

PERSONALITY AND CIGARETTE SMOKING

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Behavioural events of a social kind are usually classified into categories which lack unity from the psychological point of view. Thus we talk about criminals as if we were referring to a homogeneous group; this has often suggested the search for a single underlying cause of "criminality". Yet it must be clear that criminals as a group are extremely heterogeneous and that the criminal act is a consequence of not one but many causal factors (1). All that the psychologist can do is to postulate certain hypotheses which might identify some of the many underlying causes of the behaviour in question, and to carry out experimental investigations to test consequences which can be deduced to flow from these theories.

Clearly these considerations apply to cigarette smoking at least as strongly as to crime. (In this paper I shall only deal with cigarette smoking, not with pipe and cigar smoking. However, to avoid repetition of the term "cigarette" I shall in the main body of the article simply use the term "smoking" although no reference is intended to the much less widely studied groups of people who smoke cigars or pipes.) In this article, therefore, no attempt will be made to cover all the numerous reasons which prompt some people to smoke or to overeat, and others to refrain; we shall simply be concerned with one particular hypothesis and certain studies carried out to verify or falsify

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this hypothesis.

We shall begin by referring to a widely recognised general law of psychology relating level of stimulation on the one hand, to hedonic tone on the other. Level of stimulation, by which is meant an energy exchange involving one or more of the sense organs, can range all the way from low through medium to high; hedonic tone can range all the way from negative through indifferent to positive. Measurement of sensory stimulation is usually in terms of the amount of energy communicated to the sense organ. Hedonic tone may be measured by adient or abient movements, particularly by their extent or strength, or by verbal or written comments.

The general relationship between these two variables is shown in Figure 1, where the solid curved line shows the results of numerous experimental studies in diagrammatic form. It will be seen that medium levels of stimulation have the highest hedonic tone, and that extremely high levels of stimulation (pain) and extremely low levels of stimulation (sensory deprivation) both are categorised by negative hedonic tone. This general relationship was already known to Wundt, and the reader may be referred to a recent study by Berlyne (2) for a detailed review of the evidence.

Most experimenters working in the fields of pain tolerance and sensory deprivation tolerance have found very marked individual differences, and Eysenck (3) has tried to set up a general theory to explain these individual differences. This theory is based on the postulate that extraverted persons develop inhibitory potentials more quickly, strongly and lastingly than do introverted people (4). The terms "extraverted" and "introverted" are here not used in any categorical sense but merely to describe the end points of a continuum; the majority of people will be intermediate rather than extreme on this continuum, and the relationship between extraversion and inhibition is assumed to be monotonic throughout the whole range. The nature and measurement of this personality trait have been discussed in considerable detail elsewhere (5); personality inventories have been specially designed for the measurement

of extraversion and another important personality trait, neuroticism or emotionality (6; 7). It is these measuring instruments, and adaptations therefrom, which have been used in the studies to be mentioned later on in this article.

The concept of "inhibition", is of course, a very complex one and the reader may be referred to Diamond et al. (8) for a detailed discussion of its physiological and psychological meaning. Physiologically it seems to be related to the synchronising part of the ascending reticular formation. Psychologically the term implies a depression of cortical activity, whether concerned with perception or the co-ordination or inhibition of subcortical centres. In relation to sensory stimulation the effects of inhibition may be said to be essentially a raising of thresholds so that extraverted people would tend to receive less effective stimulation than ambiverts, and ambiverts less than introverts, when external conditions were identical for all three groups. It would seem to follow that any degree of stimulation would effectively be experienced by introverts as higher than it was being experienced by the average person, while similarly it would be experienced by extraverts as lower than it was being experienced by the average person. Objectively equal amounts of stimulation, therefore, would not be experienced as equal by extraverts and introverts; they would appear displaced to the right of the abscissa of Figure 1 by the introvert, and to the left by the extravert. Similarly, if O.L. represents the optimum (or preferred) level of stimulation of a given person, then O.L._I would lie to the left of O.L._P, and this in turn to the left of O.L._E, where I and E refer to introvert and extravert, respectively, and P to the population average.

Again, consider two points, A and B, on the abscissa, referring to low and high stimulation respectively. If straight lines are drawn through these points, parallel to the ordinate, they will cross the general curve relating level of stimulation to hedonic tone roughly at the indifference level; in other words, for the average person these two stimuli are equally indifferent.

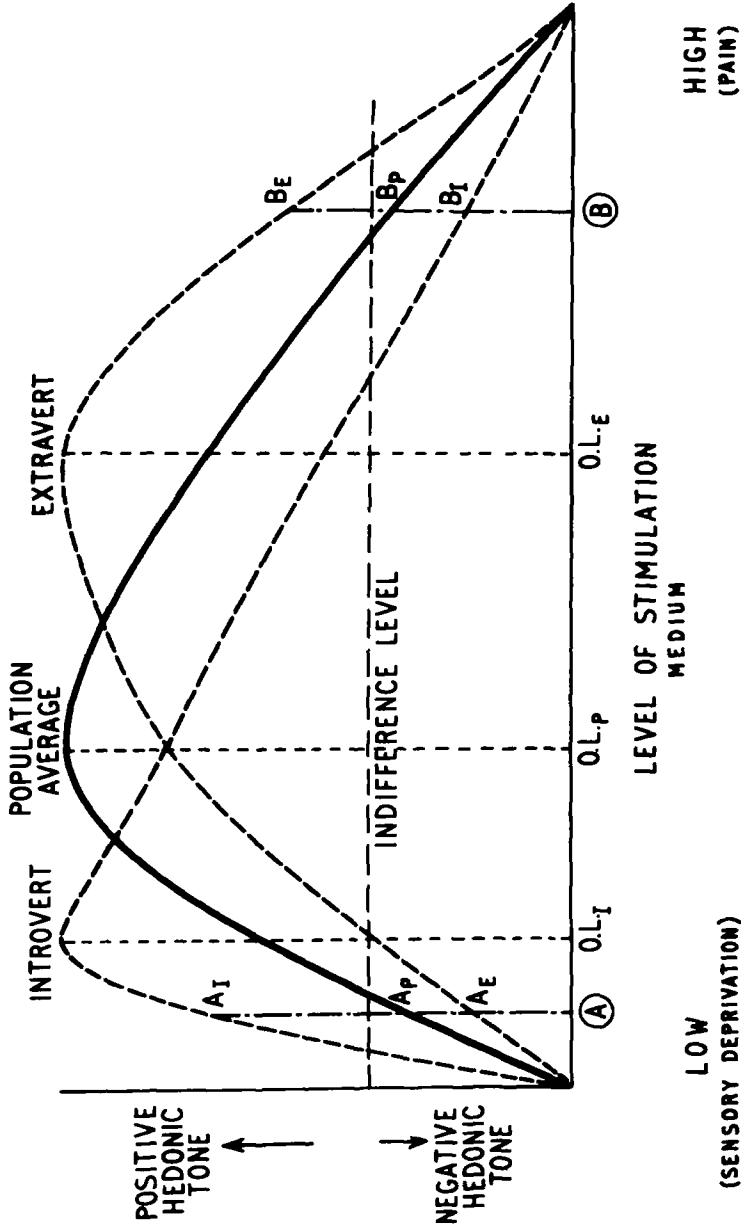


FIG. 1

Diagram showing relation between level of stimulation (abscissa) and hedonic tone (ordinate) in extraverts and introverts. For explanation see text.

For the typical extravert and introvert, however, as already explained, the general curve is not representative, and has to be displaced, to the left for the introvert, and to the right for the extravert. It follows, as shown in the diagram, that stimulus A will be positively hedonic for the introvert (A_I) and negatively hedonic for the extravert (A_E), while B will be negatively hedonic for the introvert (B_I) and positively hedonic for the extravert (B_E). (Similar consequences would appear to follow if we based our argument on individual differences in "excitation" rather than in "inhibition"; we are not concerned at this point with the possibility of a crucial experiment to decide between these alternative hypotheses.)

Many testable deductions follow from this hypothesis. It may be deduced, for instance, that extraverts would show greater pain tolerance than introverts, a prediction verified by Petrie (9), Poser (10) and Lynn and Eysenck (11). It may also be argued that extraverts should show less tolerance of stimulus deprivation than introverts, and here too there is experimental support from the work of Petrie, Collins and Solomon (12). A variety of other predictions have been made and have been supported by experimental evidence; these are discussed in Experiments with Drugs (3). For our purpose we shall draw attention only to one further consequence of our theory, to wit, the existence of a kind of stimulus hunger on the part of the extraverts and a stimulus avoidance on the part of the introverts compared with each other. There is indeed considerable evidence that extraverts drink more, eat more (particularly spicy food), take more risks (with the accompanying autonomic stimulation, providing what Berlyne (2) has called "arousal jag"), enjoy parties and social intercourse generally more, because of the considerable degree of stimulation this provides. They also appear to indulge more frequently in sexual intercourse, have illegitimate babies more frequently, and prefer unusual and perverted sex practices. The evidence on these and additional points is given in Eysenck (3).

It seems reasonable to apply this hypothesis to smoking which is certainly

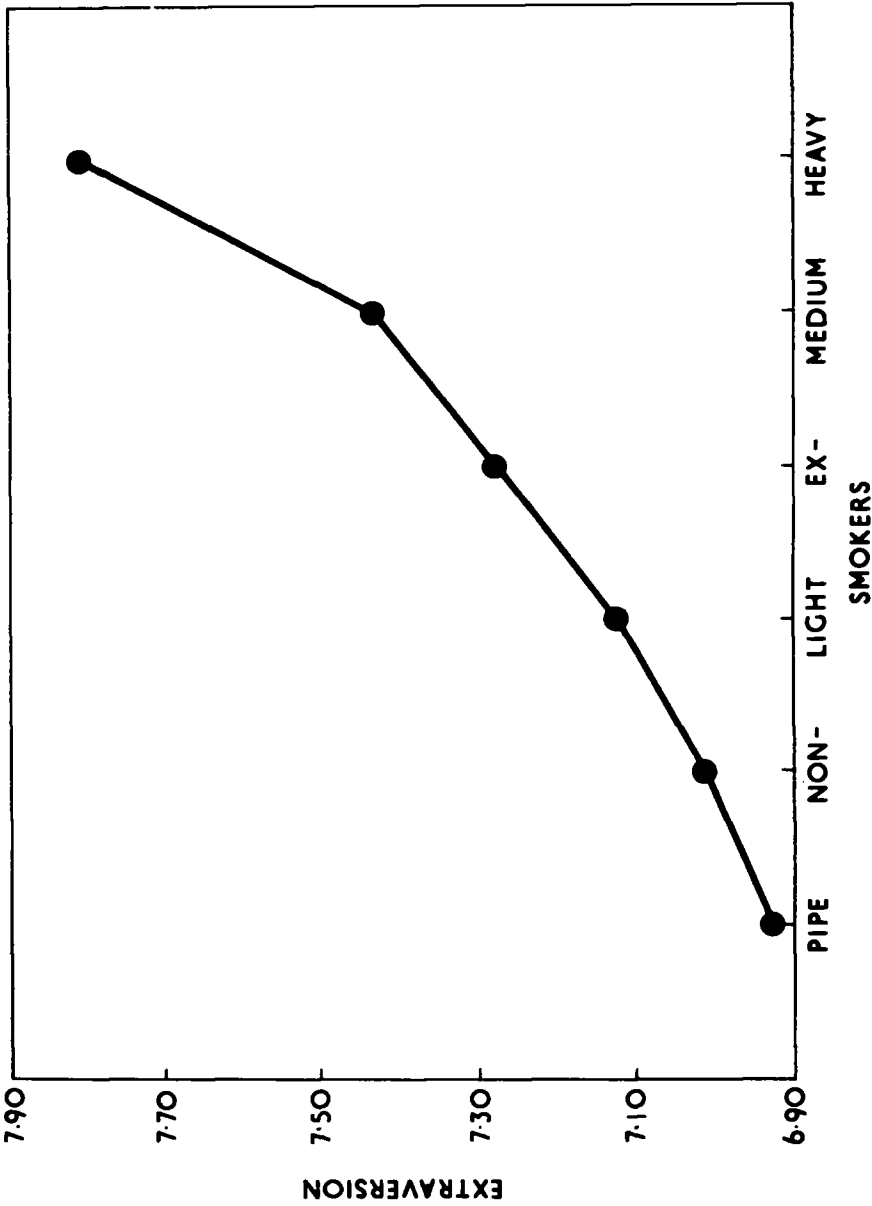


FIG. 2

Extraversion scores of various groups of pipe smokers, non-smokers, ex-smokers, ex-smokers and light, medium or heavy cigarette smokers. From Eysenck et al. (13).

productive of strong and persistent sensory stimulation. This sensory stimulation is apparent at the time of intake of smoke, where in beginners at least, it may be so strong as to produce nausea, fainting, etc.; it also becomes apparent later on when the nicotine has had time to produce its effects on the nervous system. In accordance with our general hypothesis, therefore, we would predict that the stimulation hunger of the extravert would lead him to smoke more than the introvert, and we would further predict that a linear relationship should exist between amount of extraversion and amount of smoking. Two studies have recently been carried out to verify this hypothesis (13; 14). In the first of these, 24 groups of subjects were studied, divided equally on the basis of age (40-59 and 60-70), class (A, B, C and D, E) and smoking habits (non-smokers, low, medium and heavy smokers, pipe smokers and ex-smokers). Approximately 100 subjects were tested in each of these 24 categories using a three stage sampling design which gave a good approximation of a random sample of the British population. The results of this study are shown in Figure 2, where amount of smoking is shown in relation to extraversion scores on a personality inventory; it will be seen that there is a clearcut progression in amount of smoking with increase in extraversion.

In a second similar study a population sample of 3,000 respondents, male, aged between 45 and 64 was questioned with respect to smoking habits, psychosomatic disorders and personality by trained interviewers. The results, in so far as they are relevant to our hypothesis, are shown in Figure 3; it will be seen that the results are closely similar to those of the first study. We may conclude, therefore, that in this work there is a monotonic increase in cigarette smoking as we go from the more introverted to the more extraverted type of personality.

These English studies have also found support in several American researches such as those by McArthur et al. (15), Schubert (16), and Davis (17). Much further supporting evidence will be found in the summary of "Psychology and Related Characteristics of Smokers and Non-smokers" published by Matarazzo

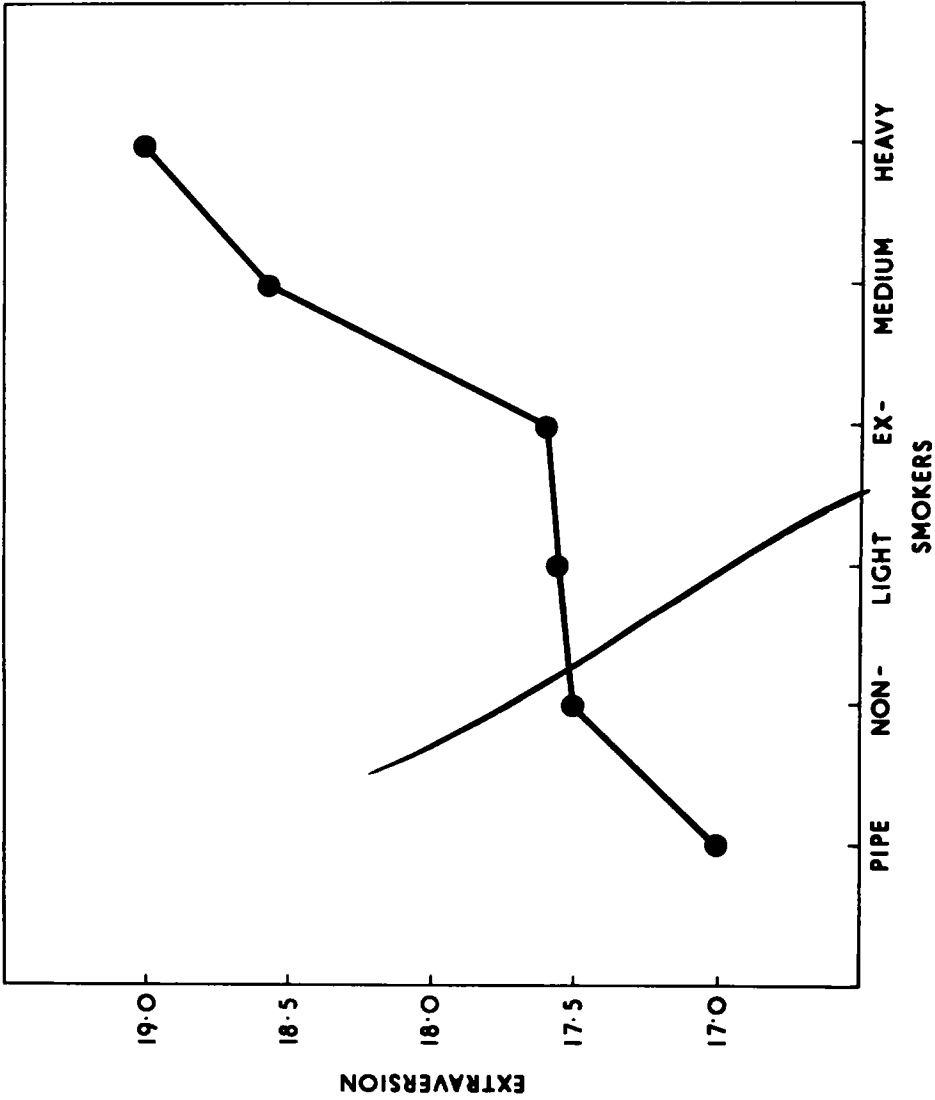


FIG. 3

Extraversion scores of various groups of pipe smokers, non-smokers, ex-smokers and light, medium or heavy cigarette smokers. From Eysenck (14).

and Saslow (18). We may conclude therefore, that our general hypothesis has been supported by the empirical data.

It is interesting to note that the evidence from a large number of investigations suggests that introverts tend to be of leptomorphic body-build ("ectomorphic" in Sheldon's terminology), while extraverts tend to be of euryomorphic body-build (Sheldon's "endomorphie and "mesomorphic" body-builds). Summaries of this work have been presented by Eysenck (5) and by Rees (19), and while the correlations between body-build and temperament are not very high, they are nevertheless quite consistent in many different samples and countries. It is interesting, therefore, to note that Parnell (20), in a study of smokers and non-smokers among 308 Oxford undergraduates, found that smokers were mainly endomorphic and mesomorphic in body-build, whereas non-smokers were mostly ectomorphic. In a similar vein Seltzer (21), in a study of 922 Harvard alumnae found that smokers had larger physical dimensions than non-smokers; this is also in accord with the hypothesis as endomorphs and mesomorphs have larger bodily dimensions comparatively speaking than do ectomorphs.

There are, of course, alternative hypotheses which might give rise to the observed correlations. It is possible, for instance, that extraverts, being sociable, are under greater pressure to adopt social habits, such as smoking. Clearly further research is indicated to rule out alternative possibilities of this kind; at the moment our knowledge of this whole field is too imperfect to allow us to arrive at any confident conclusions. It is interesting to note, however, in view of the statistical connection between smoking and lung cancer (22) that highly significant relationships have been established between extraversion and cancer by Coppen and Metcalf (23) and by Hagnell (24). Similar findings have also been made by Kissen and Eysenck (25). In these studies the relationship between lung cancer and extraversion is greater than can be accounted for by the greater number of cigarettes smoked by more extraverted subjects, and suggests some congenital or constitutional factor relating disease and personality. It is, therefore, possible that we may be

dealing with a whole complex of constitutionally determined patterns of behaviour, embracing extraversion and smoking on the one hand and disease, such as cancer and coronary disease, on the other. (Unpublished evidence shows that coronary thrombosis also appears to be more frequent in extraverted than in introverted people.) An alternative hypothesis, of course, might be that extraverts lead lives which expose them more to influences which are deleterious to health (smoking, drinking, late nights, etc.), thus weakening their powers of resistance. Clearly it is impossible at this moment to say anything definitive about these relations which are still very much in need of clarification. (See discussion in 26.)

Having discovered one personality trait which is related to the smoking habit we may now turn to another which has also often been suggested as being linked with smoking. Many writers have stated or implied that more neurotic people may tend to smoke more because they derive some kind of relief from emotional upset through this habit. The review of the literature by Matarazzo and Saslow (18) reports mainly positive findings, and the U. S. Department of Health (22) concludes that "despite the individual deficiencies of many of the studies, despite the great diversity in conceptualisation and research methods used, and despite certain discrepancies in reported findings, the presence of some comparability between them and the relative consistency of findings lends support for the existence of a relationship between the smoking habit and the personality configuration that is vaguely described as 'neurotic'". No support for any such relationship was found in the two studies by Eysenck et al. (13), and Eysenck (14), and the tortured syntax of the Department of Health report quoted above indicates the doubts which its authors themselves seem to have felt on this point. Positive data appear to have obtained only in connection with studies using small and unrepresentative groups; the much more wide ranging population studies mentioned above are not only based on more representative samples but also include larger numbers of subjects, so that we are probably justified at the moment in

suggesting that no relationship exists between smoking and neuroticism. The only positive result discovered by Eysenck (14) was that inhaling might be more prevalent among the more neurotic and emotionally disturbed smokers. There was no apparent relationship between inhaling and extraversion, a fact which might be considered to go counter to our hypothesis.

How is it possible to explain the failure of our study to demonstrate a relationship between neuroticism and smoking when introspective reports by smokers often refer to the solace offered by the smoking of a cigarette? A possible, though highly speculative, reason may lie in the direct psychopharmacological effects of nicotine on the nervous system; this hypothesis will at the same time suggest certain reasons additional to "stimulus hunger" why extraverts smoke more than introverts. Let us consider first of all Eysenck's drug postulate (3). According to this postulate C.N.S. stimulant drugs increase excitatory potential, decrease inhibitory potential and therefore have introverting effects, whereas depressant drugs decrease excitatory potential, increase inhibitory potential and have generally extraverting effects. There is considerable evidence to show that nicotine acts like a stimulant drug (27; for a review of the evidence, see Warwick, 28). Smoking therefore may be presumed to have a generally introverting effect, i.e. producing an increase in excitatory cortical potential. Now there is ample evidence to show that the majority of extraverts are more tolerant of stimulant drugs, whereas introverts are more tolerant of depressant drugs (cf. the "sedation threshold" of Shagass; see also discussion by Eysenck, 3). The same evidence appears to suggest that when we are dealing with psychopaths and criminals; i.e. people who are both high on extraversion and on neuroticism, stimulant drugs have a calming effect and improve social behaviour, whereas for people who are both introverted and high on neuroticism it is depressant drugs which have a calming effect (tranquillisers) (cf. 29). Thus on this argument, high neuroticism should lead to indulgence in smoking only if coupled with extraversion; when coupled with introversion it should have

the opposite effect of leading to the abandonment of smoking. The fact that our findings are in accordance with these theoretical predictions suggests that there may be some truth in these observations.

In conclusion we may briefly touch upon the well known observation that the abandonment of smoking frequently leads to indulgence in food and ultimately to obesity. The following theoretical considerations may be relevant here. In the first place, given a certain degree of "stimulus hunger" we would expect that the abandonment of one source of stimulation would lead to an increase in the use of other sources. Eating is clearly such another source and the common observation referred to above would seem to lend support to this hypothesis. We would also expect an increase in drinking, fast driving, sex and other similar sources of stimulation, but to our knowledge no specific studies have been made in these fields; it might be interesting to follow up this hypothesis.

Another hypothesis might be put in the following way. It is well known that giving up a cherished habit like smoking produces strong autonomic (sympathetic) responses of pain, anger, anxiety, etc. According to Wolpe's (30) hypothesis, based on the Watson and Rayner (31) study, therapeutic use may be made in conditions of this type of the reciprocal inhibition of the sympathetic by the parasympathetic system. Now eating is well known to produce parasympathetic responses, muscular relaxation, etc; indeed it was so used as a therapeutic instrument by Watson and Rayner. We would argue, therefore, that a person giving up smoking might make use of eating in order to inhibit reciprocally the autonomic upsets caused by the abandonment of the tobacco habit. It might be possible to investigate this hypothesis further by taking polygraph records of subjects in the process of giving up smoking as compared with others who have not given up the habit, before, during and after meals; our prediction would be that those who had given up the habit would show a higher level of autonomic (sympathetic) activity prior to the meal, and a greater decrease in sympathetic activity during the meal.

How do these considerations affect the problem presented by obesity in general? In so far as stimulus hunger is concerned we would of course predict that extraverts would eat more than introverts, and we have already drawn attention to the fact that extraverts are characterised by body build showing a great accumulation of fat and/or muscle than do introverts. With respect to neuroticism one might expect that the principle of reciprocal inhibition mentioned in a preceding paragraph might lead more neurotic persons to eat more than normal ones in order to counteract the effects of sympathetic stimulation. However, this argument cannot really be advanced very seriously because it does not take into account the respective strength of the sympathetic stimulation on the one hand and the parasympathetic stimulation affected by food consumption on the other. On the whole it may be thought that the former would be so much stronger quantitatively as to interfere with the consumption of food; it will be remembered that in the original Watson and Rayner experiment special steps had to be taken to reduce the strength of the sympathetic stimulation aroused by the phobic stimulus before little Albert could be persuaded to pay any attention to the food which was offered him. It seems much more likely, therefore, that sympathetic stimulation in the neurotic would interfere to a considerable extent with normal eating activities and indeed there is evidence to show that neurotics, as compared with normals, tend to be more leptomorphic in body-build. This general conclusion does not of course necessarily apply to all neurotic subjects; particularly among the more extraverted ones one might expect to find a small number in whom the principle of reciprocal inhibition did in fact produce relief from anxieties through eating, and in whom therefore eating had become a kind of addictive activity. There is some anecdotal evidence for this type of development but no proper study appears to have been made of the principle involved.

Summary

An attempt has been made to relate individual differences in the smoking

of cigarettes and in over-eating to the personality dimensions of extraversion and neuroticism. It was postulated and has been experimentally confirmed that extraverts indulge in smoking and over-eating to a greater extent than do more introverted people, the relationship between these two continuous variables being a monotonic one. It was hypothesized that this might be due to the postulated "stimulus hunger" of the extravert, consequent upon the greater degree of cortical inhibition which has often been found to be associated with high degrees of extraversion. It was also postulated that as nicotine is a C.N.S. stimulant drug it would have beneficial effects in people high on neuroticism only if they were also extraverted; if they were introverted it was hypothesized that the effects would be detrimental. The prediction was made, therefore, that neuroticism as such would not be related to smoking and this prediction was, in fact, borne out. Lastly, it was suggested that the giving up of smoking might lead to a greater degree of eating by substituting food for cigarettes in alleviating the stimulus hunger of the subjects in question.

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