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Discrepancies in results obtained with activity cages and by observation

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The development of psychoactive drugs is heavily dependent on the initial screening tests. Usually these involve assessing the "spontaneous" activity of animals (Kinnard & Watzman, 1966), either by standardized observation or by automatic recording. Photocell activity cages yield counts of the number of times beams of light are broken by animals' movements, but little information is available about the kinds of behaviour actually picked up, or on how far observation and automation tally when directly compared.

Our results demonstrate that, predictably, typical photocell counts do not measure simple or homogeneous behaviour even in undrugged animals; with drugs, complex changes of behaviour may be masked by the relatively crude photocell counts. Refined observation may not only be more informative, but also quicker and cheaper (Krsiak & Janku, 1966), the objectivity and convenience of activity cages notwithstanding.

Rats were observed in cube-shaped activity cages equipped with two beams. The numbers of "walks" across the cage and of "rears" were correlated with photocell counts ($r=0.77$ and 0.80 respectively), but time spent "washing and grooming" was not. Multiple linear regression analysis showed that walks and rears combined accounted for 85% of the variance of the photocell counts, and thus apparently were the two components which mainly determined photocell counts from undrugged rats.

Dexamphetamine (0.25–2.0 mg/kg, subcutaneously, 35 min earlier) increased photocell counts as expected, with a maximum about twice the control count—by 0.5 mg/kg ($P<0.001$). The observed number of walks and rears also increased, but rather less ($P<0.05$ and <0.1, respectively). Washing and grooming, however, dropped sharply—to about one sixth of control levels ($P<0.001$); this could not have been detected by the photocell counts. At each dose photocell counts remained highly correlated with the number of walks, but not with the number of rears where correlations fell to zero at the higher doses. Perhaps such discrepancies

arise because photocells pick up small movements, for example, head shaking (Rushton & Steinberg, 1963) which we did not score and which may constitute " stereotyped " activity (Randrup, Munkvad & Udsen, 1963). With some mixtures of amphetamine and amylobarbitone (Rushton & Steinberg, 1967), high proportions of amylobarbitone make animals walk more and rear less, probably because of ataxia (Rushton & Steinberg, 1963). This " dissociation " might again not be detected by photocells.

Despite the risks of observer bias, we suggest that the onus remains on the designers and users of more elaborate activity cages to show in what circumstances they surpass skilled observers.

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Effects of muscarinic and nicotinic agents on avoidance learning of "complex" tasks in different strains of mice

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The effects of nicotine on learning and behaviour have been widely assessed (Bovet, 1965 ; Armitage & Hall, 1967). Nicotine enhances learning and memory and this effect is generally higher in strains or individuals characterized by low performance levels.

An analysis of the action of nicotine, physostigmine, arecoline and pilocarpine was conducted in different strains of inbred mice showing high or low performance levels in a " basic " test of shuttle-box avoidance learning. The strains performing at a high level in this preliminary task were trained with presumably more " difficult " schedules in which: (1) the length of the conditioned stimulus was very short (1 sec) and a long delay divided the conditioned from the unconditioned stimulus (delay conditioning) ; (2) the animals were given a sequence of trials in which when the light was first presented alone the mouse had to move to avoid a shock, while a light-sound complex stimulus required immobility because crossings were punished (" go–no go " schedule) ; (3) each session was divided into two sub-sessions, a visual stimulus (10 W lamp) being used during the first part and an auditory stimulus (pure tone) being used during the second part.

The results show that (*a*) nicotine (0.1–0.5 mg/kg) and physostigmine (0.03–0.06 mg/kg) enhanced avoidance learning in strains characterized by low avoidance