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ARL

INDIVIDUAL DIFFERENCES IN TIME-SHARING PERFORMANCE

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FOREWORD

The research reported herein was performed by Dr. Branimir Sverko during the spring of 1976 as a part of his year of studies and research as a Fullbright Scholar at the Aviation Research Laboratory. Dr. Sverko is Assistant Professor, Department of Psychology, University of Zagreb.

INTRODUCTION AND PROBLEM

Ability assessment is traditionally based on a "serial" approach, in which discrete sub-tests of a battery are administered one by one. Some authors have recently stressed the need for a "parallel" approach, in which two or more assessment tasks could be administered simultaneously. There is a belief that such an approach might be more appropriate, especially for predicting some complex skill -- such as flying -- which is likely to involve simultaneous performance and information overload.

Passey and McLaurin (1966), for example, suggested such an approach. After a comprehensive review of current aircrew selection procedures, they recommended several improvements. One of the recommendations was that the assessment battery "should permit the administration of more than one test concurrently to provide a more precise estimation of individual capacity" (p. 94). More recently, Waldeisen (1974) and Dannhaus and Halcomb (1975) emphasized this recommendation. They suggested again that the traditional, serial approach should be replaced by, or complemented with, the parallel one which is a better analogue of a complex real-world performance.

Inherent in these recommendations is the supposition that the ability structure underlying concurrent-task performance differs from the ability structure underlying solitary performance of the same task. Why should this be the case?

One possibility is that individuals consistently differ in some kind of "time-sharing ability" which, of course, should operate only under concurrent-task conditions, but not under single-task conditions. Some authors do accept, more or less explicitly, the notion of such an ability. This notion is implicit in all aviation-related research efforts which have used time-sharing tasks for assessment purposes. For example, Trankell (1959) used a tapping task time-shared with a problem-solving task to assess what he called "simultaneous capacity"; Damos (1972) used a cross-adaptive tracking task coupled with a secondary information-processing task to assess "residual attention"; and North and Gopher (1976) used an elaborate time-sharing performance measurement system to assess what is supposed to be an "unconfounded measure of subject attention capacity." All of these labels, apparently, refer to some more general characteristic of individual, which transcends the particular combination of tasks used to measure it. Yet, since this characteristic is supposedly elicited under time-sharing conditions, it can be equated with the notion of a general time-sharing ability, whatever the particular label attached to it.

There are also more explicit designations of time-sharing as an ability. Under the auspices of NASA, an integrated battery of tests was developed to measure the primary dimensions of perceptual-motor performance (Parker, et al., 1965). Time-sharing, defined as "the ability to obtain and utilize information presented within more than a single visual display" (p. 14) was included in the eighteen abilities measured by the battery.

Levine, Romashko, and Fleishman (1973) also referred to time-sharing as an ability. In a study concerned with the evaluation of their ability classification system for integrating human performance data, they classified vigilance studies in terms of four abilities required by the tasks used. One of these abilities was time-sharing, defined as "ability to utilize information obtained by shifting between two or more channels of information." Finally, in a current effort to develop a battery of information-processing tasks, Pew and Adams (1975) planned out the use of time-shared tasks on the basis that the "ability to manage several concurrent activities has obvious relevance for pilot performance." (p. 21).

However, experimental evidence that demonstrates the existence of the general time-sharing ability is lacking, and the present study sought to provide such evidence. To support the notion of the time-sharing ability, one has to show that individual differences in time-sharing performance are both relatively unrelated to individual differences in single-task performance and invariant with different combinations of time-shared tasks. Accordingly, four different tasks were used in the present study; and subjects performed the tasks singly, one by one, as well as concurrently, in all possible two-task combinations. The performance obtained under solitary and concurrent conditions were intercorrelated, and factor analyzed in an attempt to ascertain whether a time-sharing factor, which would account for concurrent-task performance, could be identified.

METHOD

Tasks

Four tasks which elicited different psychomotor and mental functions were selected for the study. All of them were relatively simple, i.e., they required little learning and, also, it was possible to score each task performance by only one performance measure. When administered concurrently, the tasks in general did not physically interfere one with another. Following is the description of the tasks.

Rotary Pursuit Task (PR). This task measured a subject's proficiency in making coordinated rhythmical hand-movements. The subject's task was to manipulate a stylus with his right hand so as to maintain the contact between the point of the stylus and the round brass target embedded in a revolving bakelite disk. The apparatus employed has been described elsewhere (Melton, 1947). Time-on-target performance was recorded in units of .001 min. on a standard electric timer.

Digit Processing Task (DP). This was a ten-choice, self-paced serial reaction time task. The subjects had to respond to transilluminated digits, 0 through 9, which appeared in a random sequence on a small display located directly above a scrambled 10-button keyboard. As a digit appeared, the subject had to extinguish it by pressing the correspondingly numbered button with his left index finger. A digit remained illuminated until the correct button was pressed, and then a new digit immediately appeared. The number of digits extinguished per minute was the performance measure.

Mental Arithmetic Task (MA). The task was to count backwards by three's. Immediately prior to the trial, the subject was presented with a three-digit number from which he was to count backwards by three's, aloud and as rapidly as possible. His counting was tape-recorded. The number of correct counts per minute was the performance measure.

Auditory Discrimination Task (AD). This was a two-choice serial reaction time task requiring the subject to press the appropriate foot pedal in responses to tones differing in pitch. The subject had to press a pedal with his right or left foot depending on whether a high or a low tone was presented through a speaker. The tone remained on until a pedal was pressed. Then, after a 2-second delay, a new randomly selected tone was presented. Separate counters recorded the number of correct and incorrect responses, and cummulative reaction times were recorded by a Heathkit timer. However, since there were only a few incorrect responses, only the average reaction time was used as a performance measure.

Subjects

Sixty right-handed female undergraduates of the University of Illinois served as subjects for the present study. At the time of experiment all of them were in good health, and without any verified sensory or motor deficiences. The subjects were naive as to the goals of this investigation, and none of them had any previous experience with any of the tasks used.

Procedure

During the experiment the subjects were seated behind a desk supporting all the apparatus. The digit-processing-task display was located ten inches to the left of the center of the pursuit-roter disk, both in front of the subject, and the loud speaker was embedded in the partition wall in front of the subject's face. The experimenter, with the recording equipment, was seated behind the partition wall.

The subjects, who were run one at a time, first practiced the tasks singly. Three one-minute practice trials were given for each of the tasks. Following the practice trials, the subjects performed the tasks singly as well as concurrently, in the following sequence of trials: 1. PR, alone; 2. DP, alone; 3. MA, alone; 4. AD, alone; 5. PR with DP; 6. MA with AD; 7. PR with MA; 8. DP with AD; 9. PR with AD; 10. DP with MA. Each of the trials within a sequence lasted for a minute and they were separated by one-minute rests. After the sequence was completed, the subjects were allowed a five-minute rest, and then the sequence was repeated twice. In that way each subject received thirty one-minute trials, or three trials per each task condition.

The subjects performed the dual-task combinations under the instruction of equal task priority. Prior to each dual-task trial they were reminded of the necessity to pay an equal amount of their attention to each of the two tasks performed concurrently.

RESULTS

Reliability of Subject's Performance

Sixteen performance measures were obtained on each of the three sequences of trials: performance on each of the four tasks when performed singly as well as when performed concurrently with each of the other three tasks. Trial-to-trial reliabilities of these sixteen variables are shown in Table 1.

The first three columns of the Table 1 show the product-moment correlations of subjects' performance between the first and second trial, the second and third trial, and the first and third trial, respectively. The average reliabilities, computed by using Fisher's r to Z transformations, are shown in the fourth column. They range from .75 to .93, indicating that a high consistency of performance was obtained with the trials of only one minute in duration.

It will be seen, by comparing the single-task performance reliabilities (values underlined) with the dual-task performance reliabilities (values not underlined), that only a slight shrinkage of reliability occurred under the time-sharing conditions. High reliabilities of time-sharing performances indicate that the amount of attention allocated by a subject to one of a pair of concurrently performed tasks was very constant throughout the experiment.

TABLE 1

TRIAL-TO-TRIAL RELIABILITIES OF PERFORMANCE MEASURE

	$r_{1,2}$	$r_{2,3}$	$r_{1,3}$	r_{av}
PR	0.86	0.87	0.73	0.83
PR(DP)	0.75	0.87	0.69	0.78
PR(MA)	0.80	0.82	0.71	0.78
PR(AD)	0.83	0.84	0.75	0.81
DP	0.85	0.88	0.79	0.84
DP(PR)	0.83	0.87	0.78	0.83
DP(MA)	0.83	0.86	0.76	0.82
DP(AD)	0.86	0.87	0.89	0.87
MA	0.91	0.94	0.90	0.92
MA(PR)	0.92	0.93	0.86	0.91
MA(DP)	0.90	0.92	0.86	0.90
MA(AD)	0.89	0.87	0.81	0.86
AD	0.92	0.94	0.92	0.93
AD(PR)	0.80	0.82	0.77	0.80
AD(DP)	0.70	0.82	0.70	0.75
AD(MA)	0.77	0.87	0.76	0.81

Note:

N = 60.

PR denotes the solitary performance of the PR task; PR(DP), PR(MA), and PR(AD) denote the performance of the same task when performed concurrently with the tasks DP, MA, and AD, respectively. Accordingly, DP denotes the solitary performance of the DP task; DP(PR) denotes the performance of the same task when performed concurrently with the PR task; etc.

Time-sharing Decrements

The attempt to execute two tasks simultaneously usually yields a degradation in performance of at least one of the tasks. This degradation, i.e., lowered level of performance in dual-task conditions as compared with the performance levels of singly performed tasks, is known as time-sharing decrement. It is reasonable to expect that the "time-sharing ability," if it exists, should be elicited primarily under high task-interference conditions which are indicated by the presence of pronounced time-sharing decrements. Figures 1 to 4 may be used to discern whether such decrements occurred in the present data.

The figures depict the mean performances of each of the tasks, summed beforehand across the three trials. The far left bar on each figure represents the single-task performance while the other three bars represent the time-sharing performances of the same task. It is evident that a decrement in performance, in some instances a very profound one, occurred under each time-sharing condition. Four separate, one-way, within-subject analyses of variance followed by Dunnett's t-statistic comparisons (Winer, 1971, p. 202) were performed to evaluate the significance of the time-sharing decrements. The results of these analyses (presented in Figures 1 to 4) revealed that all decrements were statistically significant.

Intercorrelations and Factor Analysis

Table 2 shows the product-moment correlations among the sixteen performance variables. In computing the correlations subjects' scores on each trial were treated as separate observations to yield a total of 180 observations (60 Ss by 3 trials each). The correlations were then computed across these 180 observations. (An alternative analysis with

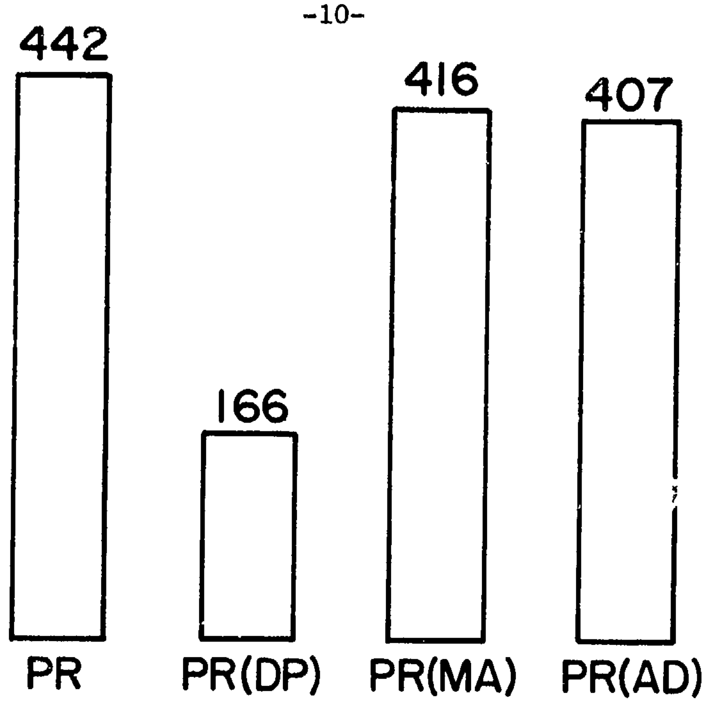

Figure 1. Mean Performance of the Rotary Pursuit Task (Time on target per minute in units of .001 min.) Overall significance of of differences among the above means: $F(3,177) = 213.26$, $p < .001$. Dunnett's t values for differences between the first mean (PR) and each of the remaining three means: 22.13, $p < .001$; 2.09, $p < .05$; and 2.75, $p < .01$; respectively.

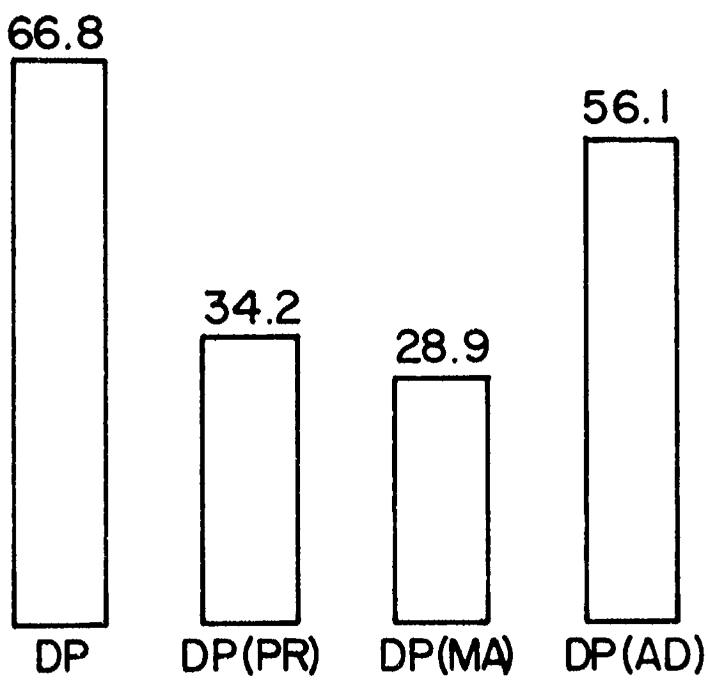

Figure 2. Mean Performance of the Digit Processing Task (Number of digits extinguished per minute). Overall significance of differences among the above means: $F(3,177 = 1098.83$, $p < .001$. Dunnett's t values for differences between the first mean (DP) and each of the remaining three means: 42.46, 49.41, and 13.41, respectively (all significant at $p < .001$).

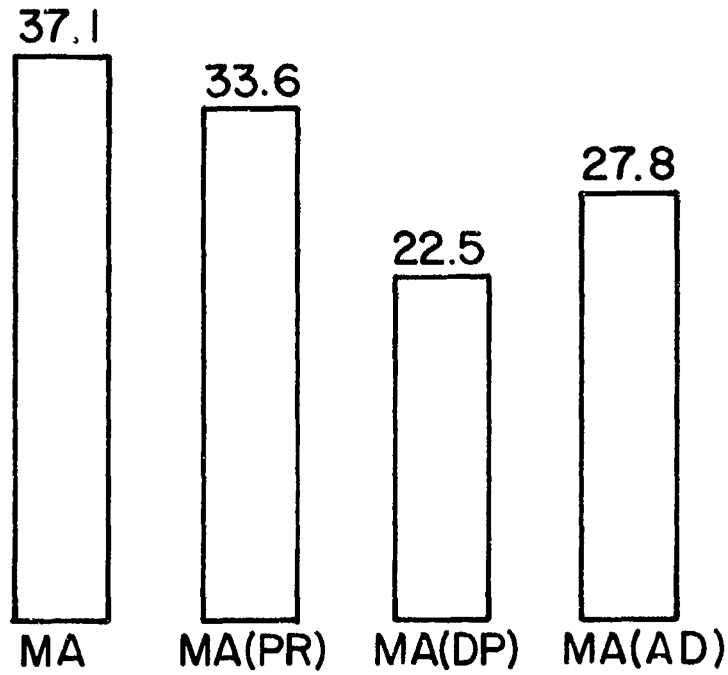

Figure 3. Mean Performance of the Mental Arithmetic Task (Number of correct counts per minute). Overall significance of differences among the above means: $F(3,177) = 224.31$, $p < .001$. Dunnett's t values for differences between the first mean (MA) and each of the remaining three means: 9.42, 39.60, and 25.24, respectively (all significant at $p < .001$).

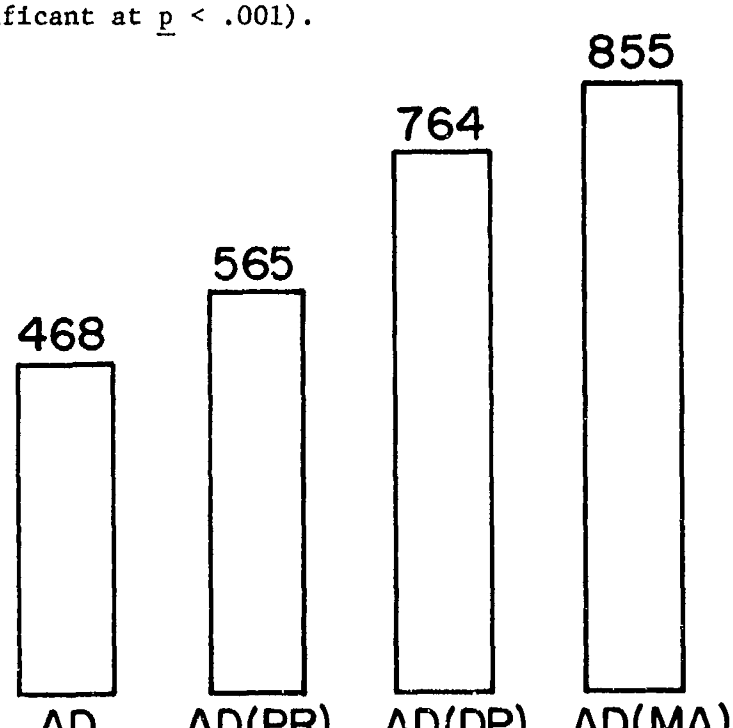

Figure 4. Mean Performance of the Auditory Discrimination Task (Average reaction time in milliseconds). Overall significance of differences among the above means: $F(3,177) = 184.74$, $p < .001$. Dunnett's t values for differences between the first mean (AD) and the remaining three means: -5.25, -16.00, and -20.94, respectively (all significant at $p < .001$).

across-the-trials summed data, i.e., with N = 60, was also performed. The two analyses yielded essentially similar results.)

As can be seen, all of the intercorrelations are positive in sign, ranging in size from .897 to .019. The correlations of each task solitary performance with the same task time-sharing performances (i.e., the three far upper values of each of the columns 1, 5, 9, and 13) are among the largest correlations in Table 2. This indicates that individual differences in single-task performance are closely related to individual differences in time-sharing performances. Next to them, and approximately equal in size, are the correlations among the time-sharing performances of the same tasks (i.e., the correlations within each of the following groups of variables: 2, 3, and 4; 6, 7, and 8; 10, 11, and 12; and 14, 15, and 16). All of the remaining correlations are generally smaller in magnitude. Thus four task-specific factors are suggested.

The matrix of Table 2 was next submitted to a principal component analysis (unities in the principal diagonal). Since four task-specific factors and, possibly, a general time-sharing factor were expected, five principal components (factors) were extracted in the first computer run; and subsequently rotated by the Binormamin method to a simple oblique solution. However, the examination of the eigen value summary table revealed only four eigen roots in excess of 1.00, with the first four principal components accounting for 78.63% of the total performance variance. The fifth principal component had an associated eigen root of only .66, and accounted for only 4.13% of the total variance. Thus, by the customary standards applied to such data, the fifth principal component could hardly be considered more than a trivial source of variance.

TABLE 2

INTERCORRELATIONS AMONG PERFORMANCE MEASURES (N-180)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. PR																
2. PR(DP)	.677															
3. PR(MA)	.674	.590														
4. PR(AD)	.842	.707	.718													
5. DP	.420	.375	.292	.423												
6. DP(PR)	.366	.018	.188	.262	.469											
7. DP(MA)	.338	.330	.334	.397	.447	.339										
8. DP(AD)	.421	.343	.334	.434	.788	.567	.555									
9. MA	.297	.259	.481	.316	.331	.190	.363	.326								
10. MA(PR)	.387	.330	.526	.389	.324	.183	.363	.349	.897							
11. MA(DP)	.247	.278	.424	.260	.264	.140	.235	.301	.801	.839						
12. MA(AD)	.325	.294	.480	.336	.350	.241	.421	.418	.854	.834	.804					
13. AD	.351	.325	.421	.397	.418	.182	.402	.489	.358	.346	.283	.332				
14. AD(PR)	.399	.335	.430	.438	.444	.273	.504	.527	.429	.438	.351	.444	.739			
15. AD(DP)	.365	.266	.413	.373	.492	.259	.401	.635	.364	.361	.313	.362	.660	.719		
16. AD(MA)	.364	.360	.468	.411	.399	.188	.525	.509	.467	.439	.386	.530	.634	.712	.715	

Notes:

N = 180 since the correlations were computed over a string of subject-by-trial observations.

Reaction-time scores of the AD-task were beforehand multiplied by -1.

For explanation of the abbreviations see the note below Table 1.

Accordingly, an additional four-factor solution, using the Binormamin rotation again, was also obtained. The rotated factor loadings of the five-factor solution and of the four factor solution are presented in Table 3 and Table 5, respectively. The among-factor correlations are shown in Table 4 and Table 6, respectively.

Neither matrix of rotated factor loadings provides evidence for a general time-sharing factor. The first factor is clearly a factor specific to MA-task performance. Both solitary performance and time-sharing performances of the MA task load equally high on the first factor, with most of the remaining variables being essentially uncorrelated with the factor. The same is true for the second factor as well as for the third factor which are clearly the factors specific to the performances of the PR task and AD task, respectively.

The interpretation of the fourth factor is, however, less clear cut. From the four-factor solution, it may be interpreted as a factor specific to the DP-task performance, but with the DP (MA) variable loading scarcely on the factor. This variable defines its own, fifth factor in the five-factor solution. Thus, there is a tendency for DP-task performance to define two factors instead of one. A possible interpretation for this tendency may be as follows. Note that the two factors associated with the DP-task performance are defined primarily with the variables DP (PR) and DP (MA), respectively. Also note, from Figures 1 to 4, that the most severe time-sharing decrements are associated with these two variables as well. This indicates that a high information load was involved when DP task was performed with either the PR task or the MA task. Under such

TABLE 3

ROTATED FACTOR LOADINGS: A FIVE-FACTOR SOLUTION

Variable	FACTOR I	II	III	IV	V
1. PR	-.05	.94	-.02	.23	-.13
2. PR(DP)	-.06	.87	-.12	-.24	.28
3. PR(MA)	.23	.77	.18	-.04	-.23
4. PR(AD)	-.06	.93	.02	.07	-.01
5. DP	-.02	.07	.04	.51	.45
6. DP(PR)	.03	.01	-.08	.96	-.06
7. DP(MA)	.03	-.04	-.03	-.02	.93
8. DP(AD)	-.03	-.01	.20	.54	.42
9. MA	.94	-.04	.02	.01	.03
10. MA(PR)	.92	.09	-.03	.01	.00
11. MA(DP)	.96	-.02	-.03	.01	-.06
12. MA(AD)	.89	-.04	-.03	.04	.15
13. AD	-.07	.05	.94	-.07	-.06
14. AD(PR)	.02	.01	.86	-.02	.04
15. AD(DP)	-.05	-.04	.93	.10	-.06
16. AD(MA)	.10	-.01	.75	-.16	.19

Note: The loadings in excess of .50 have been underlined.

TABLE 4

CORRELATIONS AMONG FACTORS

Factor	II	III	IV	V
I	.41	.46	.23	.38
II		.48	.28	.48
III			.38	.58
IV				.39

TABLE 5

ROTATED FACTOR LOADINGS: A FOUR-FACTOR SOLUTION

Variable	FACTOR I	II	III	IV
1. PR	-.05	.91	-.11	.17
2. PR(DP)	-.04	.91	.01	-.11
3. PR(MA)	.22	.74	.08	-.13
4. PR(AD)	-.06	.93	-.01	.08
5. DP	-.01	.09	.15	.72
6. DP(PR)	.02	-.05	-.21	.95
7. DP(MA)	.07	-.05	.34	.39
8. DP(AD)	-.02	.00	.31	.74
9. MA	.94	-.04	.03	.01
10. MA(PR)	.93	.09	-.03	.00
11. MA(DP)	.96	-.03	-.05	-.03
12. MA(AD)	.90	-.03	.03	.09
13. AD	-.08	.02	.92	-.07
14. AD(PR)	.02	-.01	.87	.02
15. AD(DP)	-.06	-.08	.89	.11
16. AD(MA)	.11	.00	.85	-.06

Note: The loadings in excess of .50 have been underlined.

TABLE 6

CORRELATIONS AMONG FACTORS

Factor	II	III	IV
I	.41	.48	.31
II		.51	.39
III			.46

conditions of severe task interference, subjects might not have been able to satisfactorily follow the instruction of equal task priorities; some of the subjects might have favored one or the other of two concurrent tasks.* Such differences in the allocation policy are likely to introduce an additional, uncontrollable source of variance in the performance of tasks involved, and hence cause artificial, variable-specific factors to appear. These are the limitation of any time-sharing paradigm requiring subjects to allocate their attention "equally" between two concurrent tasks. Nevertheless, it is clear that none of the factors which made appearance is by any means a general time-sharing factor.

Correlations of "Total Decrement Scores"

As a means of controlling of individual differences in task-specific abilities while attempting to assess time-sharing ability, concurrent task performance is customarily scored relative to solitary task performance levels (e.g., North and Gopher, 1975; Parker, 1964; Sterky and Eysenck, 1965). In attempting such an analysis on the present data, the following formula was used: $D = (S - T)/S$, where S = solitary task performance, T = time-sharing performance of the same task, and D = time-sharing decrement score reflecting the percentage of solitary task performance lost under time-sharing conditions.

*That this probably occurred is also indicated by the failure of DP-task performance to correlate with either PR- or MA-task performance under concurrent conditions (i.e., r_{6-2} and r_{11-7}, in Table 2, amount only .018 and .234, respectively), while the solitary performances of the same pairs of tasks correlated substantially higher (i.e., r_{5-1} and r_{4-5} are .420 and .331, respectively). Such a reduction in correlation under concurrent conditions did not occur in the remaining four pairs of tasks.

After all individual D values had been computed, they were summed across two concurrently performed tasks to yield "total decrement scores" for each particular dual-task combination. Since there were six dual-task combinations, six total decrement variables were obtained and then intercorrelated among themselves.

However, most of the correlations thus computed were "spurious" in the sense that they were computed between dual-task combinations having one task in common. (For example, the correlation of total decrement scores between the dual-task combinations PR-DP and PR-MA is a "spurious" one, since both combinations involve PR-task performance.) In fact, twelve out of fifteen correlations computed had a task in common, and hence are not presented here. The remaining three correlations, which are obtained between dual-task combinations having no task in common, are presented in Table 8.

TABLE 8

CORRELATIONS BETWEEN "TOTAL DECREMENT SCORES" OF DIFFERENT DUAL-TASK COMBINATIONS

Dual-task Combinations Correlated			Correlation Coefficent
RP-DP	with	MA-AD	.060
RP-MA	with	DP-AD	-.068
RP-AD	with	DP-MA	.056

As can be seen, the "total decrement scores" are essentially uncorrelated, providing clear evidence that individual differences in time-sharing decrements are not consistent across different dual-task combinations. Again, evidence to support the existence of the "time-sharing ability" was not found.

DISCUSSION AND CONCLUSION

The conclusions of two recent studies appear to be at variance with results presented above. The first study is by Waldeisen (1974) who found that solitary performance of two tasks (a four choice discrimination-matching task and a velocity estimation task) failed to correlate significantly with their concurrent performances. This result led him to conclude that "the ability measured by the discrete, serial conditions was different from the ability measured by the simultaneous conditions." Such a conclusion does not seem warranted by the present-study data. As already noted, a task's solitary performance correlated substantially with its time-sharing performances. Also, the comparison of solitary with time-sharing performances, in terms of obtained factor loadings, revealed differences which are not sufficiently large to support Waldeisen's conclusion, at least in the case of the PR, MA, and AD tasks. The exception to this conclusion observed in the case of DP-task performance is probably due, as already explained, to subjects' failure to divide their attention equally between two concurrent tasks. This same interpretation may be relevant for Waldeisen's data as well.

The second study is by Parker (1964) who claimed the identification of a "time-sharing ability factor." The purpose of his study was to describe complex tracking performance in terms of a number of more basic abilities. Six abilities believed to underlie the tracking proficiency were hypothesized; one of them was the "time-sharing ability." Fifteen tests constructed to measure the hypothesized abilities were factor analyzed and seven factors interpreted; one as the "time-sharing ability factor." However, out of three time-sharing tests included in the battery, only two of them defined the factor, while the third time-sharing test was essentially uncorrelated with the factor. Thus, by the customary standards that at least three tests should converge to define a factor, Parker's data may be also interpreted as not showing clear evidence for the time-sharing factor.

The results of the present study are generally consistent with the results obtained by McQueen (1917), as long as 60 years ago. Around the turn of the century, when the concept of attention dominated psychological studies, many psychologists believed that individuals consistently differ in the "power of distributing the attention." Since this "power" was assumed to be general, McQueen undertook an investigation to test this assumption. His subjects, 40 elementary-school children, performed a number of psychomotor and mental tasks, both singly and concurrently. After having analysed the results by a correlational method, McQueen concluded that the supposed general "power" did not exist. Indeed, we should pay more heed to work done by our predecessors; our contemporary concern with the time-sharing "ability" seems to be but another attempt to deal with the distribution-of-attention "power."

In conclusion, the existence of a general time-sharing ability is not confirmed. In general, the ability to perform a task under time-sharing conditions seems most closely related to the ability to perform the same task on its own. Consequently, the notion of "time-sharing ability" as well as recommendations for replacing the traditional, serial approach to ability assessment by the parallel one, are not supported.

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The traditional approach to ability and skill assessment employed serial, discrete presentations of assessment tasks. Recently, some authors stressed the need for an approach which would permit administration of more than one assessment task simultaneously. There is a belief that such approach might be more appropriate, especially in the prediction of some complex skill, such as flying, which is likely to involve simultaneous performance and overload. Inherent in this belief is the supposition that individuals

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20. consistently differ in some kind of "timesharing ability." But this has not been proved so far, and the present research is an attempt to test this supposition.

Four tasks were used: (1) The rotary pursuit task (subject's task was to keep the point of a stylus on a round brass target inserted in a rotating disc); (2) The digit processing task (a ten-choice self-paced serial reaction time task requiring subject to press the appropriate buttons on the keyboard in response to digits which appear on the adjacent display); (3) The mental arithmetic task (backward counting by threes); and (4) The auditory discrimination task (a two-choice serial reaction time task requiring subject to press the appropriate foot pedal in response to tones differing in pitch).

Sixty subjects performed the tasks several times singly, one by one, as well as concurrently, in all possible two-task combinations. Sixteen scores were obtained for every subject: his performance on each task when performed singly, as well as when performed concurrently with each of three other tasks. These 16 variables were intercorrelated and the resulting matrix of intercorrelations was submitted to a factor analysis. Only task-specific factors were identified. No evidence for a time-sharing factor, which would account for concurrent task performances, was found. Thus, the notion of "time-sharing ability" was not supported.