

July 10, 1968

Dr. Ardie Lubin  
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Navy Medical Neuropsychiatric Research Unit  
San Diego, California 92152

Dear Ardie,

It was kind of you to send me the preprint of your latest effort in discriminating sleep stages. It represents much work and I appreciate the opportunity to read it, since I have just revised the paper of our period analytic approach to the same problem, following some suggestions from the editors of the EEG Journal. The revised version is enclosed and represents much of the data from the Missouri laboratory, except that there are additional tables such as you request (page 16) describing the relation of the computer classification to the visual by the trained observers. This data is being prepared for another publication, but I am sending your preprint to Dr. Itil with a request he share the data with you for inclusion in your report.

I am impressed by the portrayal of the power spectral density approach, especially by the complexity and by the implicit expense. The difficulties which you describe - difficulties which are described by others trying this approach, and also found by ourselves - are the lack of discrimination of small differences in this method except at a great expense in either time or dollars or both.

That PWRS shows good discrimination among sleep stages by the delta band, the unimportance of theta, the significance of alpha and sigma, and the difficulties of discriminating stage I from stage I-REM and stage 3 from stages 2 and 4 are the same problems and the same discriminators we face in period analysis. Some additional discriminations are possible in period analysis, for the stage I- stage I-REM discrimination seems now to be working; the stage 3 discrimination is feasible following your suggestions (page 18) and some of our own.

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I agree with your conclusions (page 17). Some of the recommended additional data is available or is readily programmable using period analytic and the distance function approaches.

Perhaps the time has come to compare the available methods for systematically collected data. As I indicated earlier, we are prepared to analyze tapes using the period analytic methods. We would be specially interested if they are also to be analyzed by our methods. The costs in dollars and time are negotiable and should compare favorably with the expense and delays which you described for your present systems.

Such analyses could be done as part of a demonstration for an APSS meeting and as the basis for a discussion of the available methods. If this is not feasible, we would still be willing to consider a demonstration for you at a cost that is comparable to that of Astropower.

It was a pleasure to hear your report in Washington, and to read this preprint. Perhaps the enclosed report will permit you to be more optimistic about this real-time (or 2-4x real time) analytic system for the reliable and automatic scoring of EEG sleep stages.

My best regards.

Sincerely yours,

Max Fink, M.D.  
Professor of Psychiatry

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