Comment on Schulz's and Strobach's "Catecholamine excretion as a function of personality"

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Schulz & Strobach (1970) have examined the relationship between extraversion (E) and neuroticism (N) and the excretion of catecholamines.

In their discussion of our finding (Fine & Sweeney, 1968) of a positive relationship between N and the noradrenaline (NA)/adrenaline (A) ratio (NA/A), they state that our results are "not clear" and attribute the lack of clarity to a number of factors. In the interests of further clarifying this aspect of what we feel is an important area of research, a number of comments are in order.

(1) They attribute our failure to find a relationship between E and catecholamine excretion to the fact that we used 24-h samples instead of "day urine only." Since we were interested in personality *trait* rather than *state* measurement, we deliberately took 24-h samples, believing that they represented a more complete picture of the total catecholamine output which characterized the S. Schulz and Strobach used a 3-h sample. It is possible that they were measuring a state rather than a trait.

(2) It is illogical for them to quote a relatively high reliability for their A (and NA) analysis and then proceed to build an argument (against our use of NA/A) based on the biochemical unreliability of small fractions of A, particularly when they were undoubtedly dealing with smaller fractions than we were (3-h as opposed to 24-h urine samples).

(3) Errors in biochemical analysis must result in errors in both the NA/A and the A/NA ratios, causing either spuriously high or low values. However, such errors have the same relative effect, regardless of whether the ratio in question is NA/A or A/NA. For example, given NA = 10 and A = 5, then NA/A = 2 and A/NA = .50. If an error in A was ascertainable and the "true" value of A was found to be 1, then NA/A = 10 and A/NA = .10. Note that 2 is to 10 as .10 is to .50. The change in ratio induced by an error in biochemical analysis is proportionally identical for both ratios, although the absolute change of 8 for the NA/A ratio is obviously much greater than the

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study, a day of anticipation, which seems to us to be the closest match between any of our experimental days and the conditions under which they ran their study. The results are shown in Table 1.

Column A of Table 1 presents our correlations and Column C depicts those of Schulz and Strobach. For the neuroticism measure, the results are quite similar. For the extraversion measure, we do not find a significant

Table 1
Comparison of Fine & Sweeney and Schulz & Strobach Studies: Product Moment Correlations Between MPI Extraversion and Neuroticism Scores and Catecholamine Excretion Expressed as NA/A for All Ss, and for Smokers and Nonsmokers Separately

	A			B			C		
	Fine & Sweeney			Fine & Sweeney With One S Deleted			Schulz & Strobach		
	N†	Ex.	Neur.	N	Ex.	Neur.	N	Ex.	Neur.
All Ss	27	-.12	.34*	26	-.33*	.33*	54	-.27**	.32**
Smoke	17	-.13	.10	17	-.13	.10	27	.09	-.22
No Smoke	10	.12	.65**	9	-.42	.74***	15	-.53**	.78***

†Ns in Schulz & Strobach smokers and nonsmokers groups do not add up to 54 because pipe smokers and Ss with no smoking data were eliminated from analysis.

*p < .10, two-tailed; **p < .05, two-tailed; ***p < .01, two-tailed.

absolute change of .40 for the A/NA ratio. Schulz and Strobach appear to be referring to the absolute change when they say that errors in biochemical analysis would be "potentiated" by the NA/A ratio. We do not believe that the absolute change in ratio is the appropriate basis for comparing the two ratios. The effect of an error in A should have no bearing upon one's choice of ratio, since the proportional effects of such an error are equivalent for both ratios.

This is not to say that the results of correlations between each of the two ratios and other variables will be identical. The reader has only to take a distribution of fictitious NA and A values, calculate NA/A and A/NA for each NA-A pair, and plot a frequency distribution for each ratio to see that the shapes of the distributions, and hence the correlations based on those distributions, differ.

Schulz and Strobach actually present their data analyzed both with NA/A and A/NA. They found significant results only with NA/A! Thus, our choice appears to be the preferable one, if significance of results is a criterion. Worth noting, also, is the fact that their results using NA/A approximate ours: they obtained an R = .32 between N and NA/A, and we obtained an R = .34.

We were intrigued with their finding of differences between smokers and nonsmokers in correlations between neuroticism, extraversion, and NA/A. Accordingly, we analyzed our data in the same manner as they did, dividing our Ss into smokers and nonsmokers. We, as they did, used the Maudsley Personality Inventory as the measure of extraversion and neuroticism. Our data are from the second day of our

negative correlation for nonsmokers. However, if we exclude the data from one very atypical S, the only S who was very low on both the extraversion and neuroticism scales (scores of 8 and 18, respectively), the correlations change to the values shown in Column B.¹

It can be seen from a comparison of Columns B and C that the results of the two studies are remarkably similar, even though our correlation of -.42 between NA/A and extraversion for nonsmokers did not reach significance.

Instead of casting doubt on our findings and the use of NA/A, the Schulz and Strobach study appears to be a good replication of our study with respect to the variables discussed above. Despite cultural differences, differences in Ss, and different biochemical analytic techniques, using only the MPI and the NA/A ratio in common, the two studies provide strong support for one another. The use of the ratio A/NA would have yielded no significant results.

REFERENCES

- FINE, B. J., & SWEENEY, D. R. Personality traits and situational factors and catecholamine excretion. *Journal of Experimental Research in Personality*, 1968, 3, 15-27.
SCHULZ, H., & STROBACH, H. Catecholamine excretion as a function of personality. *Psychonomic Science*, 1970, 18, 237-238.

NOTE

1. The pattern of very low scores on both the neuroticism and extraversion measures has occurred very infrequently in our experience with the MPI. Of the 161 Ss to whom we have administered the MPI, only two others exhibited a pattern as low or lower than did the S noted above. Perhaps a better test of the uniqueness of this S is the fact that in the senior author's 18 years of research experience, this was the only test S to ever write to him subsequent to a study to find out how it came out.