

State-dependent effect of diazepam on learning

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State-dependent learning presents a methodological problem in studies concerning drug effects on memory processes. It can also be a prognostic indicator for psychiatric patients undergoing joint psycho- and chemotherapy. Moreover, several drugs capable of inducing strong state-dependent effects have the potential for abuse by man (Overton, 1972).

The present double-blind study with diazepam

for means in the same state and change state indicates the state-dependent effect. A significant dissociation effect was found in paired association learning task ($P < 0.001$), but not in the Symbol Arrangement Test. The significance arose, when the PP condition changed to PD, and DD condition to DP condition. Interference was greater when the subjects were under the drug during the retrieval phase (groups PD and DD) as compared to the retrieval under placebo (groups PP and DP). Neither acute nor subacute treatment revealed a significant drug effect on the encoding phase, even if mean number of mistakes was greatly increased in acute diazepam condition. We conclude, that the change-state effect of diazepam was due to the action of drug on the recall phase, and that diazepam has two kinds of action: a slight acquisition impairing, and recall facilitating effect.

Table 1 Drug effects on the state-dependent learning

Task	Number of correct responses; Mean \pm s.d.				F value
	PP	PD	DP	DD	
<i>Symbol arrangements</i> (number of objects correctly ordered)	5.2 \pm 1.8	5.2 \pm 1.3	5.0 \pm 1.3	3.5 \pm 2.3	1.83
<i>Paired associations</i> (number of correct answers)	3.3 \pm 2.1	4.2 \pm 1.3	3.6 \pm 1.3	4.8 \pm 1.0	7.99***

The analysis of positive transfer on four groups, 10 subjects in each. PP=placebo-placebo, PD=placebo-diazepam, DP=diazepam-placebo, DD=diazepam-diazepam; the first letter refers to treatment on day 1, and the second letter to the treatment on day 2. Paired associations refer to the correct answers given to the test syllables on the next day after the right answers had been learned on the first day. The interaction F values for means in the same state and change state indicate the state-dependent effect.

*** $P < 0.001$.

(10 mg) on 20 student volunteers attempted to assess state-dependent effects of diazepam, which otherwise impairs memory (Gregg, Ryan & Levin, 1974). The tests used were Kahn's Symbol Arrangement Test and a paired association learning task. The different phases in information processing were experimentally differentiated in order to observe the effects of diazepam on encoding, storage, and retrieval (Atkinson & Shiffrin, 1968).

Table 1 presents the main results analysed by a two-way analysis of variance. The interaction F value

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