Table 1
Number of Positive (Friendly) Responses

	Treatment Levels			
	A1B1	A1B2	A2B1	A2B2
Sums	65	58	43	72
Means	4.33	4.46	3.58	3.79
N	15	13	12	19

Note–A1 = light iris, A2 = dark iris, B1 = large pupil, B2 = small pupil.

After the instructions were read, E presented at random the six pictures, which comprised the S's assigned set, to the S in a one-at-a-time order. The S was permitted to look at the picture for as long as 60 sec, if needed, after which he was presented the next picture. Approximately 15 sec elapsed between presentations. After the S had rated all of the pictures in his set, he was thanked and dismissed.

RESULTS AND DISCUSSION

Positive (friendly) responses were recorded for each S during his respective six trials and the sums of these responses by treatment are presented in Table 1. Also shown are treatment means and the number of Ss in each treatment.

An effect of the attrition which resulted from recognition of photographic subjects by experimental Ss was to yield cell frequencies which were not only unequal but also disproportionate. Accordingly, the method of unweighted means (Myers, 1966) was used to analyze the data presented in Table 1.

The significant main effect of iris color ($F = 5.68$, $df = 1/55$, $p < .05$) permits the rejection of the first hypothesis, which states that expressed affect will not differ as a function of iris color. The nonsignificant main effect of pupil size and the nonsignificant interactive effect of iris color and pupil size require that the second and third hypotheses be accepted.

Interestingly, as shown in Table 1, the mean number of positive affect statements was significantly greater for photographic subjects whose irises were light in color than for those whose irises were dark. This finding is, of course, in the predicted direction, and possibly is due to the increased information provided by such eyes. The failure of pupil-size differences to elicit differential affective responses is more difficult to explain.

Hess (1965) presented to a group of 20 men two pictures of an attractive young woman which were identical except that in one picture the young woman's pupils were extra large and in the other they were very small. The mean affective response to the picture with the large pupils was twice as large as that to the one with the small pupils. Presumably, what is appealing about large pupils in a woman is that they imply positive affect for the man at whom she is looking.

It seems likely that this appeal and concomitant positive affect would be lessened if the sex of the person in the photograph was the same as that of the S, as was the case in the present investigation. Indeed, support for this assumption has been provided by Hess, Seltzer, & Shlien (1965) who found a significant difference between pupil response of heterosexual and homosexual males when viewing pictures of males and females. Additional support is provided by Simms (1967) whose Ss revealed less affect (less pupil dilation) when viewing photographs of persons of their own sex than when viewing photographs of members of the opposite sex. In his discussion of these results, Simms posed the question of whether the pupillary response pattern would also be reflected in the stated interest of Ss.

Since the results of the present study as shown in Table 1 reveal less affect (less stated interest) by Ss in exactly the same order as obtained by Simms, they relate directly to his question. It also appears noteworthy that these effects were obtained regardless of the color of the irises of photographic subjects.

Finally, it should be noted that the Ss in Hess's study had an opportunity to compare identical prints in which pupil size varied, whereas no such opportunity was provided for Ss in the present investigation.

In summary, the results of this study reveal that the iris-pupil albedo ratios of adult human males, as inferred from black-and-white photographs, exert a significant influence on the way in which they are perceived by male college students.

Since the age range of these photographic subjects was not significantly different from that encountered among male college faculty members, it appears that a similar perceptual bias may be induced by some male faculty members in their male students.

These findings require support from additional studies which assess the relative influence of this variable when the "photographic subject-observer" conditions feature sex interaction.

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Further evidence for linguistic operations in the analysis of class-membership statements*

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Ss comparing various pairs of linguistically unlike statements to ascertain their logical status–same or contrary–conformed in their behavior to a model which predicts the utilization of two operations to perform the task.

In a previous article (Krossner, 1970), it was shown that Ss analyzing pairs of logically equivalent but linguistically differing class-membership statements of the sort, "All cats are mammals; no cats are nonmammals," utilize two types of operations. The operations transform a class-membership statement into any of its logical equivalents. Times to solution and error likelihoods in the experimental task were shown to depend monotonically on the number of operations that would be required to convert one member of a given pair of statements into the other.

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Table 1
Logical Diamonds 2 and 3. Within each diamond, the statements are logically equivalent.

	Diamond 2	Diamond 3
Form 1:	All As are non-Bs.	All non-As are Bs.
Form 2:	No As are Bs.	No non-As are non-Bs.
Form 3:	No Bs are As.	No non-Bs are non-As.
Form 4:	All Bs are non-As.	All non-Bs are As.

Table 2
Average Solution Times in Seconds vs Number and Type of Operations for Diamond 2 (Top Line) and Diamond 3 (Second Line)

	Equivalent				Contrary	
Form	0--Read	1--Op	1--S-P	2--Both	1--Op	1--S-P
1	2.62 3.18	6.45 10.10	10.89 9.89	8.56 11.70	4.40 4.92	3.58 4.50
2	2.02 3.80	5.54 8.92	5.71 10.86	6.96 11.76	2.73 6.59	4.99 7.20
3	1.94 3.63	5.52 10.25	4.98 9.41	8.07 12.42	3.31 6.80	5.67 8.58
4	2.37 3.17	6.77 9.80	6.70 9.13	8.50 11.32	4.82 4.48	3.29 4.40
Average	2.24 3.44	6.07 9.77	7.07 9.82	8.02 11.80	3.82 5.70	4.38 6.17

The two types of operation are straightforward. The first type, illustrated by the above example, is denominated an operator change, and it involves a change of operator word, from "all" to "no" in this instance, with the insertion of "non" in front of a class name as necessary. The second type, a subject-predicate interchange, involves a shift of class name from subject to predicate and vice versa, with the insertion or deletion of nons to keep logical equivalence. Thus, the transitions from Form 2 to Form 3, as illustrated in Table 1 of the present paper, involve subject-predicate interchanges.

A maximum of two operations, one an operator change and the other a subject-predicate interchange, suffices to convert any binary class membership statement into an equivalent. In Table 1, a transition from Form 1 to Form 3 would require two operations. The symmetrical nature of the operations in converting the four equivalent forms into each other is exhibited most clearly by a diamond-shaped arrangement of the statements; see Fig. 1 in Krossner (1970) for this.

The set of statements, hereafter called Diamond 1, used in the cited paper is not the only set possible. Two other sets, labeled Diamonds 2 and 3, are shown in linear order in Table 1 of the present article. A would-be fourth set, beginning "All non-As are non-Bs" is only a mirror reversal of Diamond 3 and has no independent existence. The three diamonds among them comprise all the equivalent sets which give rise to pairs of binary universal class-membership statements.

The purpose of the present article is to extend the previous results by showing that the same operations used in comparing pairs of statements from Diamond 1 are also used for Diamonds 2 and 3.

METHOD

CVC nonsense syllables of low association value were employed as class names to avoid any semantic contamination in the syntactic task. Each of the four forms in a diamond was paired with itself (the zero operations case), with the other equivalents, and with its two negations to give a total of 24 pairs per diamond. Two reduplications with different nonsense syllables gave a total of 72 stimulus cards. The pairs were typed on index cards as two lines, one statement below the other.

The Ss were undergraduate Harvard and Radcliffe students; 14 were tested with Diamond 2 and 10 with Diamond 3. Ss were instructed to look at a card and tell E whether the statements were logically the same or contrary. E recorded the answer and the time to solution and presented another card. Orders of presentation were randomized for each S.

RESULTS AND DISCUSSION

The harmonic mean was computed for the three trials with each statement pair to eliminate possible bias effects due to occasional long response times; these harmonic means, averaged across Ss, are presented in Table 2.

For both diamonds the model-predicted ordering of solution times in terms of number of operations is strongly substantiated. In all cases but one, times for transitions involving a larger number of operations are longer than those for a smaller number, and this is true across forms, i.e., regardless of the form the first statement of the pair assumed. The sole exception is with Diamond 2 in the S-P transition, Form 1-Form 4. This pair required 10.89 sec, more than the 8.56 sec of the two-operation transition, Form 1-Form 3. Even with this high value, however, the average time to perform one operation in Diamond 2 is 6.57 sec, less than the average 8.02 sec required for two operations.

With Diamond 3 for both equivalents and contraries and with Diamond 2 for contraries, as with Diamond 1 in Krossner (1970), the similarities in the average times for one-operation transitions, regardless of whether they are Op or S-P, permit the conclusion that it is the number and not the type of operation that is criterial.

As with Diamond 1, times to solution and errors were highly correlated. The Pearson correlation coefficient for Diamond 2 was .67 ($p < .001$) and for Diamond 3 was .85 ($p < .001$).

A three-way analysis of variance with operations, form, and Ss as factors showed, for Diamond 2, that operations ($F = 16.2$, $df = 3/39$), form ($F = 4.4$, $df = 3/39$), and the Operations by Form interaction ($F = 3.25$, $df = 9/117$) were all significant ($p < .001$). For Diamond 3 operations ($F = 27.8$, $df = 3/27$, $p < .001$) was significant, while form and the interaction were not (both $Fs < 1$).

Mosteller tests of predicted order (Mosteller, 1955) performed on each form grouping independently confirmed the trend in times with operations (all $ps < .05$). In these tests the average of the Op and S-P scores was used for the one-operation measure.

The discovery of a unitary psychological metric based on language for the processing of as elementary a sort of logical data as pairs of class-membership statements lends encouragement to the search for equivalent operations that are used with more complicated logical problems, such as syllogisms.

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