
3. Sea			
4. Lightning			
5. Wind			
6. Stars			
7. Earth			
8. Match			
9. Pearl			
10. Gasoline			

<u>Instructions</u>

<u>Instructions for Learning Sentences</u>

This is an experiment in learning complex verbal material and is not a psychological test. Therefore, we are not interested in your reactions as an individual but as a member of a group.

In this experiment you will be shown a series of sentences. These sentences will be projected on the screen one-by-one, each one for a brief period of time. You will see this same series several times, but on each of these times the sentences will appear in a different order. There will be a short period of time between each repetition of the series.

Your task will be to learn as many of these sentences as you can. In learning them, don't just memorize the sequence of words, but also try to understand the meaning or meanings of each sentence.

After you have had these several chances to see and learn each sentence, I am going to test you to see how well you have learned them. When this time comes, I'll give you additional appropriate instructions.

Are there any questions?

Remember, you will see each one of a series of sentences for a short time. This series will be repeated several

times. You are to learn each of the sentences in the series and its meaning. Then I will test you to find out how many you have learned.

Instructions for Animistic Test

Now we are going to try something different. First of all, fill in the information called for (i.e. name, date, age sex) at the top of the sheet of paper which I have just handed to you. In particular, don't forget your name. Now, look at the list of words running down the left hand side of the page. These words refer to a number of different objects. I want you to indicate whether you think the object referred to by each of these words is "living" or "not living". If you think the object referred to is "living" put a check in the Yes column opposite that word. If you think the object referred to is "not living" place a check in the No column opposite the word. CHECK EVERY WORD.

After you have placed a check in either the Yes or No column, give the reason or reasons why you checked Yes or No for the object referred to by that word.

In deciding whether the object is "living" or "not living", I want you to respond or decide:

        1)   as if you were a scientist - - - - e.g.
                 Newton, Madam Curie, or Darwin.

        2)   as if you were a poet - - - - - - e.g.
                 Shakespeare, Frost, or Wordsworth.

Are there any questions?

All right, go ahead.

        1a) like a scientist would

        2a) like a poet would.

Table of Raw Data

Frequencies of Animistic Responses for Each S

in Each of the 12 Groups

Number of Ss	Sentence Contexts and Sets											
	Scientific			Scientific-Animistic			Animistic			Control		
	S	R	P	S	R	P	S	R	P	S	R	P
1.	5	0	10	0	0	4	0	1	7	2	2	0
2.	5	6	9	4	0	6	4	1	4	6	1	5
3.	1	0	6	1	2	5	1	1	8	0	4	2
4.	0	4	6	0	0	10	2	0	7	0	6	8
5.	0	3	6	0	3	5	0	2	9	4	3	4
6.	0	0	4	7	3	5	4	5	10	0	7	5
7.	6	0	4	1	4	6	0	4	6	2	0	7
8.	0	0	5	1	0	4	0	7	4	2	3	7
9.	4	0	4	2	0	7	0	0	9	0	0	3
10.	0	0	9	0	0	5	4	0	8	4	0	10
11.	0	0	6	0	0	6	0	3	9	4	3	6
12.	0	0	7	0	7	10	0	0	8	3	0	9
13.	0	2	8	10	0	8	0	3	4	3	0	5
14.	0	0	2	0	0	4	0	0	8	2	0	6
15.	0	0	10	0	3	6	6	5	5	3	0	2
16.	2	0	6	0	0	5	0	0	5	0	5	6
17.	2	0	5	3	2	8	0	5	8	1	0	5
18.	0	0	6	0	7	8	0	6	10	2	0	9
19.	7	2	10	2	0	6	0	8	6	4	1	9
20.	0	0	0	0	2	4	0	3	10	3	1	4
21.					3						0	
22.					0						0	
23.					0						4	
24.					0						0	
25.					0						2	
26.											0	
27.											0	
28.											0	
29.											0	
30.											0	

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Approved by:

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Date: _May 27, 1954_
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