Pre-Sleep Ingestion of Two Hypnotic Drugs
and Subsequent Performance

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Abstract. The present study examined the effect of pre-sleep ingestion of two depressant drugs (nitrazepam and butobarbitone) on subsequent performance. 12 subjects attempted five 15-min tasks in a balanced, latin-square design. The high dose of each drug increased the time on task decline in a short-term memory task. STM did not show a definite time of day effect. Proof reading was superior in the morning, but concept identification was faster in the afternoons. The implications of these results are briefly discussed.

Key words: Pre-sleep Ingestion — Hypnotic Drugs — Performance Tests — Short Term Memory — Time on Task — Time of Day — Proof Reading — Concept Identification.

Depressant drugs are widely used to induce sleep, but the consequences of such drugs have received little attention. Of particular importance is impaired working efficiency which can be both dangerous and expensive, in modern, machine-assisted society. Subjective report cannot be relied on alone, as it has been shown that a drug can impair performance even when subjective changes are undetected (Munro-Faure et al., 1971). If performance tests are used, then it is found that they can vary widely in their “sensitivity” to disturbance (Poulton, 1965). It has often been found necessary to prolong testing (e.g. 2 hrs) in order to achieve the required sensitivity (Wilkinson, 1969).

The present study has two aims, first to compare the effects of two depressants (butobarbitone and nitrazepam). The second aim is to evaluate the usefulness of 5 short (15 min) tests in measuring performance impairment.

Method

Drugs. Each drug was given at two dose levels, i.e. butobarbitone (100 and 200 mg) and nitrazepam (5 and 10 mg). A lactose placebo was included twice, giving 6 conditions in all. The drugs were given in identical gelatine capsules, without any identification of the contents. The capsules were taken at 23.00 hrs on the day

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before testing. A telephone call reminded subjects to take the capsules. The order of administration for each subject was determined by a balanced latin-square. Urine samples were taken at the beginning of the next day to confirm that the drugs had been taken.

Subjects. Twelve healthy subjects (3 males, 9 females) were tested in groups of 4, in a partitioned room. They were unable to see each other during testing and were monitored via a one-way screen. They were not allowed to drive to or from the laboratory on the day of testing. Tea, coffee, cigarettes and alcohol were not allowed, but subjects were given normal meals.

Testing. A repeated-measures design was used (Winer, 1971). A full practice day was given 1 week before the main experiment. A testing session consisted of a full day. Each subject received the six drug conditions, a separate day per drug. The sessions were set at exact weekly intervals to keep to the same day of the week. Five tests were attempted in the morning and again in the afternoon, following the general paradigm of Colquhoun and Corcoran (1964). The order of tests was determined separately for mornings and afternoons, from two, balanced latin-squares. In addition, the first test of the afternoon was never the last or first test of the morning.

Tasks

1. Short-Term Memory (STM). Strings of 8 digits were recorded on tape and presented at the rate of 2 digits per second. At the end of the sequence, subjects were given 6 sec to write down the numbers in the presented order. The cycle of presentation and response continued for 15 min. Subjects were instructed not to respond whilst listening to the numbers. Observation indicated no departure from this rule. Subjects were asked to respond even when uncertain, but errors of omission were not forbidden.

2. Proof Reading (PR). Subjects scanned passages of prose for the frequent letter E and the infrequent letter K, for 15 min (relative frequencies 25:1).

3. Concept Identification (CI). Subjects were given packs of cards, having 32 cards per pack. The designs were generated from five binary dimensions (e.g., size: small or large). In each pack a subgroup was defined using two dimension (e.g., small and square). The backs of these cards were marked. Subjects were required to classify the cards correctly and to identify the rule. Subjects checked their decisions by referring to the back of the card.

4. Visual Search. This task required subjects to scan through consonant matrices of constant size (12 by 50 letters) for a particular target letter(s). This target letter was randomly positioned, and occurred between 1 and 5 times per matrix (average is three per matrix). Random variation in frequency and position were produced to force subjects to scan the matrices completely. Observation indicated that subjects did comply with this aspect of the test. Each matrix was presented on a separate sheet, and sufficient were supplied for each 15 min period. Subjects worked at their own pace. No significant effects were found for this test.

5. Lines Classification. Subjects were presented with a couple of lines, of varying length each on a separate card. The lines were selected from either of two normal distributions; producing a group of 'long' lines (mean = 4 inches) and a group of 'short' lines (mean = 4.7 inches). Equal numbers of lines from each group were mixed at random to give packs of 100 lines. Subjects were required to classify lines as 'short' or 'long' and were aware that the 2 groups did overlap. After each decision, subjects were given knowledge of the correct decision, where 'correctness' was defined in terms of the distribution of origin. Two measures were used to sum-