indicated the mean pain tolerance for denial of 71.5 was significantly higher than the mean for the neutral instructions of 54.2 ($q = 3.58$, $df = 16$, $p < .06$) as well as the mean for intellectualization of 45.4 ($q = 5.41$, $df = 16$, $p < .01$). Variance among the "main-effect" means corresponding to the obstetrician, nurse's-aide, and grade-nine student endorsers ($\bar{X} = 60.4$, $\bar{X} = 54.6$, and $\bar{X} = 56.2$, respectively) was statistically insignificant ($F < 1$) unlike the Instructions by Endorsers interaction ($F = 3.40$, $df = 4, 16$, $p < .05$). Analysis of the interaction indicated that the denial instructions ($\bar{X} = 88.3$) led to significantly higher pain tolerance than the neutral instructions ($\bar{X} = 38.0$) when instructions were endorsed by the obstetrician ($q = 5.9$, $df = 16$, $p < .01$). Also, there was a significant difference between the denial mean ($\bar{X} = 79.8$) and the intellectualization mean ($\bar{X} = 25.1$) when instructions were endorsed by the grade-nine student ($q = 6.5$, $df = 16$, $p < .01$). There were no significant differences among the three instruction means when endorsement was by the nurse's aide ($\bar{X}$ for denial = 45.6, $\bar{X}$ for intellectualization = 56.1, and $\bar{X}$ for the neutral instructions = 61.2).

DISCUSSION

The "main-effect" superiority in increasing pain tolerance of the cognitive-appraisal instructions involving "denial of the pain" tends to confirm the contention that procedures leading to increased tolerance of physical stress may be different from those increasing tolerance of psychological stress (Bobe & Davidson, in press). Speisman et al (1964) found that for a sample of university students a stress-film commentary emphasizing intellectualization was more effective than a denial commentary in reducing stress reaction to the film. However, the opposite was true of the student sample included in the present study using the administration of physical stress.

The common clinical suggestion that stress-reducing treatments have different effects for different clinical personnel was confirmed. For those designated as clinicians, it was found that endorsement of instructions by an obstetrician rendered the denial instructions effective in raising pain tolerance, while no instructions were effective when endorsed by the nurse's aide. The difference between the means for the obstetrician endorsement ($\bar{X} = 88.3$) and the nurse's aid endorsement ($\bar{X} = 46.5$) when the denial instructions were presented was statistically significant ($q = 4.9$, $df = 16$, $p < .01$). The reason why pain tolerance was significantly lower for the intellectualization instructions than for

the denial instructions when endorsement was by the nonclinician is not clear, especially since the difference between pain tolerance under the neutral instructions ($\bar{X} = 63.7$) as compared to that under the denial instructions ($\bar{X} = 79.8$) was not significant ($q = 1.9$, $df = 16$, $p > .10$). It is possible that the instructions involving content of an intellectual nature were incompatible with endorsement by a grade-nine student leading to apprehension about their efficacy, with resulting increased anxiety over the pain experience and subsequent decreased pain tolerance (Conn, 1961).

The procedures designed to manipulate cognitive appraisal used in this study differed from those of Speisman et al (1964) and Lazarus & Alfert (1964) as the Ss were asked to manipulate their own cognitive appraisal rather than E manipulating cognitive appraisal by programming the S's experience in the laboratory. However, it might be argued that the present study more closely resembles the real-life situation in that cognitive defenses against stress are instigated by the stressed individual himself.

It is possible that a fruitful study for future research would be an investigation of the generalizability to clinical pain of the present results relating to experimental pain (Beecher, 1957).

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NOTE

1. The complete printed passages may be obtained by writing the author.

The effect of a coding cue on verbal discrimination learning*

SHARRON S. WIKE and EDWARD L. WIKE
The University of Kansas, Lawrence, Kans. 6604

This study investigated the effect of the oral presentation of an English word as a coding cue for the correct CVC in a verbal discrimination task. The Ss were 22 undergraduates, 11 to a group. It was found that the group given the English words similar to the corresponding nonsense syllables made significantly fewer errors on the test trial.

It has been found that giving S a coding cue along with a trigram facilitates short-term memory of that trigram (Lindley, 1963; Schaub & Lindley, 1964; Lindley & Nedler, 1965). Thus, giving S the word "view" helped S to remember

VUJ. Presumably the trigram was encoded by means of the cue and at the time recall decoding (i.e., from "view" to VUJ) took place.

In verbal discrimination learning, S does not have to learn the response in the same way that he does in a paired-associate, serial, or short-term memory task—the correct syllable is given to him along with the incorrect syllable. It is not a matter of

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Table 1
The Incorrect Items, Correct Items,
and Coding Cue Words

Incorrect Items	Correct Item	Coding Cue
ved	yas	yes
qen	tup	top
xas	cib	sibling
seb	haq	hack
mah	jir	jeer
zum	toj	to
nuc	wum	womb
neq	wos	was
jec	kaf	cough
paj	rez	raise
qal	nem	nimble
jiz	zap	sap
zed	gep	gip
dux	vor	for
gik	fim	feminine
mox	bov	boy
taw	kul	cool
mif	doy	day
ruh	mey	me
suv	loq	lock
woc	huz	hussy
vos	hix	hex
wiv	nuw	new

response learning *per se*, in which S must produce the response from his own resources. Would giving a coding cue for the correct item during verbal discrimination learning have any effect? That is, since the response does not need to be learned, would a technique that seems to aid learning of a response *qua* response help? Does a coding cue carry any other characteristics besides aid in response learning? More specifically, does administration of a coding cue aid the differentiation of the correct vs the incorrect response in verbal discrimination learning?

METHOD

The Ss were 23 volunteers from the introductory psychology course at the University of Kansas. One S was eliminated due to failure to follow instructions. There were 22 Ss, 11 in each of two groups, in the experiment proper. There were 8 males and 14 females. The Ss were assigned alternately to the two conditions.

The apparatus consisted of a Sawyer Rotomatic slide projector that was controlled by three timers activated by a power supply. The material for the verbal discrimination task consisted of 50 low-meaningful nonsense syllables. The syllables had a rated meaningfulness of 1.46 to 2.95 (Noble, 1961). Two syllables were combined randomly into 24 pairs. One member of each pair was randomly designated as correct. Two interpair orders of the 24 pairs were randomly constructed. Two blank slides preceded each order of 24 pairs. The pairs of syllables and the English words given as coding cues for the correct syllables are presented in Table 1.

There were two groups, an experimental

group and a control group. In the experimental group, an English word was given orally by E as soon as the correct item was shown alone. Two trials were administered—a study trial and a test trial. On both trials S was presented with a pair of syllables, required to spell his choice as to the correct member of the pair, and then presented with the correct member of the pair on the next slide. All 24 pairs were given on the study trial, before the test trial was administered. The English words were given to Ss in the experimental group only on the study trial. The rate on the study trial was 4:8; the rate on the test trial was 8:2.

The instructions were as follows: "This is a learning task. The material will be presented on this screen. You will be presented with 24 pairs of three-letter nonsense syllables—such nonsense syllables as TOF and BUJ. In each pair of syllables, one of the syllables is arbitrarily called correct. How do you know which is the correct syllable in the pair? After the pair of syllables is shown, the next slide will show the correct syllable. There is no way for you to know the first time through the list which are the correct syllables when you are shown the pair of syllables. The correct syllables were chosen randomly; there is no rule or pattern. Your job is, when you are presented with a pair of syllables, to choose one of the syllables and spell it. This is your choice as to the correct member of the pair. Following the first trial—the guessing trial—there will be a test trial. On this test trial, the pairs will be the same, the same syllables will be correct, but the order of the pairs will be different. On the test trial, if you cannot remember the correct syllable in a given pair, guess as you did on the first trial. It is very important that you make a response every time a pair of syllables is presented. Remember to spell your choice. On the first trial you will have 4 sec to make your choice; on the test trial you will have 8 sec to make your choice. You will be told when the test trial is beginning. Research has shown that generally people can remember nonsense syllables easier if they can see a likeness to an English word in a given syllable."

In addition, the experimental group was given the following sentence: "When the correct syllable is shown on the first trial, I will say an English word for each correct nonsense syllable as a hint to help you remember the correct syllable."

RESULTS AND DISCUSSION

The response measure was the mean number of errors on the study trial and on the test trial. The groups did not differ significantly on the number of errors on the study trial ($t = .36$, $df = 20$, $p > .05$).

The mean number of errors was 10.09 for the experimental group and 10.54 for the control group. The experimental group made significantly fewer errors on the test trial ($t = 5.32$, $df = 20$, $p < .01$). The mean number of errors for the experimental group was 3.00; the mean number of errors for the control group was 6.90.

Thus, giving a similar English word as a coding cue helped S to respond with the correct alternative in a verbal discrimination task. The coding cue aided in differentiating between the correct and incorrect alternatives. The coding cue must do more than merely help the S acquire the response, since response learning is unnecessary in verbal discrimination learning. Perhaps the simplest explanation for the difference in the two groups is that when E pronounces the English word, a frequency unit is added to the correct syllable. If S is responding by the rule "choose the more frequently occurring alternative," as in the frequency theory of Ekstrand, Wallace, & Underwood (1966), vocalization by E may add a frequency unit to the correct item for the experimental group that is not added for the control group.

A second explanation might be that giving an English word as a coding cue increases the meaningfulness of the correct alternative. The S could then employ the strategy "choose the more meaningful alternative" with success. Alternatively, perhaps the frequency units of the English word accrue to the corresponding nonsense syllable and S then responds according to frequency theory, i.e., "choose the more frequently occurring alternative."

The English word was similar to the nonsense syllable in two ways: (1) It had formal similarity, that is, one or two letters were usually identical; and (2) it had acoustic similarity to the nonsense syllable. The relative importance of these two similarity components upon coding by S is unknown.

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