

Experimental Studies of the Behavioural Effects of Nicotine: II Interaction of Sex and Smoking Habits

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In the preceding paper of this series, we have several times drawn attention to the complications introduced by the independent variables of sex and smoking habit (smoker vs. non-smoker). The statistical significance of the second- and third-order interactions involving these variables has been shown in the various Tables already given; in this paper we shall attempt to discover whether any reasonable generalizations can be derived from the complex pattern of results. Theoretically, one might assume that the effect of nicotine, in the small dosage used, would be greater for non-smokers than for smokers, on the grounds that smokers would have developed a tolerance for the drug (*Winsor and Richards, 1935*). Along similar lines, one might make the same prediction for women as opposed to men, on the grounds that men smokers tend to smoke more, and to have smoked longer, than women smokers. We shall examine the data on our six

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experimental tests with a view to deciding on the applicability of this hypothesis to the results. Statistical results having already been reported, we shall rely mainly on the presentation of diagrams; details of this kind often get submerged in the statistical complexities of a third-order analysis of covariance, and require resuscitation by pictorial means.

As far as sex differences are concerned, there is little apparent difference in drug responsiveness on most tests; serial reaction time, spiral aftereffect, visual masking and CFF fail to show any suggestive differences. Reminiscence scores in the serial reaction time experiment seem to support the hypothesis of greater drug effects for women (Fig. 1), but scores on the tremor test (frequency of touching) would seem to contradict

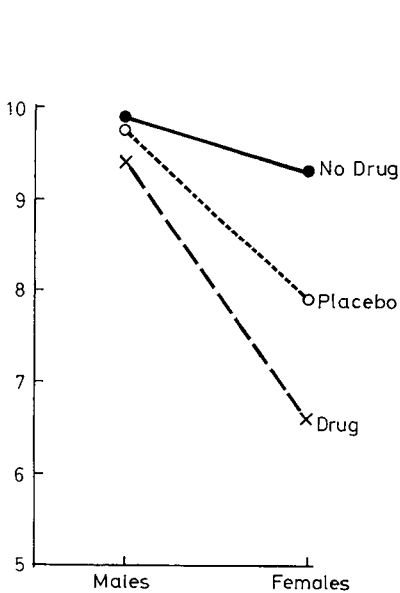


Fig. 1 Serial reaction time: regression of post-treatment initial score on total pre-treatment performance score.

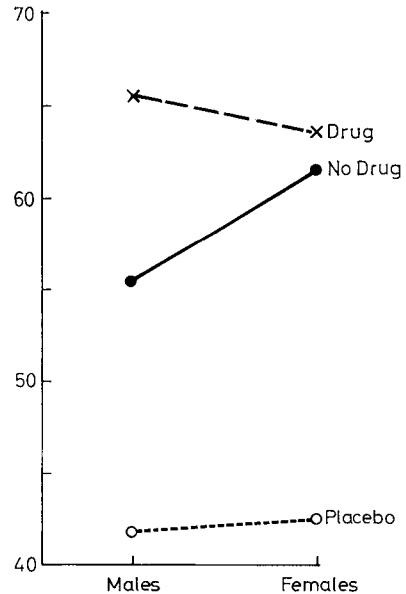


Fig. 2 Motor tremor - frequency of touching.

it (Fig. 2). The duration scores on the tremor test are equivocal (Fig. 3), and do not support the hypothesis at all clearly. The two-flash threshold (Fig. 4) gives results in line with the hypothesis, and the uncertainty interval results from the same experiment are also in line (Fig. 5). On the whole, however, it would be difficult to interpret these data as giving any direct support to the theory of greater feminine responsiveness, and while they do not conclusively disprove it they must, on the whole, be interpreted as constituting evidence against it.

Comparisons between smokers and non-smokers also fail to throw up differences in responsiveness in the serial reaction time test, the spiral aftereffect test and the visual masking test. There is some slight support in the reminiscence scores of the serial

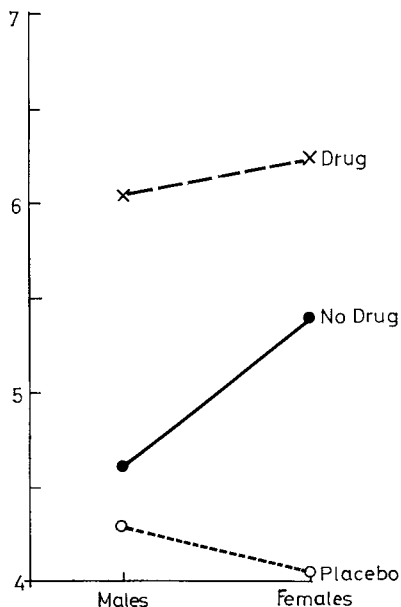


Fig. 3 Motor tremor - duration of touch.

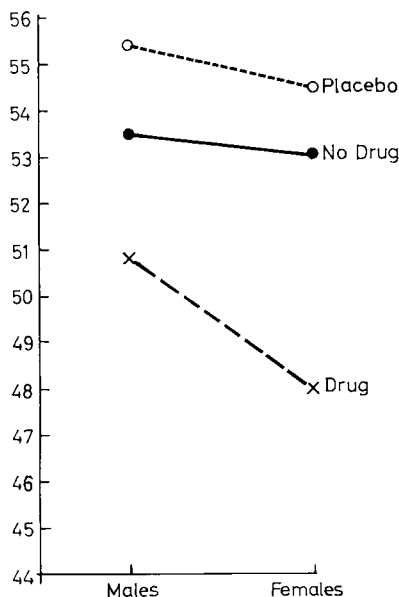


Fig. 4 Two-flash thresholds.

reaction time test (Fig. 6), and the „frequency of touching“ score of the motor tremor test (Fig. 7). Data from the two-flash threshold test give some mild support (Fig. 8), as do, a little more strongly, data from the uncertainty interval scores of the same test (Fig. 9).

However, the C. F. F. threshold data (Fig. 10) are contrary to the hypothesis, and those from visual masking are ambiguous. Fig. 11 shows the results from the ascending threshold experiment, and it will be seen that while differences are greater for nonsmokers, there has been a cross-over of drug scores as opposed to placebo and no-drug scores, with only the smokers showing the predicted lowering of thresholds. Descending threshold measurements (Fig. 12) show greater differences between drug and placebo for non-smokers, but smaller drug vs. no-drug dif-

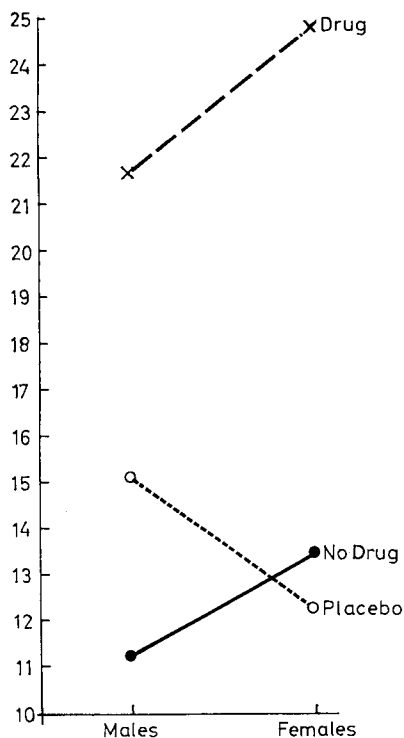


Fig. 5 Uncertainty intervals: two-flash threshold.

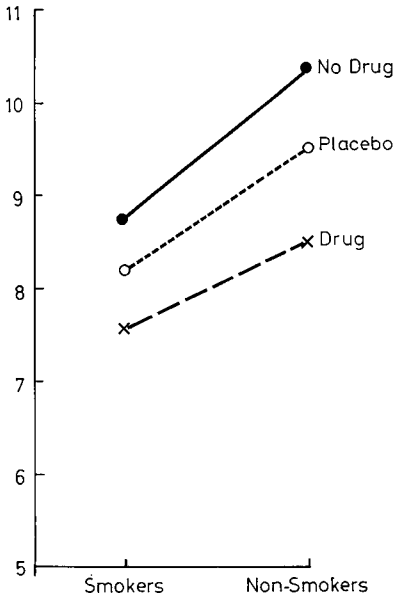


Fig. 6 Serial reaction time: regression of post-treatment initial score on total pre-treatment performance score.

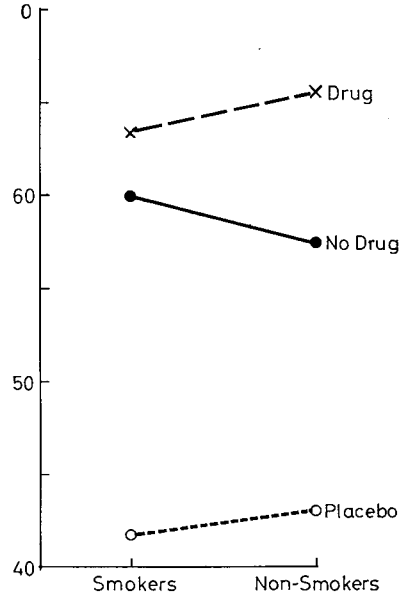


Fig. 7 Motor tremor - frequency of touching.

ferences. On the same test, the uncertainty intervals (Fig. 13) show a cross-over effect, but no difference in drug effect differences.

These results make it clear that the effects of sex and smoking history are too complex to be easily subsumed under any special general rule or law. Effects seem to be related to the particular tests used, or even the particular score chosen. Possibly personality (particularly extraversion-introversion) may act as a tertiary independent variable which should be taken into account, but the number of subjects, although quite large for experiments of this kind, was not large enough to make possible a detailed study of this point. In future studies it may be possible to incorporate this additional variable.

Summary

In a previous article, the effects of small doses of nicotine were evaluated with respect to six experimental laboratory tests. It was found that sex and previous smoking history were relevant factors in accounting for the results, and this paper brings together the differences in these six experiments between men and women, and smokers and non-smokers. It was hoped that some simple and clear-cut hypothesis would account for the observed data, but the results did not lend themselves to any such summary. They do, however, make clear the need for controlling very carefully both variables in research of this kind.

Zusammenfassung

In einer früheren Arbeit wurden die Wirkungen kleiner Nikotinmengen auf sechs Laborversuche geprüft. Dabei stellte sich heraus, daß Geschlecht und Rauch-Anamnese für die Ergebnisse von Bedeutung waren. In dem vorliegenden Aufsatz werden die Unterschiede zusammen-

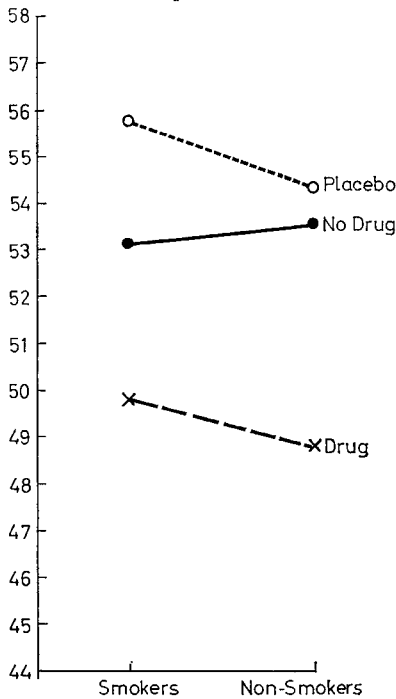


Fig. 8 Two-flash thresholds.

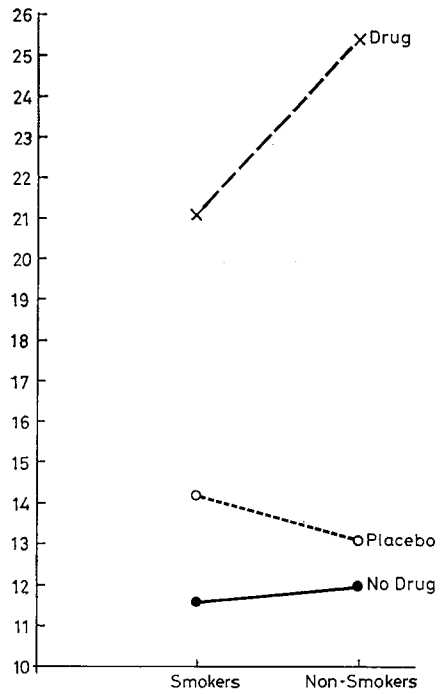


Fig. 9 Uncertainty intervals: two-flash threshold.

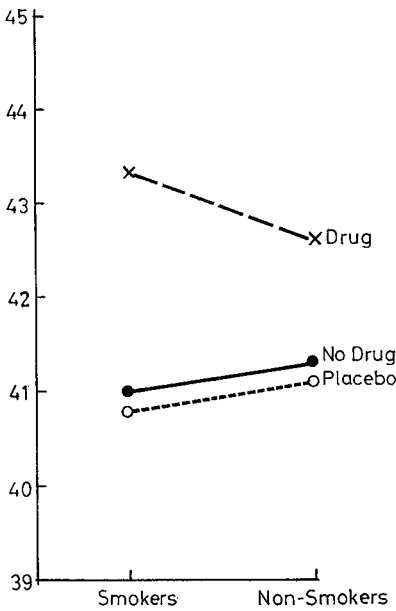


Fig. 10 CFF thresholds.

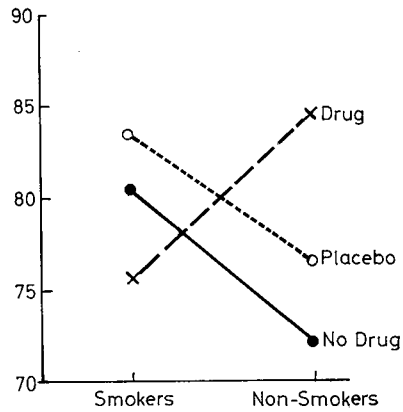


Fig. 11 Visual masking - ascending thresholds.

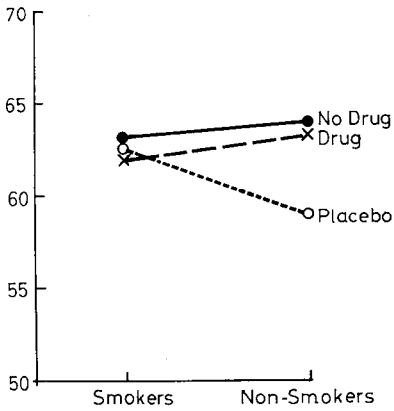


Fig. 12 Visual masking - descending thresholds.

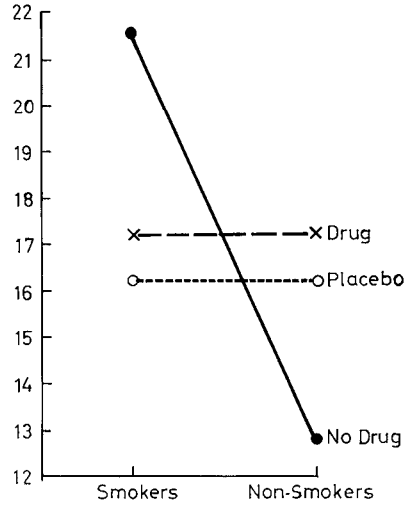


Fig. 13 Visual masking - uncertainty intervals.

gestellt, welche sich in diesen sechs Versuchen zwischen Männern und Frauen, Rauchern und Nichtrauchern ergaben. Die Hoffnung, daß die beobachteten Befunde sich durch eine einfache und einleuchtende Hypothese würden erklären lassen, wurde durch die Ergebnisse nicht erfüllt. Diese zeigen indes die Notwendigkeit, bei Arbeiten dieser Art die beiden genannten Variablen sorgfältig zu beachten.

Literature

Winsor, A. L., S. J. Richards: The development of tolerance for cigarettes. *J. ex. Psychol.* 18 (1935), 113-120

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