United States
Department of
Agriculture

Forest Service

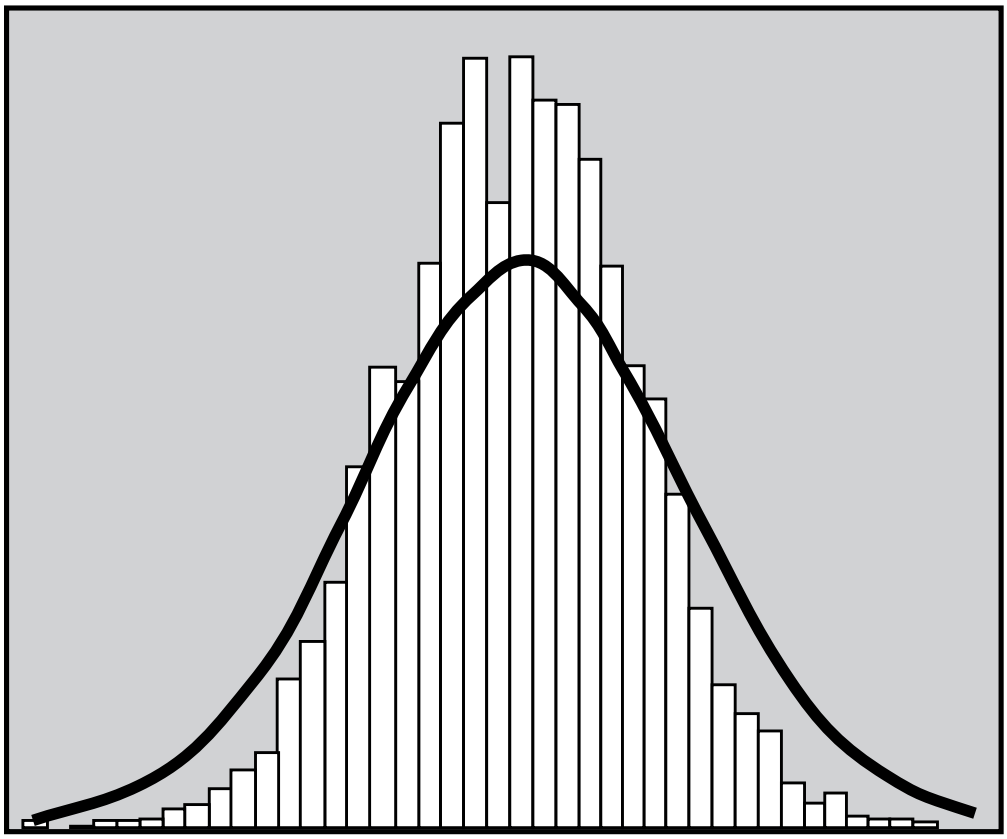
Forest
Products
Laboratory

Research
Paper
FPL–RP–558

Predictor Sort Sampling, Tight *t*'s, and the Analysis of Covariance

Theory, Tables, and Examples

Steve P. Verrill
David W. Green



Abstract

In recent years wood strength researchers have begun to replace experimental unit allocation via random sampling with allocation via sorts based on nondestructive measurements of strength predictors such as modulus of elasticity and specific gravity. Although this procedure has the potential of greatly increasing experimental sensitivity, as currently implemented it can easily reduce sensitivity. In this paper we discuss the problem and we present solutions. Given the existence of nondestructive measurements of strength predictors, our methods can be used to reduce sample sizes. We have written a public domain computer program that implements the methods.

Keywords: *t* distribution, paired *t*, pooled *t*, analysis of covariance, power, experimental design, sample size, asymptotics

October 1996

Verrill, Steve P.; Green, David W. 1996. Predictor sort sampling, tight *t's*, and the analysis of covariance: Theory, tables, and examples. Res. Pap. FPL-RP-558. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory. 105 p.

A limited number of free copies of this publication are available to the public from the Forest Products Laboratory, One Gifford Pinchot Drive, Madison, WI S3705-2398. Laboratory publications are sent to more than 1,000 libraries in the United States and elsewhere.

The Forest Products Laboratory is maintained in cooperation with the University of Wisconsin.

The use of trade or firm names is for information only and does not imply endorsement by the U.S. Department of Agriculture of any product or service.

The United States Department of Agriculture (USDA) prohibits discrimination in its programs on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, and marital or familial status. Persons with disabilities who require alternative means of communication of program information (braille, large print, audiotape, etc.) should contact the USDA Office of Communications at (202) 720-2791. To file a complaint, write the Secretary of Agriculture, U.S. Department of Agriculture, Washington, DC 20250, or call (202) 720-7327 (voice), or (202) 720-1127 (TTD). USDA is an equal employment opportunity employer.

Contents

Page

Introduction 1

Mathematical Basis of Our Approach 3

Applying Our Methods 3

Tables and a Computer Program 3

Example 1—A Simulated Experiment Using Our Methods 4

Example 2—Estimating Power 7

Analysis of Variance/Covariance 8

Monte Carlo Estimates of Critical Values 9

Power Study 10

Tight *t*'s as "Partially Paired" *t*'s 12

References 13

Appendix A—Proofs 16

Appendix B—Tables 18

Predictor Sort Sampling, Tight t' s, and the Analysis of Covariance

Steve P. Verrill, Mathematical Statistician
David W. Green, Supervisory Research General Engineer

1 Introduction

In recent years wood strength researchers have begun to replace experimented unit allocation via random sampling with allocation via sorts based on nondestructive measurements of strength predictors such as modulus of elasticity and specific gravity. Warren and Madsen (1977) describe the procedure as follows:

> One can take steps, however, to ensure that the inherent strength distributions of test and control samples are reasonably equivalent. Indeed, failure to do so can only throw doubt on the results.
>
> Specifically, then, all the boards in the experiment are ordered from weakest to strongest as nearly as can be judged from their moduli of elasticity, knot size, and slope of grain. To divide the material into J equivalent groups the first J boards, after ordering, are taken and randomly allocated one to each group. This is repeated with the second, third, fourth, etc., sets of J boards. The strength distributions of the resulting groups should then be essentially the same.

Although this procedure is intuitively attractive, if the associated analysis does not take into account the nonrandom nature of the sampling, the experiment can be less sensitive to treatment effects. We illustrate the problem with a simple example:

Suppose that a wood scientist wishes to test whether the mean strength of lumber treated with preservative A differs from the mean strength of lumber treated with preservative B. Assume that the scientist has decided on samples of size k and has obtained $2k$ specimens from some source. Then, to make the initial samples of lumber as similar as possible, the scientist measures a predictor variable (this could be a linear combination of modulus of elasticity (MOE), specific gravity, . . .), orders the measurements

$$M_1 \leq M_2 \leq \ldots \leq M_{2k-1} \leq M_{2k},$$

and labels the corresponding specimens

$$S_1, S_2, \ldots, S_{2k}.$$

Next, for $i = 1,\ldots, k$, the scientist randomly assigns one of $\{S_{2i-1}, S_{2i}\}$ to treatment A and the other specimen to treatment B. This procedure should lead to nearly identical initial predictor distributions in the 2 samples. Believing that the predictor is well correlated with modulus of rupture (MOR), the scientist hopes that the procedure will also lead to nearly identical initial MOR distributions. In accord with current practice, the scientist then proceeds with the experiment and analyzes the results as if the two initial samples were composed of independent, identically distributed representatives of an initial strength distribution. Given this (incorrect) distributional

assumption, an appropriate test for a postpreservative difference in mean strength would be a pooled t test.

Contrary to the scientist's intuition, this approach can actually *decrease* one's ability to detect a difference between the two preservatives. Why the decrease? Given the standard assumptions of normality and independence, the test statistic

$$\tau = \frac{\bar{X}_B - \bar{X}_A}{s_p\sqrt{2/k}}$$

has a null[1] t distribution with $2k - 2$ degrees of freedom. However, when the sampling is via a predictor sort, τ is no longer distributed as a t. Instead the distribution depends upon the correlation ρ between the predictor variable and the response variable. As this correlation increases to 1, the null distribution of τ will "tighten" around 0. In Figure 1, we present a histogram[2] of τ values for the predictor sort case in which $k = 24$ and $r = .70$. Superimposed on the histogram is the probability density function of a standard t distribution with 46 degrees of freedom. Clearly, the t distribution overestimates the "width" of the true distribution.

Now an analyst who is ignoring the nonrandom nature of the sampling will use 2.013 (from a standard t table) as the critical value for a test of the hypothesis that there is no difference in the strength properties associated with treatments A and B. Let Δ denote the true, unknown difference between the mean strengths of the two types of wood, and let σ denote the true standard deviation of the strength. For Δ/σ sufficiently small, the narrowing of the τ distribution will *reduce* the chance of detecting an effect. On the other hand, for Δ/σ sufficiently large, it will increase the chance.[3] This result is illustrated in Figure 2. There the dashed line[4] represents the power[5] associated with a predictor sort design followed by a standard (but incorrect) analysis using a 2.013 critical value. The solid line represents the power associated with a standard random sampling design followed by a standard analysis.

If the correct critical values are used (we obtain these below), then the predictor sort procedure yields a power curve that is uniformly better than the power curve obtained in the random sampling case. For the $k = 24$, $r = .7$ case, this curve is plotted as the dotted line in Figure 2. As we will see below, this increased power can yield *substantial* sample size savings.

In the next section we obtain the asymptotic (large sample) distributions of the "pooled tight t" and the "paired tight t."

In Section 3 we work through several examples of predictor sort/tight t design and analysis procedures. We have written a public domain computer program that implements these procedures.

---

[1] The "null" distribution is the distribution of the test statistic under the "null hypothesis" — no difference between treatments.

[2] The histogram was obtained via computer simulation and is based on 4,000 trials.

[3] The relative narrowness of the τ distribution means that right tail values tend to be pulled down and left tail values tend to be pulled up. Thus, roughly speaking, if $\Delta/(\sigma\sqrt{2/k})$ is less than 2.013, τ will be less likely to lie above the critical value than a standard t statistic, while if $\Delta/(\sigma\sqrt{2/k})$ is greater than 2.013, τ will be more likely to lie above the critical value than a standard t statistic.

[4] For the cases $\Delta/\sigma = 0.0, 0.075, 0.150, 0.225, \ldots . 1.5$, 4000 samples of total size 48 were generated and then divided into subsamples of size 24 via a predictor sort with $r = .7$. The τ statistics were then calculated, and the frequency with which these statistics fell beyond the -2.013,2.013 bounds was noted. The resulting 21 estimated power values were connected to yield the dashed line.

[5] The power of a statistical test is the probability (ranging from 0 to 1) that the test will reject the null hypothesis of no difference, that it will "detect a difference." As the actual difference increases or the sample size increases, the power will increase. One can also increase power by using an improved statistical method. A predictor sort followed by a tight t analysis constitutes one such method.

The program is described by Verrill, Green, and Herian [in press] and may be obtained from the authors. See Section 3 for details.

Readers who are primarily interested in the application of our methods should restrict their attention to Section 3.

The work that forms the basis for the computer program is discussed in Sections 4–6 and Appendix A. In Section 4 we present estimates of the small sample critical values of the tight *t*'s and identify the sample sizes needed to permit use of the asymptotic (large sample) critical values. In Section 5 we present a power study that should be useful in selecting sample sizes, and we show that we need not greatly concern ourselves about entering the critical value tables via estimates of ρ. We include in this power study an analysis of covariance approach and identify those cases in which it is inferior to one of the tight *t* approaches. Finally, in Section 6 we warn against intuitively attractive, but incorrect, power calculations.

2 Mathematical Basis of Our Approach

We record here a theorem that justifies our approach to designing "tight *t*" experiments and analyzing "tight *t*" data. Its practical import is explored in the sections that follow. If you simply want to know how to use the result, please skip ahead to the next section.

Theorem. Assume that the predictor variable and the variable of interest have a joint bivariate normal distribution with correlation ρ. Let the allocation of samples be as described in Section 1. (For a multiple factor case, enough adjacent experimental units would be chosen at a time to provide one additional observation for each cell.) Then, for $-1 < \rho < 1$, the asymptotic distribution of the statistic that treats the groups of "equivalent" experimental units as a block (the "paired approach") is X^2_{J-1}. The asymptotic distribution of the statistic that ignores the block structure generated by these groups (the "pooled approach") is $(1-\rho^2)X^2_{J-1}$.

Proof. The proof appears in the Appendix.

Note: Let *T* denote the usual pooled *t* statistic. Then $T/\sqrt{1-\rho^2}$ *is* the "pooled tight *t*" statistic. The "paired tight *t*" statistic has the same form as the usual paired statistic. By the reasoning used to prove the more general theorem just stated, one can show that given predictor sort sampling, for $-1 < \rho < 1$, the pooled tight *t* and the paired tight *t* are asymptotically N(0,l).

3 Applying Our Methods

3.1 Tables and a Computer Program

To apply our methods, one can take a "manual" approach and use Tables 1 - 56 provided in Appendix B. In sections 3.2 and 3.3 we work through two examples.

Alternatively, one can use a computer program that we have written. This program performs sample size calculations, specimen allocations, and data analyses. It can be run over the World Wide Web — see http://www1.fpl.fs.fed.us/ttweb.html[6].

[6]The program is in the public domain and can be obtained from the authors. Source code is available as are executable versions for Sun Solaris 1.x, Sun Solaris 2.x, and DOS. A user can obtain the program and annotated input to the program (Verrill, Green, and Herian [in press]) via the World Wide Web (http://www1.fpl.fs.fed.us/papers.html), or via the U.S. Postal Service (USDA Forest Products Lab, 1 Gifford Pinchot Drive, Madison, WI 53705 — please send us a floppy and specify the operating system). If you have questions about the program or encounter difficulties in running it, please contact us at steve@ws13.fpl.fs.fed.us.

3.2 Example 1 — A Simulated Experiment Using Our Methods

In this section we work through an example of a predictor sort/tight *t* experiment.[7]

Suppose that a scientist wants to determine whether there is a difference in the effects of preservatives A and B on MOR. In an effort "to reduce random variation between specimens in the two groups," the MOE values of all specimens will be determined prior to treatment. These values will be ranked from high to low. Pairs of specimens with adjacent MOEs will be randomly separated into the two treatment groups. Before any of this can be done, however, the scientist must determine how many specimens will be needed.

3.2.1 Design — Sample Size Calculations

The scientist wants to choose a total sample size $n = 2k$ sufficient to detect a 10% difference in mean strength at a .05 significance level with a probability of at least .90. The scientist believes that the coefficient of variation of MO R is approximately 20%, and the correlation ρ between MOR and MOE is .70. (Here we use MOE as the predictor, but other variables or linear combinations of variables could be used.)

There are three approaches that one could take to calculating an appropriate sample size — table, noncentral *t*, normal approximation. For lower ρ, or for high ρ and large sample size combinations, the three approaches will yield essentially the same results. We give examples of all three approaches because they differ in ease of implementation, and because the latter two methods are suspect for high ρ, small sample size combinations (see Section 5).

Power Tables

Table 49 contains power results for a correlation of .70. (A detailed description of the tables is provided in the Index to the Tables that appears at the beginning of Appendix B.) The difference A that we want to be able to detect is approximately $.10 \times \mu$ where μ is the mean MOR of the specimens. Also, since the coefficient of variation, $\sigma / \mu \times 100$, is approximately 20%, $\sigma \approx$ (is approximately) $0.20 \times \mu$. Thus $\Delta / \sigma \approx 0.5$. Looking in the "Tight *t* /Unknown ρ /Pooled/ ρ estimated" column in Table 49, we see that the power for a total sample size of 72 ($72 = n = 2k$) and $\Delta / \sigma = .5$ is .84. For a total sample size of 96 and $\Delta / \sigma = .5$, the power is .92. Interpolating between these two values we see that we would need about

$$72 + \left(\frac{.90 - .84}{.92 - .84}\right) \times (96 - 72) = 90$$

total observations to assure ourselves of a .90 probability of detecting a 10% difference in mean strength. (For $\rho = .70$, $\Delta / \sigma = .5$, $n = 90$, a standard random sampling approach would only yield a power of $.55 + (.68 - .55)(90 - 72)/(96 - 72) \approx .65$ — see Table 49.)

Noncentral t

As noted in Section 5, the noncentral *t* approach works best for $\rho \leq .80$. As ρ approaches 1, this approach yields an overestimate of power and thus an underestimate of needed sample size.

[7] One can also take an analysis of covariance approach to this problem. As we will see in the power study, provided that the relationship between the predictor and MOR is correctly modelled, an analysis of covariance approach will also yield good power properties.

For this example, the noncentrality parameter is

$$\gamma = \frac{\Delta}{\sigma}\sqrt{\frac{k}{2}}\frac{1}{\sqrt{1-\rho^2}}.$$

The power is then

$$\text{Prob}\,(t_\gamma \le -t_{2k-2}(.025)) + \text{Prob}\,(t_\gamma \ge t_{2k-2}(.025))$$

where $t\gamma$ is a noncentral t statistic with noncentrality parameter γ, and $t_{2k-2}(.025)$ is the one-sided .025 critical value for a central t with $2k-2$ degrees of freedom. Our computer program performs this calculation (as well as the other calculations associated with the design and analysis of a predictor sort experiment) and yields $n = 88$.

Normal Approximation

As noted in Section 5, the normal approximation approach is even more susceptible to overestimating power — underestimating sample size — than the noncentral t approach. However, this does not appear to be a problem for lower r and higher n (e.g., see Table 49), and to implement the method we need only a table of the normal cumulative distribution function.

For the current example, we have

$$(\bar{X}_B - \bar{X}_A - \Delta)/\left(s_{\text{pooled}}\sqrt{1-\rho^2}\sqrt{2/k}\right) \approx \text{N}(0,1)$$

where s_{pooled} is the pooled standard deviation, and N(0,l) denotes a standard normal distribution. Thus, the approximate power is

$$\begin{aligned}
&\text{Prob}\left((\bar{X}_B - \bar{X}_A)/\left(s_{\text{pooled}}\sqrt{1-\rho^2}\sqrt{2/k}\right) \le -1.96\right)\\
&+ \text{Prob}\left((\bar{X}_B - \bar{X}_A)/\left(s_{\text{pooled}}\sqrt{1-\rho^2}\sqrt{2/k}\right) \ge 1.96\right)\\
&= \text{Prob}\left(\text{N}(0,1) \le -1.96 - \Delta/\left(s_{\text{pooled}}\sqrt{1-\rho^2}\sqrt{2/k}\right)\right)\\
&+ \text{Prob}\left(\text{N}(0,1) \ge 1.96 - \Delta/\left(s_{\text{pooled}}\sqrt{1-\rho^2}\sqrt{2/k}\right)\right)\\
&\approx \text{Prob}\left(\text{N}(0,1) \le -1.96 - .5/\left(\sqrt{1-.7^2}\sqrt{2/k}\right)\right)\\
&+ \text{Prob}\left(\text{N}(0,1) \ge 1.96 - .5/\left(\sqrt{1-.7^2}\sqrt{2/k}\right)\right)
\end{aligned}$$

We can neglect the first term in this sum, set the second term equal to the desired power, and solve for k. For our example this yields

$$\begin{aligned}
&\text{Prob}\left(\text{N}(0,1) \ge 1.96 - .5/\left(\sqrt{1-.7^2}\sqrt{2/k}\right)\right) = .90,\\
&1.96 - .5/\left(\sqrt{1-.7^2}\sqrt{2/k}\right) = -1.28,\\
&3.24 = .5/\left(\sqrt{1-.7^2}\sqrt{2/k}\right),\\
&6.48\sqrt{.51} = \sqrt{k/2},\\
&k = 42.8, \text{ or } n \approx 86.
\end{aligned}$$

We see that, for this example, the three methods give similar results. For $r \leq .8$ and $n \geq 24$ (say) this is to be expected. (See the power tables.)

3.2.2 Design — Specimen Allocation

For the example, MOR, MOE pairs were generated from a bivariate normal distribution with mean vector

$$\begin{pmatrix} \mu_{\mathrm{MOE}} \\ \mu_{\mathrm{MOR}} \end{pmatrix} = \begin{pmatrix} 1.8 \\ 5000 \end{pmatrix}$$

and covariance matrix

$$\begin{pmatrix} \sigma^2_{\mathrm{MOE}} & .7(\sigma_{\mathrm{MOE}})(\sigma_{\mathrm{MOR}}) \\ .7(\sigma_{\mathrm{MOE}})(\sigma_{\mathrm{MOR}}) & \sigma^2_{\mathrm{MOR}} \end{pmatrix}$$

where $\sigma_{\mathrm{MOE}} = .2 \times \mu_{\mathrm{MOE}}$ and $\sigma_{\mathrm{MOR}} = .2 \times \mu_{\mathrm{MOR}}$. In Table 56, we list the 90 MOE,MOR pairs as drawn, the 90 pairs ordered by MOE, and the division of the data into two sets of 45 pairs. (In addition to performing sample size calculations, the computer program described above also sorts predictor values and then randomly allocates adjacent experimental units to the two test conditions.) In Table 56, we also list "treated" MOR values. For treatment B, these are the same as the untreated values. For treatment A, they have been reduced by 500 from the untreated values.

3.2.3 Analysis

Given the values listed in Table 56, the estimate of r is

$$\begin{aligned} &= .5 \times \left(\frac{\sum_{i=1}^{k}(\mathrm{MOE}_{i,A} - \overline{\mathrm{MOE}}_A)(\mathrm{MOR}_{i,A} - \overline{\mathrm{MOR}}_A)}{\sqrt{\sum_{i=1}^{k}(\mathrm{MOE}_{i,A} - \overline{\mathrm{MOE}}_A)^2 \sum_{i=1}^{k}(\mathrm{MOR}_{i,A} - \overline{\mathrm{MOR}}_A)^2}} \right. \\ &\quad \left. + \frac{\sum_{i=1}^{k}(\mathrm{MOE}_{i,B} - \overline{\mathrm{MOE}}_B)(\mathrm{MOR}_{i,B} - \overline{\mathrm{MOR}}_B)}{\sqrt{\sum_{i=1}^{k}(\mathrm{MOE}_{i,B} - \overline{\mathrm{MOE}}_B)^2 \sum_{i=1}^{k}(\mathrm{MOR}_{i,B} - \overline{\mathrm{MOR}}_B)^2}} \right) \\ &= .72. \end{aligned}$$

The pooled estimate of the MOR standard deviation is

$$\begin{aligned} s^2_{\mathrm{pooled}} &= \left(\sum_{i=1}^{k}(\mathrm{MOR}_{i,A} - \overline{\mathrm{MOR}}_A)^2 + \sum_{i=1}^{k}(\mathrm{MOR}_{i,B} - \overline{\mathrm{MOR}}_B)^2 \right) / (n-2) \\ &= 1.17 \times 10^6. \end{aligned}$$

The pooled tight t statistic is

$$\tau = (\overline{\mathrm{MOR}}_B - \overline{\mathrm{MOR}}_A) / \left(s_{\mathrm{pooled}} \sqrt{1 - \hat{\rho}^2} \sqrt{2/45} \right) = 2.99.$$

This value should be compared to a critical value appropriate to a pooled tight t statistic with $r = .72$, $n = 2k = 90$, and (two-sided) size equal to .05. This critical value can be obtained in several ways. One approach is to note that $n = 90$ which, according to Table 17, is large enough that we may use a standard normal distribution table to find the critical value. Thus we are justified in comparing 2.99 with z (.05/2) = 1.96 and concluding that there is a significant difference between the two treatments.

Alternatively, when we cannot use large sample results, we can use Tables 1-10 (and Table 11) to calculate the critical values for pooled (Tables 1–5) and paired (Tables 6-10) tight t statistics. For example, if the correlation between predictor and response (e.g., MOE and MOR) were .70, and one wanted to use the pooled tight t with total sample size equal to 90, and to do a test at a 5% significance level, then one would use the values in the .70 row of Table 3, and the equation

$$\text{critical value} = a_0 + a_1/n^{1/2} + a_2/n + a_3/n^{3/2}$$

to obtain the critical value

$$\text{cv} = 1.96 - .02812/(90^{1/2}) + 2.638/90 + 4.050/(90^{3/2}) = 1.99.$$

For n = 90 and r = .75, we have

$$\text{cv} = 1.96 - .01677/(90^{1/2}) + 2.068/90 + 6.746/(90^{3/2}) = 1.99.$$

An interpolation (which is even simpler than usual in this case) yields 1.99 as an appropriate estimate of the critical value. Since 2.99 > 1.99, we can conclude that there is a significant difference between the two treatments. (The computer program described above will also calculate the t value, find the appropriate critical value, and report the appropriate conclusion.)

3.3 Example 2 — Estimating Power

Winandy and others (1992) proposed to investigate the effects of preservative treatments on selected hardwoods and two types of laminated veneer lumber. Because they had limited supplies of material, the authors were forced to restrict replication numbers to 16, 18, or 20, depending upon the the particular treatment/drying condition/material combination in question. The authors wanted to be able to detect 10% differences in MOR. They believed that a reasonable estimate of the coefficient of variation for their material was .16, and that a reasonable estimate of the correlation between MOE and MOR was .7. What kind of power could they expect?

3.3.1 Standard Random Sampling Pooled T

We have Δ / σ = .10/.16 = .625. Interpolating (quadratically in Δ / σ and then quadratically in n) in the "Standard random sampling pooled t" column of Table 49, one can see that approximate values for the powers are the following:

k	n	Power
16	32	.409
18	36	.455
20	40	.499

Using our Fortran program (with r set to 0), we obtain the following:

k	n	Power
16	32	.402
18	36	.445
20	40	.487

Thus, if Winandy and others had performed standard random sampling and standard pooled *t* analyses, they would have had less than a 50% chance of detecting 10% mean differences. (This assumes that the authors wanted to compare individual "cells" in the desing. In the absence of interactions it would generally be possible to combine data from separate cells to achieve increased power.) There is a greater than 50% chance that they would have had to report no statistically significant differences (at a .05 significance level) even if there really were 10% differences in population means.

3.3.2 Tight t Approach

We have $\Delta / \sigma = .10/.16 = .625$. Interpolating (quadratically in Δ / σ and then quadratically in *n)* in the "Tight *t* /Unknown r /Pooled/ r from experience" column of Table 49, one can see that approximate values for the powers are the following:

k	*n*	Power
16	32	.66
18	36	.71
20	40	.76

Using the noncentral *t* approach in our Fortran program (with r set to .7), we obtain the following:

k	*n*	Power
16	32	.67
18	36	.72
20	40	.77

Thus, by combining predictor sort sampling with a tight *t* analysis, Winandy and others increased their chances of detecting 10% mean differences by a factor of 1.5.

3.4 Analysis of Variance/Covariance

In actual practice, researchers seldom compare only two treatments. In general, there are multiple "factors" (e.g., chemical concentration, adhesive type, drying procedure) that are tested at multiple "levels." For example, if there were three factors, each of which were tested at two levels, then the design would be a $2 \times 2 \times 2$. If there were *r* replicates in each of the $2 \times 2 \times 2 = 8$ cells, $8 \times r$ specimens would be needed to perform the experiment.

Taking a predictor sort approach, one would order the $8 \times r$ specimens on the basis of a nondestructive predictor such as MOE, take the top 8 specimens and randomly assign them to the 8 cells, take the next 8 specimens and randomly assign them to the 8 cells, and so on.

To analyze these data one would take one of three approaches:

1. Use a standard unblocked analysis of variance (ANOVA) program, but replace the *F* values reported in the program by $F/(1 - r^2)$ values, where r is the correlation between the predictor and the property being investigated.

2. Use a standard blocked analysis of variance in which the blocks were the groups of 8 specimens with similar predictor properties. (Note that one would have to keep track of which specimens were in which blocks.)

3. Perform a standard analysis of covariance (ANOCOV) using the predictor as the covariate. (Note that one would have to keep track of the value of the predictor for each specimen.)

The first two analysis approaches are only approximate for smaller sample sizes.

Our computer program performs power calculations and specimen allocations for this more general case. (Currently it can handle at most 5 factors, a total of 25 levels, and 5,000 specimens.) The program does not perform analyses for multiple factor experiments, but ANOVA and ANOCOV programs that do perform such analyses are readily available (e.g., the SAS GLM procedure).

4 Monte Carlo Estimates of Critical Values

We ran 10,000 trials for each combination of $n = 2k$ = 4,6,8(4)40(8)120, 160, 200, 300 and r = .40(.05).95, .99, 1.0. (The notation "8(4)40" stands for "from 8 to 40 in steps of 4.") (Here, k is the number of observations per treatment, and r is the correlation between the predictor x and the response y). To do so we used the uniform (UNI) and normal (RNOR) random number generators developed by James Blue, David Kahaner, and George Marsaglia[8] The absolute values of the scaled pooled statistic (the usual pooled statistic divided by $\sqrt{1-\rho^2}$) and the usual paired statistic were ordered, and order statistics 8001, 9001, 9501, 9801, and 9901 were used as estimates of the two-sided .20, .10, .05, .02, .01 critical values. Using the techniques described in Verrill and Johnson (1988), one can see that this approach yields the following .999 probability intervals on the true sizes: [.187,.213], [.090,.110], [.043,.057], [.015,.025], and [.0066,.0134] (e.g., prob(ξ .090 $\leq$ .10 cv estimate $\leq \xi$ .110) = .999).

For each r /size (.20, .10, .05, .02, or .01) combination, the critical values for n = 8(4)40(8)120, 160, 200, 300 were smoothed via the equation $\text{cv} = a_0 + a_1/n^{1/2} + a_2/n + a_3/n^{3/2}$. For $\rho < 1$, a_0 was fixed at the appropriate asymptotic criticzd value.

For r = 1 (not covered by the Theorem), there are heuristic reasons for believing that $\sqrt{k \ln k}$ times the usual pooled statistic converges in distribution to something approximating a linear combination of independent double exponentials. Thus, in this case, we calculated the smoother of the Monte Carlo critical values of the usual paired statistic, but we calculated the smoother of the Monte Carlo critical values of $\sqrt{k \ln k}$ (rather than $1/\sqrt{1-\rho^2}$) times usual pooled statistic. To perform the pooled r = 1 calculations, we fixed a_0 at the average of the estimated critical values for n = 104, 112, 120, 160, 200, 300. (Plots indicated that the critical values seemed to have leveled off at an "asymptotic value" by n = 104.) In the paired r = 1 case, a_0 was a free parameter that was estimated in the smoothing process. The coefficients for the pooled statistics are presented in Tables 1–5. Those for the paired statistics are presented in Tables 6–10. Since the smoothing equations do not perform well for n < 8, the critical values for n = 4 and 6 and size .05 are presented in Table 11. (Again the critical values reported in Table 11 for r = 1 are the critical values of the usual paired statistic, but the critical values of $\sqrt{k \ln k}$ times the usual pooled statistic.)

The quality of the smoothed critical values was tested by performing an additional 10,000 trials for each n, r combination. Counts of the cases in which the smoothed critical values were exceeded are summarized in Tables 12 and 13. To understand these tables one needs to note that if the smoothed critical values were exact, then one would expect that

- 95% of the .20 two-sided size counts (for different n, r) will lie between 1922 and 2079,

[8] See the National Institute of Standards and Technology's World Wide Web Guide to Available Mathematical Software at http://gams.nist.gov

- 95% of the .10 two-sided size counts will lie between 942 and 1060,
- 95% of the .05 two-sided size counts will lie between 458 and 544,
- 95% of the .02 two-sided size counts will lie between 173 and 228, and
- 95% of the .01 two-sided size counts will lie between 81 and 120.

(These limits are obtained using the arcsin square root transformation on the exceedance fraction.) For a given r there are 22 × 5 = 110 n ,size combinations (we exclude n = 4,6 as they were not included in the smoothing calculation). The values in the column headed by "-" in Tables 12–16 indicate the number of times among the 110 that the counts fell below the 9570 limits. The values in the column headed by "+" indicate the number of times that the counts fell above the limits. The values in the column headed by "0" indicate the number of times that the counts fell within the limits. The values in the column headed by .20 are the minimum and maximum over n = 8(4)40(8)120, 160, 200, 300 of the exceedance counts for the two-sided .20 critical values. Similar remarks hold for the columns headed by .10, .05, .02, and .01. It is clear from Tables 12 and 13 that if one uses the smoothed critical values, the two-sided size will not be off by more than .01 for sizes .20 and .10, and .005 for size .05. In fact these figures are fairly conservative (as can be seen by the frequency with which the counts fall within the 95% limits).

In Table 14 we present the corresponding results for the case in which "incorrect t values" are used — we calculate a pooled t statistic that is not divided by $\sqrt{1-\rho^2}$ and compare it to standard t values, In this case it is clear that actual sizes fall far below nominal sizes. The resulting power loss is discussed in Section 5.

In Tables 15 and 16 we present the results for the cases in which "correct t values" are used (the pooled t statistic is divided by $\sqrt{1-\rho^2}$ before it is compared to standard t values). In the pooled case, the tabled t values yield good approximations to the critical values of the scaled statistic for r $\leq$ .80. In the paired case, the t approximation is satisfactory for r as large as .90. For low n, however, as r increases beyond .90, the actual size falls below the nominal size and a small amount of power (less than or equal to .15) is lost.

To get an idea of the sample sizes needed for the asymptotic critical values to be satisfactory, for each r /size combination we fit a curve of the form $a_0 + a_1/n^{1/2} + a_2/n + a_3/n^{3/2}$ to the counts of the times that the asymptotic critcal values were exceeded in the 10,000 trials. (The value a_0 was fixed at 2000, 1000, 500, 200, or 100, depending on the size in question.) We then found the n' s at which these curves descended below 2200, 1100, 550, 250, or 125. These values are reported in Table 17 for the pooled T and in Table 18 for the paired T. Note that as the size decreases or r increases (for the pooled case), the n needed to achieve good performance of the asymptotic values also increases. On the other hand, for all but the highest r , good performance is achieved for fairly small n (less than 100 in the pooled case).

5 Power Study

We performed a power study that covered the cases in which r = .4(.1) .8, .85(.05).95, .99, $n = 2k$ = 12(12)48, 72, 96, Δ / σ_y = 0.0(.25)1.5, and r = .4(.1).8, .85(.05).95, .99, $n = 2k$ = 4(2)14, Δ / σ_y = 0.0(.5)3.0. Here Δ is the mean difference between treatment 1 and treatment 2, and σ_y^2 is the variability of the y's. The results of the study are presented in Tables 19 – 54, and can be summarized as follows:

- Using a predictor sort followed by a standard analysis yields poor power properties.

- The gain in efficiency of the tight t (pooled or paired) predictor sort approach over a standard random sampling approach ranges from 33% to 800% as r increases from .5 to .99.

- For the r = .7 case (common in wood strength research) sample sizes may be (approximately) halved by using a tight t approach.

- Because of the difference in degrees of freedom, the pooled approach yields greater power than the paired approach. For small n, the gain can be substantial (e.g., for a = .01, n = 8, ρ = .7, and Δ / σ_y = 2.5, the paired tight t yields power .42 while the pooled tight t yields power .81).

- For r $\leq$ .85, the pooled tight t performs as well as an analysis of covariance. (The analysis of covariance is based on the model $y_{ij} = a_j + bx_{ij} + \epsilon_{ij}$ and tests whether $a_1 = a_2$. Here y denotes, for example, MOR, and x denotes, for example, MOE.) For small n (say, $n \leq 14$) the pooled tight t actually performs better than an analysis of covariance (e.g., for a = .01, n = 6, r = .4, and Δ / σ_y = 3.0, a predictor sort followed by an analysis of covariance yields a power of .29, while the pooled tight t yields power .45.).

- In the pooled case, for $n \geq 12$, r $\leq$ .95, entering the critical value tables via estimated r 's causes no problems. (In our simulations, for each trial, $\hat{\rho}$ was calculated as the average of the correlation between the predictor and the response for the treatment 1 sample, and the correlation between the predictor and the response for the treatment 2 sample. For $\hat{\rho}$ less than .40, standard t tables were used to obtain critical values. For $\hat{\rho}$ between .40 and .90, the interpolation was linear between the two nearest bracketing r 's. For $\hat{\rho}$ greater than .90, the critical value was a quadratic interpolation/extrapolation of the critical values for r = ,90,.9.5, and .99.)

  For n < 12, r $\leq$ .95, entering the tables via $\hat{\rho}$ can yield inflated sizes, but if r is known from experience to within .05–.10, nominal and actual sizes match well. (In our simulations, for each trial, " r from experience" was drawn from a N(r , $.05^2$) distribution for r $\leq$ .90, from a N(r , $.025^2$) distribution for .90 < r < .95, and from a N(r , $.005^2$) distribution for r = .99.)

  For r = .99, entering the tables via $\hat{\rho}$ yields inflated sizes, but the inflation decreases to acceptable levels as n increases. For r = .99, entering the tables via a r "known from experience" is unacceptable.

- Entering the critical value tables via estimated r 's causes no problems in the paired case.

- For the pooled tight t, power results can be approximated well by taking a noncentral t approach with noncentrality parameter equal to

$$(\Delta/\sigma_y)/\sqrt{2(1-\rho^2)/k}$$

  and $2k - 2$ degrees of freedom. Alternatively, power can be estimated by assuming that $(\bar{Y}_2 - \bar{Y}_1 - \Delta)/(s_{\text{pooled}}\sqrt{1-\rho^2}\sqrt{2/k}) \approx \mathrm{N}(0,1)$. The noncentral t approach yields perfectly adequate approximations to the true power for r $\leq$ .80, For higher r it tends to overestimate power, but the overestimation decreases as n increases. The normal approach yields a more significant overestimate of power, and its use should probably be restricted to lower r and higher n.

- Similarly, for the paired tight t, power results can be approximated by taking a noncentral t approach with the same noncentrality parameter as in the pooled tight t case, but with $k - 1$

degrees of freedom. Also, power can be estimated by the same normal approximation used in the pooled tight t case. Again, the noncentral t approach yields good power approximations for $r \leq .80$ and for higher r, n combinations. The power overestimation associated with the normal approach is, of course, even more pronounced in the paired case.

- The noncentrality parameter associated with a two treatment analysis of covariance is

$$\left(\Delta/\sigma_y\sqrt{1-\rho^2}\right)/\sqrt{\frac{2}{k}+\frac{(\bar{X}_{\cdot 2}-\bar{X}_{\cdot 1})^2}{\sum(X_{i1}-\bar{X}_{\cdot 1})^2+\sum(X_{i2}-\bar{X}_{\cdot 2})^2}}.$$

Thus it pays to minimize $\bar{X}_{\cdot 2}-\bar{X}_{\cdot 1}$. For this reason, an analysis of covariance associated with predictor sort sampling performs slightly better (a .01–.10 increase in power) than an analysis of covariance associated with a standard random allocation.

- If the relationship between the predictor and the response is misspecified, then, even for very high r, the tight t's can yield better power than an analysis of covariance. For moderate n, the misspecification can be difficult to detect. For example, for $r = .95$, $n = 24$, and $\Delta/\sigma_y = 0.0(.1).8$, we list the powers associated with tight t analyses (r estimated from the data) and an analysis of covaiance in Table 55. The table is based on 10,000 computer simulation trials per Δ/σ value. The data sets for this analysis were generated by drawing 24 x values from a $N(20,7^2)$ distribution, and obtaining y values from $y = x^3 + \epsilon$ where the ϵ's were $N(0, \sigma^2)$ with σ chosen so that the sample correlation between the x's and y's was approximately .95. An example of such a data set is presented in Figure 3.

Caveats

These conclusions do not necessarily hold for very small n (e.g., $n < 12$). If a user wishes to work with samples of this size, the user should look to Tables 19–27 and 37–45 for specific guidance. Also, note that critical values obtained from Tables 1-10 do not perform well for $n = 4$; instead, see Table 11. (Tables 1 – 10 are based on smoothing curves fit to Monte Carlo critical values obtained for $n \geq 8$. See Section 3. These curves do not extrapolate well down to $n = 4$.)

6 Tight t's as "Partially Paired" t's

It is edifying to see how the noncentrality parameter described in Section 5,

$$(\Delta/\sigma_y)/\sqrt{2(1-\rho^2)/k},$$

differs from those in the "pure" pooled and paired cases. (Bear in mind, however, that asp increases to 1, the noncentral t approach to estimating power loses validity.) Consider the following error model:

$$(Y-\mu_y)/\sigma_y = \delta + \gamma_y + \epsilon_y,$$

$$(X-\mu_x)/\sigma_x = \delta + \gamma_x + \epsilon_x,$$

where Y is the property of interest, X is the predictor, δ, γ_y, γ_x, ϵ_y, and ϵ_x are independent random variables with means equal to 0 and variances equal to σ_δ^2, σ_γ^2, σ_γ^2, σ_ϵ^2, and σ_ϵ^2. (Thus, $\sigma_\delta^2 + \sigma_\gamma^2 + \sigma_\epsilon^2 = 1$.) Here σ represents the "natural variation" shared by Y and X. γ_y and γ_x

represent the natural variation unique to Y and X. ϵ_y and ϵ_x are the measurement errors. In this case the noncentrality parameter appropriate to a pure pooled t analysis would be

$$\left(\Delta/\sqrt{\sigma_y^2(\sigma_\delta^2+\sigma_\gamma^2+\sigma_\epsilon^2)}\right)\left(\sqrt{k}/\sqrt{2}\right).$$

The noncentrality parameter that it is possible that a statistician would recommend and that it it is likely that a scientist would use (incorrectly) to calculate the sample sizes needed for a pure paired t analysis would be

$$(\Delta/(\sigma_y\sigma_\epsilon))\left(\sqrt{k}/\sqrt{2}\right).$$

Since $\rho = \sigma_\delta^2/(\sigma_\delta^2+\sigma_\gamma^2+\sigma_\epsilon^2) = \sigma_\delta^2$, the noncentrality parameter that one would use (correctly) to calculate the sample sizes needed for a predictor sort experiment would be

$$\left(\Delta/\sqrt{\sigma_y^2(\sigma_\gamma^2+\sigma_\epsilon^2)(1+\sigma_\delta^2)}\right)\left(\sqrt{k}/\sqrt{2}\right).$$

We see from this that the predictor sort approach succeeds in partially blocking out natural variation (σ_δ^2). If σ_δ^2 is large in comparison to σ_γ^2 and σ_ϵ^2 (ρ is high), then the tight t noncentrality parameter is much larger than the pure pooled noncentrality parameter — the tight t yields a large increase in power. However the the predictor sort approach does not succeed in blocking out all natural variation (the γs remain), and if σ_γ^2 is not small in comparison to σ_ϵ^2, "standard" paired t power calculations can seriously underestimate the sample sizes needed.

References

David, H.A. (1981). *Order Statistics, Second Edition* John Wiley and Sons, Inc., New York, N.Y.

Verrill, S., Green, D., and Herian, V. [in press]. Annotated Input to and Output from TT, a Program that Implements Tight t Design and Analysis. USDA Forest Service, Forest Products Laboratory Technical Note.

Verrill, S. and Johnson, R.A. (1988). Tables and Large-Sample Distribution Theory for Censored-Data Correlation Statistics for Testing Normality. *Journal of the American Statistical Association* **83** 1192-1197.

Warren, W.G. and Madsen, B. (1977). Computer-Assisted Experimental Design in Forest Products Research: A Case Study Based on Testing the Duration-of-Load Effect. *Forest Products Journal* **27** 45-50.

Winandy, J., McDonald, K., and Green, D. (1992). USDA Forest Products Lab Study Plan 4-92-3: Effects of CCA/Oil or ACQ Treatment on the Flexure Properties of Red Maple, Red Oak, and Southern Pine and Yellow Poplar LVL.

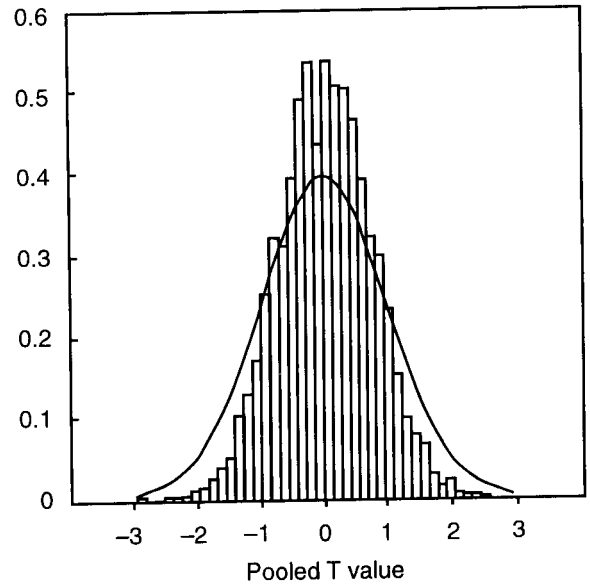


Figure 1: Histogram of τ for a correlation equal to .70 and total sample size of 48 (24 per treatment) overlayed with the density function of a standard *t* distribution with 46 degrees of freedom.

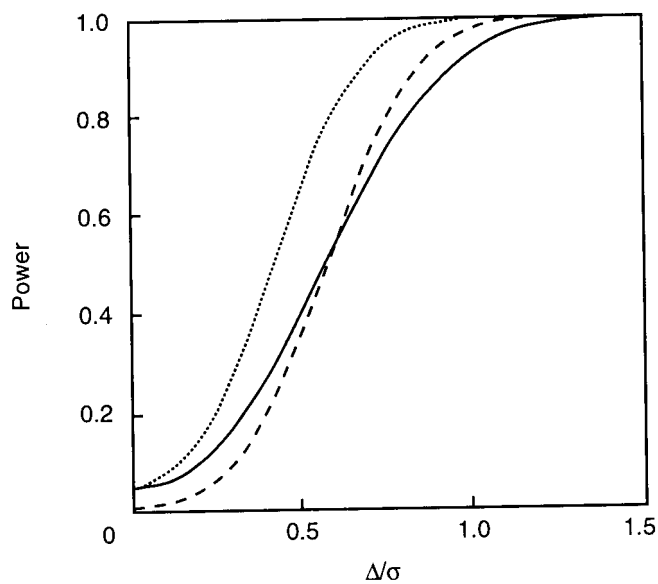


Figure 2: Power comparison. Here the correlation between the property and the predictor value is .70. The total sample size is 48 (24 per treatment). A is the difference between the mean responses for the two treatments. σ is the standard deviation of the response. The solid line is the power curve for standard random sampling followed by a standard pooled *t* analysis. The *dashed line* is the power curve for a predictor sort allocation followed (incorrectly) by a standard pooled *t* analysis, The *dotted line* is the power curve for a predictor sort allocation followed (correctly) by a pooled tight *t* analysis.

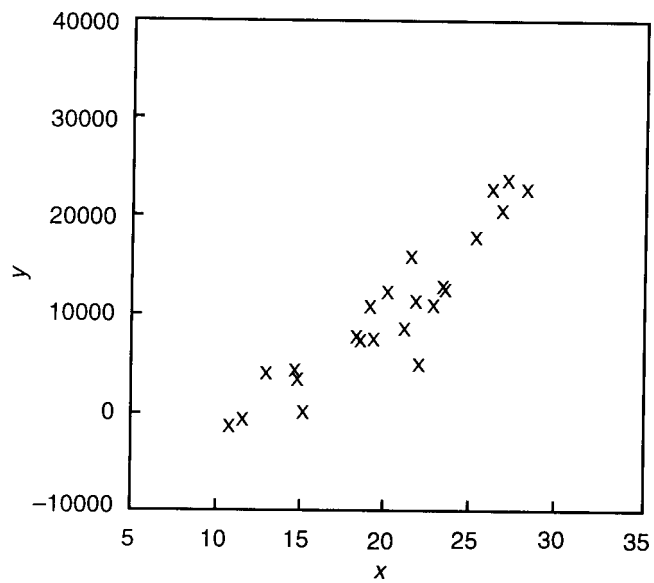


Figure 3: 24 *(x, y)* pairs where *x* is drawn from a N(20,7²) distribution, $y = x^3 + \epsilon$, ϵ is drawn. from a $N(0,\sigma^2)$ distribution, and σ is chosen so that the sample correlation between *x* and *y* is approximately .95.

Appendix A — Proofs

Let H denote the inverse of the N(0,l) distribution function.

Lemma. Let U_{1n} denote the first order statistic from a sample of n Uniform(0,l)'s. Then $H(U_{1n})/\sqrt{n}$ converges in probability to 0.

Proof. Since $(H(U_{1n}) - H(1/n))\sqrt{2\ln(n)}$ converges in distribution to an extreme value distribution, and $-H(1/n) \sim \sqrt{2\ln(n)}$ see, for example, Section 9.3 of David (1981)), the lemma follows.

Proof of the Main Result

For ease of exposition, we will present the proof for the one-way case. The extension to a proof of the n-way case is straightforward.

Let $\{X_i, i = 1, \ldots, n\}$, $\{Z_i, i = 1, \ldots, n\}$ be i.i.d. N(0,1) random variables. Define $Y_i \equiv \rho X_i + \sqrt{1-\rho^2}\, Z_i$. Then the Y_i's are i.i.d. N(0,1) and

$$\mathrm{corr}(X_i, Y_j) = \begin{cases} \rho & \text{if } i = j \\ 0 & \text{otherwise} \end{cases}$$

Since the ANOVA F statistics are invariant under changes in location and scale it is clear that we can obtain statistics that have the relevant distributions by ordering the X's, bringing along the Y's, and randomly dividing $Y_{(i-1)J+1,n}, \ldots, Y_{iJ,n}$ among the J treatments. (Here, $Y_{l,n}$ is the l th order statistic among the Y's.)

Let W_{ij} denote the i th Y that is assigned to treatment j. Then $W_{ij} = \rho X_{k(i,j),n} + \sqrt{1-\rho^2} P_{ij}$, where $k(i,j) \in \{(i-1)J+1, \ldots, iJ\}$, and the P_{ij} are i.i.d. N(0,l) and are independent of the X's. (Here, $X_{l,n}$ is the l th order statistic among the X's.)

6.1 The Numerator of the F Statistics

The numerator of both the blocked and unblocked F statistics equals $\sum_{j=1}^{J} I(\bar{W}_{\cdot j} - \bar{W}_{\cdot\cdot})^2$ where $I = n/J$. This equals

$$\sum_{j=1}^{J} I\left(\rho^2(\bar{X}_{k(\cdot,j),n} - \bar{X}_{k(\cdot,\cdot),n})^2 + 2\rho\sqrt{1-\rho^2}\,(\bar{X}_{k(\cdot,j),n} - \bar{X}_{k(\cdot,\cdot),n})(\bar{P}_{\cdot j} - \bar{P}_{\cdot\cdot}) + (1-\rho^2)(\bar{P}_{\cdot j} - \bar{P}_{\cdot\cdot})^2\right).$$

Now

$$\sum_{j=1}^{J} I(\bar{X}_{k(\cdot,j),n} - \bar{X}_{k(\cdot,\cdot),n})^2 = \sum_{j=1}^{J} I\left(\sum_{i=1}^{I}(X_{k(i,j),n} - \bar{X}_{k(i,\cdot),n})/I\right)^2$$
$$\leq \sum_{j=1}^{J}\left(\sum_{i=1}^{I}(X_{iJ,n} - X_{(i-1)J+1,n})\right)^2 /I \leq \sum_{j=1}^{J}(X_{n,n} - X_{1,n})^2/I$$

which converges in probability to zero by the Lemma. Also, it is clear that $\sum_{j=1}^{J} I(\bar{P}_{\cdot j} - \bar{P}_{\cdot\cdot})^2 \sim \chi^2_{J-1}$. These results, together with the Cauchy-Schwarz inequality, imply that

$$\sum_{j=1}^{J} I(\bar{W}_{\cdot j} - \bar{W}_{\cdot\cdot})^2 \xrightarrow{D} (1-\rho^2)\chi^2_{J-1}. \tag{1}$$

6.2 The Unblocked F Denominator

We have

$$\sum_{j=1}^{J}\sum_{i=1}^{I}(W_{ij} - \bar{W}_{\cdot j})^2/J(I-1)$$
$$= \sum_{j=1}^{J}\sum_{i=1}^{I}(W_{ij} - \bar{W}_{\cdot\cdot} + \bar{W}_{\cdot\cdot} - \bar{W}_{\cdot j})^2/J(I-1)$$
$$= \sum_{j=1}^{J}\sum_{i=1}^{I}(W_{ij} - \bar{W}_{\cdot\cdot})^2/J(I-1) - \sum_{j=1}^{J} I(\bar{W}_{\cdot j} - \bar{W}_{\cdot\cdot})^2/J(I-1).$$

It is clear that the first term in the last sum converges to 1 in probability as $I = n/J$ *goes* to infinity. By (1), the second term in the last sum converges in probability to zero, so the unblocked denominator coverges in probability to 1.

6.3 The Blocked F Denominator

We have

$$\sum_{j=1}^{J}\sum_{i=1}^{I}(W_{ij} - \bar{W}_{i\cdot} - \bar{W}_{\cdot j} + \bar{W}_{\cdot\cdot})^2/(I-1)(J-1)$$
$$= \sum_{j=1}^{J}\sum_{i=1}^{I}\frac{(W_{ij} - \bar{W}_{i\cdot})^2 - 2(W_{ij} - \bar{W}_{i\cdot})(\bar{W}_{\cdot j} - \bar{W}_{\cdot\cdot}) + (\bar{W}_{\cdot j} - \bar{W}_{\cdot\cdot})^2}{(I-1)(J-1)}. \tag{2}$$

By (1), the last term in equation (2) converges in probability to zero as $I = n/J$ goes to infinity. The first term equals

$$\sum_{j=1}^{J}\sum_{i=1}^{I}(\rho(X_{k(i,j),n} - \bar{X}_{k(i,\cdot)}) + \sqrt{1-\rho^2}(P_{ij} - \bar{P}_{i\cdot}))^2/(I-1)(J-1).$$

Clearly,

$$\sum_{j=1}^{J}\sum_{i=1}^{I}(X_{k(i,j),n} - \bar{X}_{k(i,\cdot)})^2/(I-1)(J-1)$$
$$\leq \sum_{j=1}^{J}\sum_{i=1}^{I}(X_{iJ,n} - X_{(i-1)J+1,n})^2/(I-1)(J-1).$$

Then, since $\sum|a| \xrightarrow{p} 0$ implies that $\sum a^2 \xrightarrow{p} 0$, and

$$\sum_{i=1}^{I}(X_{iJ,n} - X_{(i-1)J+1,n}) \leq X_{n,n} - X_{1,n},$$

the Lemma, together with the Cauchy–Schwarz inequality, implies that the first term in equation (2) converges in probability to 1- r^2. Making one last use of the Cauchy–Schwarz inequality (to show that the second term in equation (2) converges in probability to zero), we see that the blocked denominator converges in probability to $1 - r^2$.

Appendix B — Tables

Index to the Tables

- Smoothing curve coefficients

  – Pooled *t*, Tables 1–5

  - Paired *t*, Tables 6-10

  These tables can be used to calculate the critical values for pooled or paired tight *t* statistics. For example, if the correlation between predictor and response (e.g., MOE and MOR) were .7, and one wanted to use the pooled tight *t* with total ($n = 2k$) sample size equal to 30, and to do a test at a 5% significance level (a .05 "size"), then one would use the values in the .70 row of Table 3, and the equation

$$\text{critical value} = a_0 + a_1/n^{1/2} + a_2/n + a_3/n^{3/2}$$

  to obtain the critical value

$$2.067 = 1.960 - .02812/30^{1/2} + 2.638/30 + 4.050/30^{3/2}.$$

  If the absolute value of the pooled tight *t* statistic calculated from the data were greater than this critical value, then one would reject the null hypothesis of equality of treatments.

- Monte Carlo critical values for $n = 4$ and 6, Table 11

  For $n < 8$, one should not use Tables 1-10 to obtain critical values. Instead one can obtain critical values directly from Table 11. (Table 11 contains critical values for a *5%* significance level.) For example, to obtain the appropriate critical value for a paired tight *t* test with total sample size of 6 (3 samples per treatment) and a predictor/response correlation of .75, one would look at the .7.5 row in Table 11 and then read over to the "Paired, $n = 6$" column to obtain 4.11. If the absolute value of the paired tight *t* statistic calculated from the data were greater than this critical value, then one would reject the null hypothesis of equality of treatments.

- Quality summaries of critical values, Tables 12–16

  Tables 12-16 are described in Section 4. They are not used in the course of an analysis. Instead they give us confidence that the tight *t* approach yields statistically defensible results.

- *n* required for good asymptotic, Tables 17 and 18

  The theory in this paper tells us that as sample sizes get large, it is permissible to use critical values from a normal distribution table for the paired and pooled tight *t*'s. Tables 17 and 18 quantify what is meant by "get large." (Note that one can always use Tables 1-11 to obtain appropriate critical values even when sample sizes are not "large.") For example, Table 17 tells us that if the predictor/response correlation is .65 and we want to perform a pooled tight *t* test at a .5% significance level, then we must have a total sample size of 62 (31 per treatment) if we are going to use critical values from a standard normal table.

- Power tables

  – smaller *n*, larger Δ/σ, .01 significance level, Tables 19–27

– larger n, smaller Δ/σ, .01 significance level, Tables 28–36

– smaller n, larger Δ/σ, .05 significance level, Tables 37–45

– larger n, smaller Δ/σ, .05 significance level, Tables 46-54

Tables 19–54 need to be explained in some detail. Columns 3-13 give power values that were estimated from computer simulation runs. These runs involved 10,000 trials per correlation, sample size combination. Columns 14 – 16 are based on calculations involving the noncentral t distribution and the normal distribution. The formulas used are described below.

1. Column 1 — "n." The total sample size. There are $n/2$ observations per treatment.
2. Column 2 — "Δ/σ." The treatment difference divided by the response standard deviation. For example, if we are interested in being able to detect a 10% treatment difference, and we expect a 20% coefficient of variation, then $\Delta = .10 \times$ treatment mean and $\sigma = .20 \times$ treatment mean, so $\Delta/\sigma = 0.50$.
3. Column 3 — "Incorrect predictor sort." This is the power that one can expect when one performs a predictor sort before the experiment, but then one analyzes the resulting data with a standard pooled t test.
4. Column 4 — "Standard random sampling pooled t." This is the power that one can expect when one performs a standard randomization before the experiment and analyzes the resulting data with a standard pooled t test.
5. Column 5 — "Tight t/Known r/Paired/Sim." This is the power that one can expect when one performs a predictor sort before the experiment, calculates a standard paired t statistic from the data, and compares the value of this statistic with critical values obtained from Tables 6-11 using the known r value.
6. Column 6 — "Tight t/Known r/Paired/ t table." This is the power that one can expect when one performs a predictor sort before the experiment, calculates a standard paired t statistic from the data, and compares the value of this statistic with critical values obtained from a standard t table,
7. Column 7 — "Tight t/Known r/Pooled/Sim." This is the power that one can expect when one performs a predictor sort before the experiment, calculates a standard pooled t statistic from the data, divides by $\sqrt{1-\rho^2}$ (r known) to obtain the pooled tight t statistic, and compares the value of this statistic with critical values obtained from Tables 1-5 and 11 using the known r value.
8. Column 8 — "Tight t/Known r/Pooled/ t table." This is the power that one can expect when one performs a predictor sort before the experiment, calculates a standard pooled t statistic from the data, divides by $\sqrt{1-\rho^2}$ (r known) to obtain the pooled tight t statistic, and compares the value of this statistic with critical values obtained from a standard t table.
9. Column 9 — "Tight t/Unknown r/Paired/ r estimated." This is the power that one can expect when one performs a predictor sort before the experiment, calculates a standard paired t statistic from the data, and compares the value of this statistic with critical values obtained from Tables 6–11 using the r value that is estimated from the data (the average of the sample correlation between the predictor and response for the first treatment, and the sample correlation between the predictor and the response for the second treatment).

10. Column 10 — "Tight t /Unknown r /Pooled/ r estimated." This is the power that one can expect when one performs a predictor sort before the experiment, calculates a standard pooled t statistic from the data, divides by $\sqrt{1-\rho^2}$ (r estimated from the data as described below), and compares the value of this statistic with critical values obtained from Tables 1-5 and 11 using the r value that is estimated from the data (the average of the sample correlation between the predictor and response for the first treatment, and the sample correlation between the predictor and the response for the second treatment).

11. Column 11 — "Tight t /Unknown r /Pooled/ r from experience." This is the power that one can expect when one performs a predictor sort before the experiment, calculates a standard pooled t statistic from the data, divides by $\sqrt{1-\rho^2}$ (r "from experience," as described below), and compares the value of this statistic with critical values obtained from Tables 1-5 and 11 using a r value that is "known from past experience." In our simulations, there was an actual r_g that was used to generate the data, e.g., .70. In addition, for each trial, " r from experience" was drawn from a $N(r_g, .05^2)$ distribution for $r_g \leq .90$, from a $N(r_g, .025^2)$ distribution for $.90 < r_g \leq .95$, and from a $N(r_g, .005^2)$ distribution for $r_g = .99$. Thus, for example, for data generated from $r_g = .70$, on a given trial we might be calculating a pooled tight t statistic and entering a critical value table via a " r from experience" of 0.64 or 0.73 or . . . .

12. Column 12 — "Analysis of covariance/Random sampling." This is the power that one can expect when one performs a standard randomization before the experiment and analyzes the resulting data with an analysis of covariance.

13. Column 13 — "Analysis of covariance/Predictor sort." This is the power that one can expect when one performs a predictor sort allocation before the experiment and analyzes the resulting data with an analysis of covariance.

14. Column 14 — "Theoretical power/Noncentral t /Paired."
Here $k = n/2$. The value reported in the tables is

$$\text{Prob}\,(t_\gamma \leq -t_{k-1}(.025)) + \text{Prob}\,(t_\gamma \geq t_{k-1}(.025))$$

where t_g is a noncentral t statistic with noncentrality parameter

$$\gamma = \frac{\Delta}{\sigma}\sqrt{\frac{k}{2}}\frac{1}{\sqrt{1-\rho^2}},$$

and $t_{k-1}(.025)$ is the one-sided .025 critical value for a central t with $k-1$ degrees of freedom.

15. Column 15 — "Theoretical power/Noncentral t /Pooled."
Here $k = n/2$. The value that is reported in the tables is

$$\text{Prob}\,(t_\gamma \leq -t_{2k-2}(.025)) + \text{Prob}\,(t_\gamma \geq t_{2k-2}(.025))$$

where t_g is a noncentral t statistic with noncentrality parameter

$$\gamma = \frac{\Delta}{\sigma}\sqrt{\frac{k}{2}}\frac{1}{\sqrt{1-\rho^2}},$$

and $t_{2k-2}(.025)$ is the one-sided .025 critical value for a central t with $2k-2$ degrees of freedom.

16. Column 16 — "Theoretical power/ Normal."

Here $k = n/2$. For .05 size tables, the value that is reported in the tables is

$$\Phi\left(-1.96 - \Delta/\left(\sqrt{1-\rho^2}\sqrt{2/k}\right)\right) + 1 - \Phi\left(1.96 - \Delta/\left(\sqrt{1-\rho^2}\sqrt{2/k}\right)\right)$$

where Φ is the normal cumulative distribution function. For the .01 size tables, the value is

$$\Phi\left(-2.5758 - \Delta/\left(\sqrt{1-\rho^2}\sqrt{2/k}\right)\right) + 1 - \Phi\left(2.5758 - \Delta/\left(\sqrt{1-\rho^2}\sqrt{2/k}\right)\right)$$

- **Power for a misspecified model, Table 55**

  The material in this table illustrates that if the relationship between the predictor and the response is not really a bivariate normal relationship, then the analysis of covariance approach can yield power values that are lower than those of the pooled and paired tight t even for very high correlations. These power values are based on computer simulations involving 10,000 trials per Δ/σ value.

- **Data for Example 1 of Section 3, Table 56**

Table 1: Smoothing curve coefficients, pooled t, two-sided size = .20

ρ	a_0	a_1	a_2	a_3
.40	1.282	−.2059	2.575	−2.177
.45	1.282	.001621	.9152	.8049
.50	1.282	.06271	−.01157	3.812
.55	1.282	.1593	−1.144	6.681
.60	1.282	−.01531	.8269	2.467
.65	1.282	−.1666	1.717	1.066
.70	1.282	−.09374	1.552	1.339
.75	1.282	.1072	.003615	4.319
.80	1.282	.1461	−.2148	5.735
.85	1.282	.004597	1.083	5.060
.90	1.282	.002048	1.878	6.174
.95	1.282	−.1775	6.234	3.939
.99	1.282	−.9146	32.85	−21.47
1.0	1.477	.01427	.9067	−7.023

Table 2: Smoothing curve coefficients, pooled t, two-sided size = .10

ρ	a_0	a_1	a_2	a_3
.40	1.645	−0.3284	3.986	−2.312
.45	1.645	−0.008754	1.761	1.542
.50	1.645	0.04769	0.6279	5.143
.55	1.645	0.2913	−1.695	10.28
.60	1.645	−0.1048	2.178	2.162
.65	1.645	−0.2631	3.540	−0.6761
.70	1.645	−0.07300	2.214	2.251
.75	1.645	0.04893	0.6335	6.590
.80	1.645	0.2310	−0.5270	9.762
.85	1.645	0.06233	1.008	8.844
.90	1.645	−0.1475	4.390	4.275
.95	1.645	−0.3619	9.649	1.596
.99	1.645	−1.363	45.47	−37.96
1.0	1.925	0.1860	−1.194	−5.229

Table 3: Smoothing curve coefficients, pooled t, two-sided size = .05

ρ	a_0	a_1	a_2	a_3
.40	1.960	−0.2577	3.683	2.803
.45	1.960	0.04724	0.9800	8.326
.50	1.960	0.1034	0.5330	9.370
.55	1.960	0.4342	−2.825	16.62
.60	1.960	0.03690	0.9038	8.550
.65	1.960	−0.3309	5.768	−3.737
.70	1.960	−0.02812	2.638	4.050
.75	1.960	−0.01677	2.068	6.746
.80	1.960	0.5183	−2.803	18.36
.85	1.960	0.07835	0.9213	14.07
.90	1.960	−0.08358	5.158	6.189
.95	1.960	−0.01327	8.132	9.684
.99	1.960	−1.726	56.24	−52.81
1.0	2.315	0.3015	−2.284	−6.309

Table 4: Smoothing curve coefficients, pooled t, two-sided size = .02

ρ	a_0	a_1	a_2	a_3
.40	2.327	−0.1566	2.273	14.71
.45	2.327	0.3780	−1.962	22.27
.50	2.327	0.09486	0.4484	17.05
.55	2.327	0.3967	−1.928	21.65
.60	2.327	−0.3569	5.508	6.081
.65	2.327	−0.1870	4.232	7.287
.70	2.327	0.04780	2.346	11.79
.75	2.327	0.1600	1.262	15.36
.80	2.327	0.5128	−2.374	24.33
.85	2.327	0.3066	−0.05243	23.14
.90	2.327	−0.1406	6.956	9.618
.95	2.327	−0.2718	13.78	2.500
.99	2.327	−1.989	67.87	−68.44
1.0	2.794	0.7727	−7.767	0.8179

Table 5: Smoothing curve coefficients, pooled t, two-sided size = .01

ρ	a_0	a_1	a_2	a_3
.40	2.576	0.06802	−0.02613	26.21
.45	2.576	0.9366	−6.945	39.98
.50	2.576	0.08374	0.7544	22.98
.55	2.576	0.6892	−4.110	32.22
.60	2.576	−0.2685	6.198	9.504
.65	2.576	−0.6218	9.279	1.621
.70	2.576	−0.3864	7.996	4.823
.75	2.576	−0.2040	5.115	14.42
.80	2.576	0.5166	−2.394	31.42
.85	2.576	0.5108	−1.489	32.11
.90	2.576	−0.1728	9.404	9.753
.95	2.576	−0.09428	14.34	4.949
.99	2.576	−1.987	74.46	−78.26
1.0	3.124	1.250	−13.42	10.04

Table 6: Smoothing curve coefficients, paired t, two-sided size = .20

ρ	a_0	a_1	a_2	a_3
.40	1.282	−0.1797	2.741	1.332
.45	1.282	−0.02657	1.691	2.762
.50	1.282	0.08177	0.3650	6.416
.55	1.282	0.1966	−1.142	10.35
.60	1.282	0.1149	−0.1445	7.968
.65	1.282	0.1098	−0.5276	8.549
.70	1.282	0.06618	0.2865	6.648
.75	1.282	0.1187	0.1023	6.505
.80	1.282	0.2612	−1.290	9.475
.85	1.282	0.3148	−2.168	11.93
.90	1.282	0.2325	−1.354	9.830
.95	1.282	0.2327	−0.7573	8.154
.99	1.282	0.2589	−0.4565	6.288
1.0	1.288	.6075	−3.465	12.14

Table 7: Smoothing curve coefficients, paired t, two-sided size = .10

ρ	a_0	a_1	a_2	a_3
.40	1.645	−0.1082	2.242	10.57
.45	1.645	0.3142	−1.404	17.51
.50	1.645	0.4293	−2.473	19.60
.55	1.645	0.5642	−3.892	22.84
.60	1.645	0.2550	−1.023	17.08
.65	1.645	0.1541	−0.1087	14.19
.70	1.645	0.03868	1.307	10.86
.75	1.645	0.4553	−2.702	19.07
.80	1.645	0.6153	−4.316	22.79
.85	1.645	0.2683	−1.588	17.72
.90	1.645	0.2780	−0.9809	14.99
.95	1.645	0.3480	−1.447	15.49
.99	1.645	0.3521	−1.752	14.21
1.0	1.490	1.924	−9.321	26.03

Table 8: Smoothing curve coefficients, paired t, two-sided size = .05

ρ	a_0	a_1	a_2	a_3
.40	1.960	0.2104	−0.7322	27.61
.45	1.960	0.6684	−4.402	34.34
.50	1.960	0.7335	−5.161	36.02
.55	1.960	0.6474	−4.129	32.81
.60	1.960	0.2880	−0.7502	25.99
.65	1.960	0.6407	−4.543	33.54
.70	1.960	0.5610	−3.486	31.37
.75	1.960	0.6104	−4.190	32.83
.80	1.960	0.6726	−3.872	31.15
.85	1.960	0.3756	−2.169	28.55
.90	1.960	0.3746	−0.8042	22.85
.95	1.960	0.8558	−5.915	34.22
.99	1.960	0.8197	−7.140	34.78
1.0	1.681	2.847	−13.91	39.97

Table 9: Smoothing curve coefficients, paired *t*, two-sided size = .02

ρ	a_0	a_1	a_2	a_3
.40	2.327	0.6946	−7.178	63.91
.45	2.327	1.339	−10.73	66.51
.50	2.327	1.290	−10.85	68.83
.55	2.327	1.082	−7.931	57.46
.60	2.327	0.4318	−1.387	43.74
.65	2.327	0.7984	−5.779	55.24
.70	2.327	0.6043	−4.007	53.07
.75	2.327	0.9246	−7.636	58.95
.80	2.327	1.503	−12.48	69.08
.85	2.327	1.067	−8.601	60.50
.90	2.327	0.9458	−5.489	51.04
.95	2.327	1.096	−7.922	55.90
.99	2.327	1.707	−16.09	68.28
1.0	1.796	6.502	−37.45	97.12

Table 10: Smoothing curve coefficients, paired *t*, two-sided size = .01

ρ	a_0	a_1	a_2	a_3
.40	2.576	1.596	−19.05	115.7
.45	2.576	2.474	−24.38	119.5
.50	2.576	1.479	−14.39	98.50
.55	2.576	2.164	−20.94	107.8
.60	2.576	1.100	−8.802	79.13
.65	2.576	2.026	−21.91	116.2
.70	2.576	1.677	−16.89	106.4
.75	2.576	1.856	−18.95	109.3
.80	2.576	1.277	−11.58	88.73
.85	2.576	1.645	−13.92	91.23
.90	2.576	0.8136	−4.449	67.07
.95	2.576	1.520	−11.75	81.92
.99	2.576	2.019	−19.71	91.86
1.0	1.875	8.662	−50.31	133.3

Table 11: Monte Carlo critical values, two-sided size = .05

	Pooled		Paired	
ρ	$n = 4$	$n = 6$	$n = 4$	$n = 6$
T value	4.30	2.78	12.7	4.30
.40	4.19	2.87	12.4	4.42
.45	4.45	2.81	13.5	4.20
.50	4.31	2.74	11.5	4.36
.55	4.59	2.86	12.7	4.37
.60	4.40	2.84	12.3	4.22
.65	4.26	2.83	12.2	4.27
.70	4.51	2.90	12.8	4.39
.75	4.55	2.84	12.4	4.11
.80	4.56	2.97	12.7	4.24
.85	4.66	3.09	12.1	4.06
.90	4.84	3.29	12.6	4.15
.95	5.41	3.91	12.8	3.97
.99	9.08	7.09	11.8	3.69
1.0	1.40	1.69	11.1	3.58

Table 12: Quality summary, pooled statistic, smoothed critical values

				.20		.10		.05		.02		.01	
ρ	-	0	+	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
.40	4	106	0	1937	2062	951	1050	477	527	168	225	79	114
.45	0	110	0	1925	2072	968	1047	475	530	179	217	82	115
.50	3	106	1	1960	2061	944	1057	452	536	169	233	82	117
.55	2	107	1	1954	2084	952	1046	457	541	181	219	77	118
.60	2	105	3	1954	2056	937	1072	448	533	174	237	84	127
.65	1	107	2	1940	2080	963	1063	459	533	175	216	81	116
.70	2	106	2	1946	2099	930	1069	475	532	169	224	83	120
.75	1	107	2	1932	2069	940	1080	464	527	180	241	86	116
.80	3	105	2	1918	2133	949	1051	465	540	169	223	79	124
.85	1	109	0	1915	2065	947	1046	469	520	177	215	86	118
.90	4	105	1	1938	2060	944	1042	451	537	172	232	66	113
.95	5	102	3	1924	2068	914	1044	430	524	156	229	80	129
.99	5	98	7	1912	2102	936	1070	462	547	171	230	81	122
1.0	6	100	4	1910	2082	924	1059	454	552	176	233	79	122

Table 13: Quality summary, paired statistic, smoothed critical values

				.20		.10		.05		.02		.01	
ρ	-	0	+	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
.40	4	104	2	1919	2062	934	1052	470	547	177	227	75	124
.45	2	106	2	1920	2070	965	1035	475	529	180	242	80	121
.50	4	104	2	1942	2066	922	1052	457	546	171	237	80	117
.55	0	108	2	1939	2061	945	1055	462	531	182	239	82	128
.60	2	108	0	1917	2052	955	1055	453	541	174	218	83	120
.65	2	105	3	1940	2087	957	1040	459	541	174	222	69	130
.70	1	108	1	1932	2096	949	1042	460	537	178	227	81	115
.75	3	105	2	1920	2065	947	1059	458	546	184	236	72	117
.80	4	104	2	1944	2113	919	1050	453	531	171	227	81	129
.85	1	109	0	1916	2078	943	1057	459	523	177	216	82	114
.90	7	99	4	1923	2090	926	1085	438	551	162	229	77	118
.95	2	107	1	1935	2064	941	1043	458	541	174	225	83	128
.99	6	99	5	1929	2085	932	1064	457	552	169	232	76	119
1.0	1	105	4	1930	2089	958	1034	462	545	165	231	83	120

Table 14: Quality summary, pooled statistic, incorrect *t* critical values

				.20		.10		.05		.02		.01	
ρ	-	0	+	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
.40	110	0	0	1545	1688	676	795	298	389	89	156	33	72
.45	110	0	0	1472	1588	620	770	274	361	82	146	33	69
.50	110	0	0	1344	1530	537	701	203	321	58	112	25	51
.55	110	0	0	1199	1431	468	615	177	278	47	99	12	43
.60	110	0	0	1048	1305	372	514	121	226	17	75	4	37
.65	110	0	0	905	1121	289	401	89	176	13	53	5	22
.70	110	0	0	704	967	192	358	52	143	8	35	1	15
.75	110	0	0	506	817	119	296	22	111	1	26	0	14
.80	110	0	0	325	673	63	218	7	76	0	13	0	5
.85	110	0	0	148	495	18	157	1	45	0	11	0	4
.90	110	0	0	25	290	0	70	0	14	0	1	0	1
.95	110	0	0	0	93	0	21	0	2	0	1	0	1
.99	110	0	0	0	12	0	1	0	0	0	0	0	0
1.0	–	–	–	–	–	–	–	–	–	–	–	–	–

Table 15: Quality summary, pooled statistic, "correct" *t* critical values

				.20		.10		.05		.02		.01	
ρ	-	0	+	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
.40	6	104	0	1924	2073	937	1047	471	539	159	219	75	113
.45	0	107	3	1936	2092	969	1058	475	563	179	235	89	120
.50	4	103	3	1968	2075	949	1082	457	557	165	233	78	117
.55	1	103	6	1956	2121	958	1082	451	549	182	219	82	119
.60	2	98	10	1957	2162	949	1112	447	548	171	232	82	127
.65	0	105	5	1925	2156	971	1111	473	541	178	221	84	121
.70	2	92	16	1940	2172	939	1097	487	564	171	238	83	133
.75	0	91	19	1947	2222	961	1143	464	566	182	256	88	130
.80	0	82	28	1980	2380	973	1232	482	639	174	247	86	135
.85	0	72	38	1946	2612	961	1361	472	707	184	292	88	154
.90	0	42	68	1956	2975	965	1650	481	870	190	353	83	167
.95	0	11	99	2045	3901	1035	2451	508	1493	192	663	95	313
.99	0	0	110	2244	6591	1159	5510	625	4469	248	3256	136	2469
1.0	–	–	–	–	–	–	–	–	–	–	–	–	–

Table 16: Quality summary, paired statistic, "correct" *t* critical values

				.20		.10		.05		.02		.01	
ρ	-	0	+	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
.40	9	100	1	1902	2060	913	1080	459	539	166	218	71	115
.45	1	107	2	1918	2088	973	1043	475	534	190	245	88	120
.50	4	105	1	1947	2071	936	1059	457	541	168	234	78	116
.55	3	105	2	1947	2081	961	1051	471	531	161	237	80	119
.60	4	104	2	1937	2071	959	1065	453	537	159	220	81	118
.65	2	106	2	1931	2078	964	1038	464	550	169	221	80	123
.70	3	104	3	1928	2094	943	1053	469	534	170	238	76	124
.75	3	106	1	1929	2068	934	1075	449	528	175	220	78	113
.80	1	104	5	1961	2135	928	1093	462	555	179	236	83	122
.85	1	108	1	1913	2059	947	1044	464	517	178	213	89	127
.90	11	94	5	1934	2070	911	1068	437	546	161	231	68	127
.95	9	96	5	1943	2086	931	1045	439	551	153	226	80	125
.99	32	74	4	1914	2107	849	1041	379	520	130	220	48	112
1.0	88	12	10	1945	2168	777	896	300	364	69	113	22	46

Table 17: n required for "good"[1] asymptotics, pooled statistic.

ρ	Nominal two-sided size				
	.20	.10	.05	.02	.01
.40	20	35	50	39	50
.45	20	38	52	46	71
.50	20	35	59	39	52
.55	20	31	63	42	66
.60	22	32	50	39	52
.65	21	32	62	43	59
.70	25	36	53	46	60
.75	24	36	56	46	59
.80	29	43	90	50	60
.85	36	60	80	55	76
.90	48	74	116	77	98
.95	88	126	227	140	231
.99	309	381	430	264	281
1.0	–	–	–	–	–

Table 18: n required for "good"[1] asymptotics, paired statistic.

ρ	Nominal two-sided size				
	.20	.10	.05	.02	.01
.40	34	56	94	71	85
.45	35	67	140	92	143
.50	32	73	134	87	113
.55	28	63	144	90	122
.60	31	59	122	74	109
.65	28	59	113	81	105
.70	31	57	120	78	118
.75	32	67	125	73	112
.80	31	69	159	98	112
.85	31	63	94	83	159
.90	34	69	111	91	123
.95	36	66	150	97	192
.99	36	64	88	70	106
1.0	–	–	–	–	–

[1]For the purposes of the study, "good" means that the actual sizes are below .22, .11, .055, .025, and .0125 for the nominal .20, .10, .05, .02, and .01 cases. The fact that .005 is 10% of .05 and .005 is 25% of .02 accounts for the non-monotonic sample sizes.

Table 19: Power, r = .40, small n, nominal size = .01

				Tight t									"Theoretical" power		
				Known ρ				Unknown ρ			Analysis of covariance				
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
4	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.54	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.54	0.01	0.01	0.01	0.01	0.01	0.02
	1.00	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.54	0.02	0.01	0.02	0.02	0.02	0.07
	1.50	0.03	0.03	0.02	0.02	0.04	0.04	0.02	0.55	0.04	0.02	0.02	0.02	0.04	0.17
	2.00	0.05	0.05	0.03	0.03	0.06	0.05	0.03	0.55	0.05	0.02	0.02	0.03	0.06	0.35
	2.50	0.07	0.07	0.03	0.03	0.08	0.08	0.04	0.57	0.08	0.03	0.03	0.03	0.08	0.56
	3.00	0.09	0.09	0.04	0.04	0.11	0.11	0.04	0.58	0.11	0.04	0.04	0.04	0.11	0.76
6	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.01	0.02	0.01	0.01	0.02	0.02	0.02	0.05	0.02	0.01	0.02	0.01	0.02	0.03
	1.00	0.03	0.04	0.02	0.03	0.05	0.05	0.03	0.10	0.05	0.03	0.03	0.03	0.05	0.11
	1.50	0.08	0.08	0.04	0.05	0.10	0.10	0.05	0.19	0.10	0.06	0.07	0.05	0.10	0.28
	2.00	0.14	0.15	0.06	0.07	0.19	0.18	0.08	0.30	0.18	0.10	0.12	0.08	0.19	0.54
	2.50	0.24	0.25	0.09	0.10	0.30	0.30	0.11	0.44	0.30	0.16	0.20	0.11	0.31	0.78
	3.00	0.36	0.37	0.12	0.15	0.45	0.44	0.16	0.58	0.44	0.24	0.29	0.16	0.45	0.92
8	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.04	0.02	0.02	0.02	0.02	0.02	0.04
	1.00	0.05	0.06	0.04	0.04	0.07	0.08	0.05	0.12	0.07	0.06	0.06	0.05	0.08	0.15
	1.50	0.14	0.16	0.09	0.09	0.18	0.19	0.10	0.26	0.19	0.14	0.16	0.10	0.20	0.40
	2.00	0.30	0.31	0.17	0.17	0.36	0.37	0.19	0.46	0.36	0.27	0.32	0.18	0.38	0.70
	2.50	0.49	0.50	0.27	0.27	0.56	0.58	0.29	0.66	0.57	0.44	0.50	0.29	0.59	0.90
	3.00	0.68	0.68	0.39	0.40	0.75	0.76	0.41	0.83	0.76	0.62	0.68	0.41	0.77	0.98

Table 19 continued: Power, r = .40, small n, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
10	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.02	0.03	0.02	0.02	0.03	0.03	0.02	0.05	0.03	0.03	0.03	0.02	0.03	0.04
	1.00	0.08	0.09	0.06	0.07	0.11	0.12	0.07	0.15	0.12	0.09	0.11	0.07	0.12	0.20
	1.50	0.24	0.25	0.16	0.18	0.29	0.31	0.17	0.37	0.30	0.25	0.29	0.18	0.31	0.50
	2.00	0.48	0.47	0.30	0.33	0.54	0.56	0.32	0.63	0.55	0.47	0.53	0.33	0.57	0.81
	2.50	0.71	0.71	0.47	0.51	0.77	0.79	0.50	0.83	0.78	0.69	0.75	0.51	0.79	0.96
	3.00	0.88	0.87	0.64	0.68	0.92	0.93	0.67	0.94	0.92	0.85	0.90	0.69	0.93	1.00
12	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.03	0.04	0.02	0.03	0.03	0.04	0.03	0.05	0.04	0.03	0.04	0.03	0.04	0.05
	1.00	0.12	0.13	0.09	0.10	0.15	0.16	0.10	0.19	0.16	0.14	0.15	0.11	0.16	0.25
	1.50	0.33	0.35	0.23	0.27	0.39	0.41	0.26	0.46	0.40	0.37	0.40	0.27	0.42	0.60
	2.00	0.62	0.63	0.44	0.48	0.69	0.71	0.47	0.75	0.70	0.65	0.69	0.50	0.72	0.89
	2.50	0.85	0.85	0.66	0.71	0.90	0.91	0.69	0.92	0.90	0.85	0.89	0.72	0.91	0.98
	3.00	0.96	0.96	0.83	0.86	0.98	0.98	0.86	0.98	0.98	0.96	0.97	0.87	0.98	1.00
14	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.03	0.04	0.03	0.04	0.04	0.05	0.04	0.05	0.04	0.04	0.04	0.04	0.05	0.06
	1.00	0.15	0.17	0.13	0.15	0.20	0.21	0.14	0.24	0.20	0.18	0.20	0.15	0.21	0.30
	1.50	0.43	0.44	0.34	0.36	0.51	0.52	0.35	0.56	0.51	0.47	0.50	0.37	0.53	0.69
	2.00	0.75	0.74	0.60	0.64	0.81	0.81	0.62	0.84	0.81	0.77	0.80	0.65	0.82	0.93
	2.50	0.93	0.92	0.82	0.85	0.95	0.96	0.84	0.97	0.95	0.93	0.96	0.86	0.96	0.99
	3.00	0.99	0.99	0.94	0.95	0.99	0.99	0.95	1.00	0.99	0.99	0.99	0.96	1.00	1.00

Table 20: Power, r = .50, small *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled						
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Noncentral t Paired	Noncentral t Pooled	Normal
4	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.56	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.01	0.01	0.02	0.01	0.02	0.02	0.01	0.56	0.02	0.01	0.01	0.01	0.01	0.02
	1.00	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.57	0.03	0.01	0.01	0.02	0.02	0.08
	1.50	0.03	0.03	0.03	0.02	0.05	0.04	0.02	0.57	0.04	0.02	0.02	0.02	0.04	0.20
	2.00	0.04	0.05	0.04	0.03	0.07	0.06	0.03	0.58	0.06	0.02	0.03	0.03	0.06	0.39
	2.50	0.06	0.07	0.05	0.04	0.10	0.08	0.04	0.59	0.08	0.03	0.03	0.04	0.09	0.62
	3.00	0.08	0.09	0.05	0.04	0.14	0.11	0.05	0.60	0.12	0.03	0.04	0.04	0.12	0.81
6	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.05	0.02	0.01	0.02	0.01	0.02	0.03
	1.00	0.03	0.04	0.03	0.03	0.05	0.05	0.03	0.11	0.05	0.03	0.04	0.03	0.05	0.12
	1.50	0.07	0.09	0.06	0.05	0.12	0.11	0.06	0.20	0.10	0.07	0.08	0.05	0.11	0.32
	2.00	0.14	0.16	0.09	0.08	0.22	0.21	0.09	0.33	0.20	0.12	0.14	0.09	0.22	0.60
	2.50	0.24	0.26	0.13	0.12	0.35	0.34	0.13	0.48	0.33	0.19	0.22	0.13	0.35	0.83
	3.00	0.36	0.38	0.18	0.16	0.50	0.48	0.17	0.62	0.47	0.27	0.32	0.17	0.50	0.95
8	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.01	0.02	0.02	0.02	0.03	0.03	0.02	0.05	0.03	0.02	0.02	0.02	0.03	0.04
	1.00	0.05	0.06	0.05	0.05	0.09	0.09	0.05	0.13	0.09	0.07	0.08	0.05	0.09	0.17
	1.50	0.14	0.16	0.11	0.10	0.21	0.21	0.12	0.30	0.21	0.16	0.19	0.11	0.22	0.45
	2.00	0.28	0.32	0.20	0.19	0.41	0.41	0.21	0.51	0.40	0.31	0.36	0.20	0.43	0.75
	2.50	0.48	0.51	0.32	0.30	0.63	0.63	0.32	0.71	0.63	0.49	0.55	0.32	0.65	0.93
	3.00	0.69	0.69	0.45	0.43	0.81	0.81	0.45	0.87	0.80	0.67	0.74	0.45	0.82	0.99

Table 20 continued: Power, $\rho = .50$, small n, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
10	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.02	0.03	0.02	0.02	0.03	0.03	0.02	0.05	0.03	0.03	0.03	0.03	0.03	0.05
	1.00	0.08	0.10	0.07	0.08	0.12	0.13	0.08	0.17	0.12	0.11	0.12	0.08	0.14	0.23
	1.50	0.22	0.25	0.18	0.19	0.32	0.33	0.19	0.39	0.32	0.28	0.31	0.20	0.35	0.56
	2.00	0.46	0.46	0.33	0.35	0.60	0.61	0.34	0.67	0.60	0.52	0.57	0.37	0.62	0.86
	2.50	0.71	0.71	0.52	0.54	0.82	0.83	0.53	0.87	0.82	0.75	0.81	0.57	0.84	0.98
	3.00	0.88	0.87	0.70	0.72	0.94	0.95	0.71	0.96	0.94	0.89	0.93	0.74	0.95	1.00
12	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.02	0.03	0.03	0.03	0.04	0.04	0.03	0.06	0.04	0.04	0.04	0.03	0.04	0.06
	1.00	0.11	0.13	0.11	0.12	0.17	0.18	0.12	0.22	0.17	0.15	0.18	0.12	0.19	0.28
	1.50	0.32	0.34	0.28	0.30	0.44	0.46	0.29	0.51	0.45	0.40	0.45	0.31	0.47	0.66
	2.00	0.62	0.61	0.50	0.54	0.75	0.76	0.52	0.80	0.75	0.69	0.75	0.55	0.77	0.92
	2.50	0.86	0.84	0.73	0.76	0.92	0.93	0.75	0.94	0.92	0.89	0.92	0.77	0.94	0.99
	3.00	0.96	0.96	0.88	0.90	0.99	0.99	0.89	0.99	0.99	0.97	0.98	0.91	0.99	1.00
14	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.02	0.04	0.03	0.04	0.05	0.05	0.04	0.06	0.05	0.04	0.05	0.04	0.05	0.07
	1.00	0.14	0.17	0.15	0.16	0.23	0.23	0.16	0.26	0.23	0.21	0.23	0.17	0.24	0.34
	1.50	0.43	0.44	0.38	0.41	0.57	0.58	0.40	0.61	0.57	0.53	0.57	0.42	0.59	0.75
	2.00	0.75	0.74	0.66	0.69	0.85	0.86	0.68	0.87	0.85	0.82	0.85	0.71	0.87	0.96
	2.50	0.94	0.92	0.87	0.89	0.97	0.98	0.88	0.98	0.97	0.96	0.97	0.90	0.98	1.00
	3.00	0.99	0.99	0.96	0.97	1.00	1.00	0.97	1.00	1.00	0.99	1.00	0.98	1.00	1.00

Table 21: Power, r = .60, small *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled						
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Noncentral t Paired	Noncentral t Pooled	Normal
4	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.60	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.60	0.02	0.01	0.01	0.01	0.01	0.03
	1.00	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.60	0.03	0.01	0.01	0.02	0.03	0.09
	1.50	0.03	0.03	0.03	0.02	0.04	0.04	0.03	0.61	0.04	0.02	0.02	0.02	0.04	0.24
	2.00	0.04	0.05	0.04	0.03	0.06	0.06	0.03	0.62	0.06	0.02	0.03	0.03	0.07	0.47
	2.50	0.06	0.07	0.05	0.04	0.09	0.09	0.04	0.62	0.09	0.03	0.03	0.04	0.10	0.71
	3.00	0.08	0.09	0.05	0.05	0.12	0.13	0.05	0.63	0.12	0.04	0.04	0.05	0.14	0.88
6	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.01	0.02	0.02	0.01	0.02	0.02	0.02	0.06	0.02	0.02	0.02	0.02	0.02	0.04
	1.00	0.03	0.04	0.03	0.03	0.05	0.06	0.03	0.12	0.05	0.04	0.05	0.03	0.06	0.15
	1.50	0.07	0.08	0.06	0.05	0.12	0.13	0.06	0.23	0.12	0.08	0.09	0.06	0.14	0.39
	2.00	0.13	0.15	0.09	0.08	0.22	0.24	0.09	0.37	0.22	0.14	0.17	0.10	0.26	0.69
	2.50	0.22	0.25	0.13	0.12	0.35	0.39	0.13	0.52	0.36	0.22	0.26	0.14	0.41	0.89
	3.00	0.35	0.38	0.18	0.17	0.51	0.54	0.19	0.67	0.51	0.32	0.38	0.20	0.57	0.98
8	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.01	0.02	0.03	0.02	0.03	0.03	0.02	0.05	0.03	0.03	0.03	0.02	0.03	0.05
	1.00	0.04	0.07	0.07	0.06	0.11	0.10	0.07	0.16	0.11	0.08	0.09	0.06	0.11	0.21
	1.50	0.13	0.15	0.15	0.12	0.27	0.26	0.14	0.35	0.27	0.20	0.23	0.13	0.27	0.53
	2.00	0.28	0.31	0.26	0.22	0.48	0.48	0.25	0.57	0.49	0.37	0.43	0.24	0.50	0.83
	2.50	0.47	0.49	0.40	0.34	0.71	0.70	0.37	0.77	0.71	0.56	0.63	0.37	0.73	0.97
	3.00	0.67	0.68	0.54	0.47	0.87	0.86	0.51	0.90	0.87	0.73	0.80	0.51	0.88	1.00

Table 21 continued: Power, r = .60, small *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
10	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.01	0.03	0.03	0.03	0.04	0.04	0.03	0.06	0.04	0.03	0.04	0.03	0.04	0.06
	1.00	0.07	0.10	0.09	0.09	0.16	0.17	0.09	0.20	0.16	0.13	0.15	0.10	0.16	0.27
	1.50	0.22	0.25	0.23	0.22	0.39	0.41	0.21	0.47	0.40	0.33	0.38	0.24	0.42	0.65
	2.00	0.46	0.47	0.42	0.41	0.68	0.69	0.40	0.74	0.68	0.60	0.67	0.44	0.71	0.92
	2.50	0.71	0.70	0.62	0.61	0.88	0.89	0.61	0.91	0.88	0.81	0.87	0.64	0.90	0.99
	3.00	0.89	0.87	0.79	0.78	0.97	0.97	0.77	0.98	0.97	0.93	0.96	0.81	0.98	1.00
12	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.02	0.03	0.03	0.03	0.04	0.05	0.03	0.06	0.05	0.05	0.05	0.04	0.05	0.07
	1.00	0.10	0.13	0.13	0.14	0.20	0.22	0.13	0.25	0.21	0.20	0.21	0.15	0.22	0.34
	1.50	0.32	0.35	0.34	0.34	0.52	0.54	0.33	0.59	0.53	0.48	0.53	0.37	0.55	0.75
	2.00	0.62	0.63	0.60	0.60	0.82	0.83	0.59	0.85	0.82	0.77	0.82	0.63	0.84	0.96
	2.50	0.87	0.85	0.81	0.81	0.96	0.96	0.80	0.97	0.96	0.93	0.96	0.84	0.97	1.00
	3.00	0.97	0.95	0.93	0.93	1.00	1.00	0.93	1.00	1.00	0.99	0.99	0.95	1.00	1.00
14	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.02	0.04	0.04	0.04	0.06	0.06	0.04	0.07	0.06	0.05	0.06	0.05	0.06	0.08
	1.00	0.14	0.17	0.18	0.19	0.27	0.29	0.18	0.32	0.28	0.26	0.29	0.20	0.29	0.41
	1.50	0.42	0.44	0.47	0.48	0.63	0.66	0.46	0.69	0.64	0.61	0.66	0.49	0.67	0.82
	2.00	0.76	0.74	0.76	0.77	0.90	0.91	0.75	0.93	0.91	0.88	0.91	0.78	0.92	0.98
	2.50	0.94	0.92	0.93	0.93	0.99	0.99	0.92	0.99	0.99	0.98	0.99	0.94	0.99	1.00
	3.00	0.99	0.99	0.99	0.99	1.00	1.00	0.98	1.00	1.00	1.00	1.00	0.99	1.00	1.00

Table 22: Power, r = .70, small n, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled						
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Noncentral t Paired	Noncentral t Pooled	Normal
4	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.63	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.64	0.01	0.01	0.01	0.01	0.01	0.03
	1.00	0.01	0.02	0.02	0.02	0.03	0.03	0.02	0.64	0.02	0.02	0.02	0.02	0.03	0.12
	1.50	0.02	0.03	0.02	0.02	0.04	0.04	0.02	0.64	0.04	0.02	0.02	0.03	0.05	0.32
	2.00	0.04	0.05	0.03	0.03	0.07	0.07	0.03	0.65	0.07	0.03	0.03	0.04	0.08	0.59
	2.50	0.05	0.07	0.03	0.04	0.10	0.10	0.04	0.66	0.10	0.03	0.04	0.04	0.12	0.82
	3.00	0.07	0.09	0.04	0.04	0.14	0.14	0.05	0.67	0.14	0.04	0.04	0.05	0.17	0.95
6	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.06	0.02	0.02	0.02	0.02	0.02	0.04
	1.00	0.02	0.04	0.03	0.03	0.06	0.07	0.03	0.14	0.06	0.04	0.05	0.04	0.07	0.19
	1.50	0.06	0.09	0.06	0.06	0.14	0.16	0.07	0.28	0.15	0.10	0.12	0.07	0.17	0.50
	2.00	0.12	0.16	0.09	0.10	0.28	0.31	0.11	0.44	0.29	0.18	0.22	0.12	0.33	0.80
	2.50	0.22	0.26	0.14	0.14	0.44	0.47	0.16	0.61	0.45	0.28	0.34	0.18	0.51	0.96
	3.00	0.34	0.37	0.19	0.20	0.59	0.63	0.21	0.74	0.61	0.40	0.47	0.24	0.68	0.99
8	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.01	0.02	0.02	0.02	0.04	0.04	0.03	0.06	0.04	0.03	0.03	0.02	0.03	0.06
	1.00	0.04	0.06	0.07	0.07	0.14	0.14	0.08	0.19	0.14	0.10	0.12	0.07	0.14	0.28
	1.50	0.12	0.15	0.15	0.14	0.34	0.33	0.17	0.42	0.34	0.25	0.30	0.17	0.35	0.65
	2.00	0.27	0.30	0.27	0.26	0.60	0.58	0.30	0.66	0.59	0.46	0.53	0.30	0.62	0.92
	2.50	0.47	0.49	0.42	0.41	0.81	0.80	0.45	0.85	0.81	0.67	0.74	0.46	0.83	0.99
	3.00	0.67	0.68	0.56	0.54	0.94	0.93	0.59	0.95	0.93	0.83	0.89	0.61	0.95	1.00

Table 22 continued: Power, r = .70, small *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
10	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.01	0.03	0.03	0.03	0.04	0.05	0.03	0.06	0.05	0.04	0.05	0.03	0.05	0.07
	1.00	0.06	0.09	0.10	0.11	0.20	0.21	0.11	0.25	0.20	0.17	0.20	0.13	0.21	0.36
	1.50	0.20	0.25	0.25	0.27	0.49	0.50	0.27	0.55	0.49	0.43	0.48	0.31	0.53	0.77
	2.00	0.44	0.48	0.45	0.48	0.77	0.79	0.48	0.82	0.77	0.70	0.76	0.54	0.82	0.97
	2.50	0.70	0.70	0.65	0.68	0.94	0.94	0.68	0.95	0.94	0.89	0.93	0.75	0.96	1.00
	3.00	0.89	0.87	0.81	0.84	0.99	0.99	0.83	0.99	0.99	0.97	0.99	0.89	0.99	1.00
12	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.01	0.04	0.04	0.04	0.06	0.07	0.04	0.08	0.06	0.05	0.06	0.04	0.06	0.09
	1.00	0.09	0.14	0.15	0.17	0.27	0.28	0.16	0.32	0.27	0.25	0.28	0.19	0.29	0.44
	1.50	0.30	0.35	0.38	0.42	0.62	0.65	0.40	0.68	0.63	0.60	0.64	0.46	0.68	0.86
	2.00	0.62	0.63	0.65	0.69	0.90	0.91	0.67	0.92	0.90	0.87	0.91	0.74	0.92	0.99
	2.50	0.87	0.85	0.85	0.88	0.98	0.99	0.87	0.99	0.98	0.97	0.99	0.91	0.99	1.00
	3.00	0.97	0.96	0.96	0.97	1.00	1.00	0.96	1.00	1.00	1.00	1.00	0.98	1.00	1.00
14	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.01	0.04	0.05	0.05	0.07	0.08	0.05	0.09	0.07	0.07	0.07	0.06	0.08	0.10
	1.00	0.11	0.18	0.21	0.24	0.34	0.36	0.23	0.39	0.35	0.34	0.35	0.26	0.38	0.52
	1.50	0.40	0.44	0.53	0.56	0.75	0.77	0.54	0.79	0.75	0.72	0.77	0.61	0.79	0.91
	2.00	0.76	0.74	0.81	0.84	0.96	0.96	0.83	0.97	0.96	0.95	0.96	0.88	0.97	1.00
	2.50	0.95	0.92	0.96	0.97	1.00	1.00	0.96	1.00	1.00	0.99	1.00	0.98	1.00	1.00
	3.00	1.00	0.99	0.99	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 23: Power, r = .80, small *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
4	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.70	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.70	0.01	0.01	0.01	0.01	0.02	0.04
	1.00	0.01	0.02	0.02	0.02	0.03	0.03	0.02	0.71	0.03	0.02	0.02	0.02	0.04	0.18
	1.50	0.02	0.03	0.02	0.02	0.05	0.06	0.02	0.71	0.05	0.03	0.03	0.03	0.07	0.47
	2.00	0.03	0.05	0.03	0.03	0.08	0.09	0.03	0.72	0.09	0.03	0.04	0.04	0.11	0.78
	2.50	0.05	0.07	0.04	0.04	0.11	0.13	0.04	0.73	0.13	0.04	0.05	0.05	0.17	0.94
	3.00	0.07	0.09	0.05	0.04	0.16	0.19	0.05	0.74	0.18	0.05	0.06	0.06	0.23	0.99
6	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.04	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.02	0.02	0.01	0.02	0.03	0.02	0.07	0.03	0.02	0.03	0.02	0.03	0.06
	1.00	0.02	0.04	0.04	0.04	0.09	0.10	0.04	0.19	0.10	0.06	0.08	0.05	0.11	0.30
	1.50	0.05	0.09	0.08	0.07	0.21	0.24	0.08	0.35	0.22	0.14	0.17	0.10	0.26	0.69
	2.00	0.11	0.16	0.13	0.12	0.39	0.42	0.13	0.55	0.40	0.26	0.30	0.16	0.46	0.93
	2.50	0.20	0.26	0.19	0.17	0.58	0.62	0.19	0.72	0.59	0.39	0.46	0.24	0.67	0.99
	3.00	0.32	0.38	0.25	0.24	0.75	0.79	0.26	0.84	0.75	0.53	0.62	0.32	0.83	1.00
8	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.02	0.03	0.03	0.04	0.05	0.03	0.07	0.05	0.04	0.04	0.03	0.05	0.08
	1.00	0.03	0.06	0.09	0.08	0.17	0.20	0.09	0.24	0.18	0.15	0.17	0.10	0.21	0.41
	1.50	0.10	0.16	0.21	0.18	0.43	0.46	0.22	0.53	0.44	0.37	0.42	0.24	0.50	0.83
	2.00	0.25	0.32	0.37	0.32	0.70	0.74	0.38	0.79	0.71	0.64	0.70	0.42	0.79	0.98
	2.50	0.45	0.50	0.53	0.48	0.89	0.91	0.55	0.93	0.89	0.83	0.89	0.60	0.94	1.00
	3.00	0.67	0.68	0.69	0.64	0.97	0.98	0.70	0.98	0.97	0.93	0.97	0.76	0.99	1.00

Table 23 continued: Power, r = .80, small *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
10	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.03	0.03	0.04	0.06	0.07	0.04	0.08	0.06	0.05	0.06	0.04	0.07	0.10
	1.00	0.04	0.10	0.14	0.14	0.27	0.29	0.14	0.33	0.27	0.26	0.29	0.18	0.32	0.52
	1.50	0.17	0.25	0.35	0.35	0.63	0.66	0.35	0.70	0.63	0.61	0.66	0.44	0.71	0.92
	2.00	0.43	0.48	0.59	0.60	0.89	0.91	0.60	0.93	0.89	0.87	0.91	0.70	0.94	1.00
	2.50	0.71	0.71	0.80	0.80	0.98	0.99	0.80	0.99	0.98	0.97	0.99	0.88	0.99	1.00
	3.00	0.90	0.87	0.92	0.92	1.00	1.00	0.92	1.00	1.00	0.99	1.00	0.97	1.00	1.00
12	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.01	0.03	0.05	0.05	0.07	0.08	0.05	0.10	0.08	0.07	0.08	0.06	0.09	0.13
	1.00	0.06	0.13	0.21	0.23	0.38	0.41	0.22	0.43	0.38	0.38	0.41	0.28	0.44	0.62
	1.50	0.27	0.35	0.52	0.54	0.79	0.81	0.52	0.83	0.78	0.78	0.82	0.63	0.84	0.96
	2.00	0.62	0.63	0.80	0.82	0.97	0.97	0.80	0.98	0.96	0.96	0.98	0.89	0.99	1.00
	2.50	0.88	0.85	0.94	0.95	1.00	1.00	0.94	1.00	1.00	1.00	1.00	0.98	1.00	1.00
	3.00	0.98	0.96	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.01	0.04	0.06	0.07	0.10	0.11	0.06	0.13	0.11	0.10	0.11	0.08	0.11	0.15
	1.00	0.09	0.17	0.31	0.33	0.50	0.52	0.32	0.54	0.50	0.48	0.53	0.39	0.54	0.71
	1.50	0.40	0.44	0.69	0.71	0.89	0.90	0.69	0.91	0.88	0.88	0.91	0.78	0.92	0.98
	2.00	0.78	0.74	0.92	0.93	0.99	0.99	0.92	0.99	0.99	0.99	1.00	0.96	1.00	1.00
	2.50	0.96	0.92	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 24: Power, r = .85, small *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled						
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Noncentral t Paired	Noncentral t Pooled	Normal
4	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.73	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.73	0.02	0.01	0.01	0.01	0.02	0.05
	1.00	0.01	0.02	0.02	0.02	0.03	0.03	0.02	0.74	0.04	0.02	0.02	0.02	0.04	0.25
	1.50	0.02	0.03	0.02	0.02	0.06	0.06	0.03	0.74	0.08	0.03	0.03	0.04	0.09	0.61
	2.00	0.03	0.05	0.03	0.03	0.10	0.10	0.03	0.75	0.12	0.04	0.04	0.05	0.14	0.89
	2.50	0.05	0.07	0.04	0.04	0.14	0.15	0.04	0.75	0.17	0.05	0.05	0.06	0.21	0.98
	3.00	0.06	0.09	0.04	0.05	0.20	0.21	0.05	0.76	0.24	0.05	0.06	0.07	0.28	1.00
6	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.04	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.02	0.02	0.02	0.03	0.03	0.02	0.08	0.04	0.03	0.03	0.02	0.04	0.08
	1.00	0.01	0.04	0.04	0.04	0.11	0.13	0.05	0.21	0.13	0.08	0.09	0.06	0.14	0.40
	1.50	0.04	0.09	0.09	0.08	0.26	0.30	0.09	0.42	0.29	0.19	0.22	0.12	0.34	0.82
	2.00	0.10	0.16	0.14	0.13	0.47	0.52	0.15	0.63	0.49	0.33	0.39	0.20	0.58	0.98
	2.50	0.18	0.25	0.20	0.19	0.68	0.73	0.21	0.79	0.70	0.49	0.57	0.29	0.79	1.00
	3.00	0.30	0.37	0.28	0.26	0.84	0.88	0.29	0.89	0.84	0.63	0.73	0.39	0.92	1.00
8	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.02	0.04	0.03	0.05	0.07	0.04	0.08	0.07	0.05	0.06	0.04	0.06	0.11
	1.00	0.03	0.07	0.11	0.10	0.22	0.27	0.12	0.30	0.25	0.21	0.24	0.14	0.28	0.54
	1.50	0.10	0.16	0.26	0.23	0.52	0.59	0.27	0.62	0.55	0.49	0.55	0.31	0.63	0.93
	2.00	0.25	0.32	0.43	0.38	0.79	0.85	0.45	0.86	0.80	0.75	0.83	0.52	0.89	1.00
	2.50	0.46	0.51	0.61	0.55	0.94	0.96	0.62	0.96	0.94	0.91	0.96	0.72	0.98	1.00
	3.00	0.67	0.70	0.76	0.71	0.99	0.99	0.77	0.99	0.99	0.97	0.99	0.86	1.00	1.00

Table 24 continued: Power, r = .85, small *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
10	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.03	0.04	0.04	0.07	0.09	0.04	0.10	0.08	0.07	0.08	0.06	0.09	0.14
	1.00	0.03	0.10	0.18	0.17	0.34	0.40	0.18	0.42	0.37	0.35	0.39	0.25	0.43	0.66
	1.50	0.16	0.25	0.42	0.42	0.73	0.79	0.43	0.79	0.74	0.73	0.79	0.55	0.83	0.97
	2.00	0.42	0.48	0.69	0.69	0.94	0.96	0.69	0.96	0.94	0.93	0.97	0.82	0.98	1.00
	2.50	0.72	0.71	0.87	0.87	0.99	1.00	0.87	1.00	0.99	0.99	1.00	0.95	1.00	1.00
	3.00	0.90	0.87	0.95	0.95	1.00	1.00	0.96	1.00	1.00	1.00	1.00	0.99	1.00	1.00
12	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.03	0.06	0.06	0.10	0.12	0.06	0.13	0.12	0.09	0.11	0.08	0.12	0.18
	1.00	0.05	0.13	0.28	0.29	0.48	0.54	0.29	0.55	0.50	0.50	0.54	0.38	0.57	0.76
	1.50	0.27	0.34	0.63	0.65	0.87	0.90	0.64	0.91	0.87	0.88	0.92	0.76	0.93	0.99
	2.00	0.63	0.63	0.88	0.89	0.99	0.99	0.88	0.99	0.98	0.99	1.00	0.95	1.00	1.00
	2.50	0.89	0.85	0.97	0.98	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	0.98	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.04	0.08	0.08	0.13	0.16	0.08	0.16	0.15	0.13	0.15	0.11	0.15	0.21
	1.00	0.08	0.17	0.40	0.42	0.60	0.65	0.41	0.66	0.61	0.63	0.66	0.51	0.68	0.84
	1.50	0.39	0.44	0.79	0.80	0.94	0.96	0.79	0.96	0.94	0.95	0.97	0.89	0.98	1.00
	2.00	0.79	0.74	0.97	0.97	1.00	1.00	0.97	1.00	1.00	1.00	1.00	0.99	1.00	1.00
	2.50	0.97	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 25: Power, r = .90, small *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled						
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Noncentral t Paired	Noncentral t Pooled	Normal
4	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.78	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.01	0.01	0.01	0.02	0.02	0.01	0.78	0.02	0.02	0.02	0.02	0.02	0.08
	1.00	0.01	0.02	0.02	0.02	0.04	0.04	0.02	0.78	0.05	0.02	0.03	0.03	0.06	0.39
	1.50	0.02	0.03	0.02	0.03	0.09	0.08	0.03	0.79	0.10	0.03	0.04	0.04	0.12	0.81
	2.00	0.02	0.04	0.03	0.04	0.15	0.14	0.04	0.79	0.16	0.04	0.05	0.06	0.20	0.98
	2.50	0.04	0.06	0.04	0.05	0.23	0.21	0.05	0.80	0.24	0.06	0.07	0.07	0.29	1.00
	3.00	0.05	0.09	0.04	0.05	0.32	0.30	0.06	0.80	0.34	0.07	0.08	0.09	0.38	1.00
6	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.02	0.02	0.02	0.04	0.06	0.02	0.10	0.05	0.03	0.04	0.03	0.05	0.12
	1.00	0.01	0.04	0.05	0.05	0.16	0.20	0.05	0.27	0.18	0.12	0.15	0.08	0.21	0.59
	1.50	0.04	0.08	0.10	0.09	0.37	0.44	0.11	0.51	0.40	0.27	0.33	0.17	0.49	0.95
	2.00	0.09	0.15	0.16	0.15	0.61	0.68	0.17	0.73	0.64	0.46	0.55	0.28	0.76	1.00
	2.50	0.18	0.25	0.22	0.21	0.80	0.86	0.25	0.87	0.81	0.65	0.73	0.39	0.92	1.00
	3.00	0.30	0.38	0.31	0.30	0.92	0.95	0.34	0.94	0.92	0.79	0.87	0.51	0.98	1.00
8	0.00	0.00	0.01	0.02	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.02	0.04	0.03	0.06	0.10	0.04	0.09	0.08	0.06	0.08	0.05	0.09	0.17
	1.00	0.02	0.07	0.14	0.11	0.30	0.39	0.15	0.38	0.34	0.31	0.35	0.20	0.42	0.75
	1.50	0.08	0.16	0.32	0.25	0.66	0.75	0.32	0.74	0.69	0.66	0.73	0.44	0.82	0.99
	2.00	0.22	0.31	0.53	0.45	0.90	0.94	0.53	0.93	0.90	0.89	0.94	0.69	0.98	1.00
	2.50	0.44	0.49	0.71	0.63	0.98	0.99	0.71	0.99	0.98	0.97	0.99	0.86	1.00	1.00
	3.00	0.67	0.68	0.85	0.78	1.00	1.00	0.85	1.00	1.00	0.99	1.00	0.95	1.00	1.00

Table 25 continued: Power, r = .90, small *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
10	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.03	0.06	0.05	0.10	0.15	0.06	0.12	0.12	0.11	0.12	0.08	0.13	0.22
	1.00	0.03	0.10	0.24	0.23	0.47	0.58	0.25	0.54	0.50	0.52	0.57	0.37	0.62	0.85
	1.50	0.15	0.25	0.55	0.53	0.85	0.91	0.55	0.89	0.86	0.89	0.93	0.73	0.95	1.00
	2.00	0.43	0.49	0.80	0.79	0.98	0.99	0.80	0.99	0.98	0.98	1.00	0.94	1.00	1.00
	2.50	0.72	0.71	0.94	0.93	1.00	1.00	0.94	1.00	1.00	1.00	1.00	0.99	1.00	1.00
	3.00	0.91	0.88	0.98	0.98	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.03	0.08	0.08	0.13	0.19	0.08	0.16	0.16	0.16	0.17	0.12	0.18	0.28
	1.00	0.04	0.13	0.37	0.37	0.61	0.71	0.37	0.68	0.63	0.69	0.74	0.55	0.77	0.92
	1.50	0.24	0.35	0.75	0.75	0.95	0.97	0.75	0.97	0.95	0.97	0.99	0.91	0.99	1.00
	2.00	0.62	0.63	0.95	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.99	1.00	1.00
	2.50	0.89	0.84	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	0.98	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.04	0.11	0.11	0.18	0.24	0.11	0.22	0.21	0.21	0.23	0.17	0.24	0.33
	1.00	0.06	0.17	0.53	0.54	0.74	0.82	0.53	0.80	0.76	0.81	0.85	0.70	0.87	0.96
	1.50	0.38	0.43	0.89	0.90	0.98	0.99	0.90	0.99	0.98	0.99	1.00	0.97	1.00	1.00
	2.00	0.80	0.73	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.50	0.97	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 26: Power, r = .95, small n, nominal size = .01

				Tight t									"Theoretical" power		
				Known ρ				Unknown ρ			Analysis of covariance				
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
4	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.84	0.02	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.01	0.01	0.01	0.03	0.02	0.01	0.84	0.04	0.02	0.02	0.02	0.03	0.16
	1.00	0.00	0.02	0.02	0.02	0.08	0.07	0.02	0.85	0.09	0.03	0.04	0.04	0.11	0.73
	1.50	0.01	0.03	0.02	0.03	0.16	0.14	0.03	0.85	0.18	0.05	0.06	0.06	0.21	0.99
	2.00	0.02	0.04	0.03	0.04	0.27	0.25	0.04	0.85	0.29	0.06	0.08	0.08	0.34	1.00
	2.50	0.03	0.07	0.04	0.04	0.40	0.38	0.05	0.86	0.43	0.08	0.10	0.10	0.48	1.00
	3.00	0.04	0.09	0.04	0.05	0.53	0.50	0.06	0.86	0.55	0.10	0.12	0.12	0.60	1.00
6	0.00	0.00	0.01	0.01	0.01	0.01	0.03	0.01	0.06	0.02	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.02	0.02	0.02	0.07	0.12	0.02	0.15	0.08	0.06	0.07	0.05	0.10	0.27
	1.00	0.01	0.04	0.06	0.05	0.29	0.41	0.07	0.39	0.30	0.24	0.29	0.15	0.43	0.91
	1.50	0.03	0.08	0.12	0.10	0.59	0.71	0.13	0.66	0.59	0.50	0.58	0.30	0.80	1.00
	2.00	0.08	0.16	0.20	0.18	0.81	0.89	0.21	0.86	0.81	0.73	0.82	0.46	0.96	1.00
	2.50	0.16	0.26	0.30	0.26	0.94	0.97	0.31	0.94	0.93	0.88	0.94	0.62	1.00	1.00
	3.00	0.28	0.38	0.39	0.34	0.98	0.99	0.40	0.98	0.98	0.94	0.99	0.75	1.00	1.00
8	0.00	0.00	0.01	0.01	0.01	0.01	0.04	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.02	0.05	0.04	0.12	0.22	0.06	0.14	0.13	0.13	0.16	0.10	0.19	0.38
	1.00	0.01	0.07	0.19	0.15	0.50	0.67	0.21	0.53	0.50	0.59	0.66	0.39	0.75	0.97
	1.50	0.07	0.17	0.42	0.35	0.85	0.93	0.44	0.87	0.84	0.92	0.96	0.73	0.98	1.00
	2.00	0.21	0.32	0.65	0.56	0.97	0.99	0.67	0.98	0.97	0.99	1.00	0.92	1.00	1.00
	2.50	0.44	0.51	0.82	0.75	1.00	1.00	0.83	1.00	1.00	1.00	1.00	0.99	1.00	1.00
	3.00	0.67	0.69	0.92	0.87	1.00	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 26 continued: Power, r = .95, small *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
10	0.00	0.00	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.03	0.08	0.07	0.18	0.32	0.09	0.18	0.19	0.23	0.26	0.17	0.29	0.48
	1.00	0.02	0.09	0.36	0.34	0.69	0.83	0.38	0.71	0.69	0.83	0.89	0.67	0.92	0.99
	1.50	0.13	0.24	0.70	0.67	0.96	0.99	0.72	0.97	0.96	0.99	1.00	0.95	1.00	1.00
	2.00	0.41	0.47	0.90	0.89	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.50	0.72	0.70	0.97	0.97	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	0.91	0.87	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	0.00	0.00	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.03	0.13	0.13	0.25	0.41	0.14	0.25	0.26	0.35	0.38	0.26	0.40	0.58
	1.00	0.03	0.13	0.56	0.56	0.84	0.92	0.58	0.85	0.83	0.95	0.97	0.86	0.98	1.00
	1.50	0.23	0.35	0.89	0.89	0.99	1.00	0.90	1.00	0.99	1.00	1.00	1.00	1.00	1.00
	2.00	0.63	0.63	0.98	0.98	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.50	0.91	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	0.99	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	0.00	0.00	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.04	0.19	0.19	0.33	0.49	0.20	0.33	0.34	0.45	0.49	0.36	0.50	0.66
	1.00	0.04	0.17	0.74	0.74	0.93	0.97	0.76	0.94	0.92	0.99	0.99	0.95	0.99	1.00
	1.50	0.37	0.44	0.97	0.97	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.00	0.82	0.74	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.50	0.98	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 27: Power, r = .99, small *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
4	0.00	0.00	0.01	0.01	0.01	0.01	0.03	0.01	0.92	0.04	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.01	0.01	0.01	0.08	0.15	0.01	0.92	0.11	0.03	0.04	0.04	0.13	0.83
	1.00	0.00	0.02	0.02	0.02	0.25	0.36	0.02	0.93	0.28	0.07	0.08	0.09	0.40	1.00
	1.50	0.01	0.03	0.03	0.03	0.46	0.57	0.03	0.93	0.48	0.11	0.12	0.13	0.68	1.00
	2.00	0.01	0.04	0.04	0.04	0.63	0.74	0.04	0.93	0.64	0.14	0.16	0.18	0.87	1.00
	2.50	0.02	0.07	0.04	0.04	0.77	0.86	0.05	0.93	0.78	0.18	0.20	0.22	0.96	1.00
	3.00	0.03	0.09	0.05	0.05	0.87	0.93	0.06	0.93	0.87	0.21	0.24	0.26	0.99	1.00
6	0.00	0.00	0.01	0.01	0.01	0.01	0.23	0.01	0.18	0.04	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.02	0.03	0.02	0.17	0.50	0.03	0.36	0.20	0.29	0.34	0.18	0.52	0.96
	1.00	0.00	0.04	0.09	0.07	0.52	0.84	0.09	0.71	0.55	0.80	0.88	0.53	0.99	1.00
	1.50	0.02	0.09	0.17	0.13	0.81	0.97	0.17	0.91	0.82	0.96	1.00	0.82	1.00	1.00
	2.00	0.07	0.16	0.27	0.22	0.94	1.00	0.27	0.98	0.94	0.99	1.00	0.95	1.00	1.00
	2.50	0.15	0.26	0.38	0.31	0.99	1.00	0.38	1.00	0.99	1.00	1.00	0.99	1.00	1.00
	3.00	0.28	0.37	0.49	0.41	1.00	1.00	0.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	0.00	0.00	0.01	0.01	0.01	0.01	0.25	0.01	0.08	0.04	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.02	0.09	0.05	0.24	0.66	0.09	0.37	0.28	0.70	0.76	0.47	0.84	0.99
	1.00	0.01	0.07	0.32	0.22	0.73	0.96	0.32	0.84	0.74	0.99	1.00	0.96	1.00	1.00
	1.50	0.06	0.17	0.60	0.47	0.95	1.00	0.60	0.98	0.95	1.00	1.00	1.00	1.00	1.00
	2.00	0.21	0.32	0.81	0.69	1.00	1.00	0.81	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.50	0.44	0.51	0.92	0.84	1.00	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	0.68	0.69	0.97	0.93	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 27 continued: Power, r = .99, small *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
10	0.00	0.00	0.01	0.01	0.00	0.01	0.23	0.01	0.06	0.04	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.03	0.16	0.12	0.36	0.78	0.16	0.46	0.39	0.91	0.95	0.76	0.96	1.00
	1.00	0.01	0.10	0.58	0.50	0.89	0.99	0.58	0.94	0.89	1.00	1.00	1.00	1.00	1.00
	1.50	0.12	0.25	0.87	0.82	0.99	1.00	0.87	1.00	0.99	1.00	1.00	1.00	1.00	1.00
	2.00	0.42	0.48	0.97	0.95	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.50	0.73	0.71	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	0.92	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	0.00	0.00	0.01	0.01	0.01	0.01	0.21	0.01	0.04	0.04	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.03	0.29	0.24	0.48	0.87	0.29	0.58	0.51	0.98	0.99	0.92	0.99	1.00
	1.00	0.02	0.13	0.81	0.76	0.97	1.00	0.81	0.99	0.97	1.00	1.00	1.00	1.00	1.00
	1.50	0.22	0.35	0.97	0.96	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.00	0.64	0.62	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.50	0.92	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	0.99	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	0.00	0.00	0.01	0.01	0.01	0.01	0.19	0.01	0.03	0.04	0.01	0.01	0.01	0.01	0.01
	0.50	0.00	0.04	0.43	0.38	0.61	0.92	0.43	0.69	0.63	1.00	1.00	0.98	1.00	1.00
	1.00	0.03	0.17	0.92	0.90	0.99	1.00	0.92	1.00	0.99	1.00	1.00	1.00	1.00	1.00
	1.50	0.35	0.45	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.00	0.82	0.74	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.50	0.98	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 28: Power, r = .40, large *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
12	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.02
	0.50	0.02	0.03	0.02	0.03	0.03	0.04	0.03	0.05	0.03	0.03	0.03	0.03	0.04	0.05
	0.75	0.06	0.07	0.05	0.06	0.08	0.08	0.06	0.10	0.08	0.07	0.08	0.06	0.08	0.12
	1.00	0.12	0.13	0.09	0.11	0.15	0.16	0.10	0.19	0.15	0.13	0.15	0.11	0.16	0.25
	1.25	0.21	0.22	0.15	0.17	0.26	0.27	0.17	0.31	0.27	0.24	0.26	0.18	0.28	0.42
	1.50	0.33	0.34	0.23	0.27	0.40	0.41	0.26	0.46	0.41	0.36	0.39	0.27	0.42	0.60
24	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.02	0.02	0.02	0.02	0.03	0.03	0.02	0.03	0.03	0.03	0.02	0.02	0.03	0.03
	0.50	0.06	0.08	0.08	0.07	0.09	0.09	0.08	0.10	0.09	0.09	0.09	0.08	0.09	0.11
	0.75	0.18	0.19	0.20	0.20	0.24	0.23	0.20	0.25	0.24	0.23	0.24	0.19	0.24	0.28
	1.00	0.36	0.38	0.39	0.38	0.46	0.45	0.38	0.48	0.46	0.43	0.45	0.38	0.46	0.54
	1.25	0.61	0.60	0.60	0.60	0.70	0.69	0.60	0.72	0.69	0.66	0.70	0.60	0.70	0.78
	1.50	0.81	0.79	0.79	0.79	0.87	0.87	0.79	0.88	0.87	0.84	0.87	0.79	0.87	0.92
36	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.02	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.04	0.04
	0.50	0.10	0.12	0.14	0.14	0.15	0.15	0.14	0.16	0.15	0.15	0.15	0.14	0.15	0.17
	0.75	0.32	0.33	0.38	0.36	0.42	0.41	0.37	0.43	0.41	0.39	0.41	0.36	0.41	0.45
	1.00	0.62	0.60	0.67	0.65	0.71	0.71	0.66	0.72	0.71	0.68	0.71	0.65	0.70	0.76
	1.25	0.86	0.84	0.87	0.87	0.91	0.90	0.87	0.91	0.90	0.90	0.90	0.87	0.91	0.94
	1.50	0.97	0.96	0.97	0.96	0.98	0.98	0.96	0.98	0.98	0.98	0.98	0.97	0.98	0.99

Table 28 continued: Power, r = .40, large *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
48	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.03	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.16	0.18	0.21	0.20	0.23	0.22	0.21	0.23	0.22	0.22	0.22	0.21	0.23	0.25
	0.75	0.46	0.47	0.54	0.52	0.57	0.56	0.52	0.57	0.56	0.55	0.56	0.52	0.56	0.60
	1.00	0.80	0.78	0.84	0.83	0.86	0.86	0.83	0.87	0.86	0.84	0.86	0.82	0.86	0.89
	1.25	0.96	0.95	0.97	0.97	0.98	0.98	0.97	0.98	0.98	0.97	0.98	0.96	0.98	0.98
	1.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
72	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.05	0.06	0.08	0.07	0.08	0.08	0.07	0.08	0.08	0.07	0.08	0.07	0.07	0.08
	0.50	0.29	0.30	0.37	0.35	0.38	0.38	0.36	0.39	0.38	0.37	0.38	0.36	0.38	0.40
	0.75	0.72	0.69	0.77	0.76	0.79	0.79	0.77	0.80	0.79	0.78	0.79	0.77	0.79	0.81
	1.00	0.95	0.94	0.97	0.96	0.97	0.97	0.96	0.97	0.97	0.97	0.97	0.97	0.97	0.98
	1.25	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
96	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.06	0.09	0.10	0.09	0.10	0.10	0.09	0.10	0.10	0.11	0.10	0.10	0.10	0.11
	0.50	0.42	0.44	0.51	0.50	0.52	0.52	0.50	0.52	0.52	0.52	0.52	0.50	0.52	0.54
	0.75	0.87	0.85	0.91	0.90	0.92	0.91	0.90	0.92	0.91	0.91	0.91	0.90	0.91	0.92
	1.00	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 29: Power, r = .50, large *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled						
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Noncentral t Paired	Noncentral t Pooled	Normal
12	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.02	0.02	0.01	0.02	0.02	0.02	0.02
	0.50	0.02	0.03	0.03	0.03	0.04	0.04	0.03	0.05	0.04	0.04	0.04	0.03	0.04	0.06
	0.75	0.05	0.07	0.06	0.07	0.09	0.09	0.06	0.11	0.09	0.08	0.09	0.07	0.10	0.14
	1.00	0.11	0.13	0.11	0.12	0.18	0.18	0.11	0.22	0.18	0.16	0.18	0.12	0.19	0.28
	1.25	0.20	0.23	0.17	0.19	0.30	0.31	0.18	0.35	0.30	0.27	0.30	0.20	0.32	0.47
	1.50	0.32	0.35	0.27	0.29	0.44	0.46	0.28	0.50	0.45	0.41	0.45	0.31	0.47	0.66
24	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03
	0.50	0.05	0.08	0.09	0.09	0.10	0.10	0.09	0.12	0.10	0.10	0.10	0.09	0.10	0.12
	0.75	0.16	0.19	0.22	0.22	0.27	0.27	0.22	0.29	0.27	0.26	0.27	0.22	0.27	0.32
	1.00	0.36	0.37	0.43	0.43	0.51	0.51	0.43	0.54	0.52	0.49	0.52	0.43	0.52	0.60
	1.25	0.61	0.60	0.66	0.66	0.76	0.76	0.67	0.77	0.76	0.72	0.76	0.66	0.76	0.83
	1.50	0.82	0.79	0.84	0.84	0.91	0.91	0.85	0.92	0.91	0.88	0.91	0.84	0.91	0.95
36	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.02	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
	0.50	0.09	0.13	0.16	0.15	0.18	0.18	0.16	0.19	0.18	0.18	0.18	0.16	0.18	0.20
	0.75	0.31	0.34	0.41	0.40	0.46	0.45	0.41	0.47	0.46	0.45	0.45	0.41	0.46	0.51
	1.00	0.62	0.61	0.71	0.70	0.76	0.76	0.71	0.77	0.76	0.75	0.76	0.71	0.76	0.81
	1.25	0.86	0.84	0.90	0.90	0.94	0.93	0.90	0.94	0.93	0.93	0.94	0.91	0.94	0.96
	1.50	0.97	0.95	0.98	0.98	0.99	0.99	0.98	0.99	0.99	0.99	0.99	0.98	0.99	1.00

Table 29 continued: Power, ρ = .50, large *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
48	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.02	0.04	0.05	0.05	0.06	0.05	0.05	0.06	0.06	0.05	0.05	0.05	0.05	0.06
	0.50	0.15	0.18	0.24	0.23	0.26	0.25	0.24	0.27	0.26	0.25	0.25	0.24	0.26	0.28
	0.75	0.46	0.46	0.59	0.58	0.63	0.62	0.59	0.63	0.63	0.60	0.62	0.58	0.62	0.66
	1.00	0.81	0.77	0.87	0.87	0.90	0.90	0.87	0.90	0.90	0.88	0.90	0.87	0.90	0.92
	1.25	0.96	0.94	0.98	0.98	0.99	0.99	0.98	0.99	0.99	0.99	0.99	0.98	0.99	0.99
	1.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
72	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.04	0.07	0.08	0.08	0.09	0.08	0.08	0.09	0.09	0.08	0.08	0.08	0.08	0.09
	0.50	0.28	0.31	0.40	0.40	0.43	0.42	0.40	0.44	0.43	0.42	0.42	0.40	0.43	0.45
	0.75	0.72	0.71	0.82	0.82	0.85	0.85	0.82	0.85	0.85	0.84	0.85	0.82	0.84	0.86
	1.00	0.97	0.94	0.98	0.98	0.99	0.99	0.98	0.99	0.99	0.98	0.99	0.98	0.99	0.99
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
96	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.06	0.08	0.12	0.11	0.12	0.12	0.11	0.13	0.12	0.11	0.12	0.11	0.12	0.12
	0.50	0.43	0.43	0.57	0.57	0.59	0.59	0.57	0.59	0.59	0.58	0.59	0.56	0.58	0.60
	0.75	0.89	0.85	0.94	0.94	0.95	0.95	0.94	0.95	0.95	0.94	0.95	0.94	0.94	0.95
	1.00	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 30: Power, r = .60, large n, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
12	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.01	0.02	0.01	0.01	0.02	0.02	0.01	0.03	0.02	0.02	0.02	0.02	0.02	0.02
	0.50	0.02	0.03	0.03	0.04	0.05	0.05	0.03	0.06	0.05	0.05	0.05	0.04	0.05	0.07
	0.75	0.04	0.07	0.07	0.07	0.10	0.11	0.07	0.14	0.11	0.10	0.11	0.08	0.11	0.17
	1.00	0.10	0.14	0.13	0.13	0.20	0.22	0.13	0.25	0.21	0.20	0.21	0.15	0.22	0.34
	1.25	0.18	0.23	0.22	0.22	0.34	0.36	0.21	0.40	0.35	0.33	0.35	0.24	0.38	0.55
	1.50	0.31	0.35	0.33	0.34	0.50	0.53	0.33	0.57	0.51	0.49	0.52	0.37	0.55	0.75
24	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.01	0.02	0.03	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.04
	0.50	0.04	0.07	0.10	0.10	0.12	0.12	0.10	0.13	0.12	0.11	0.12	0.10	0.12	0.15
	0.75	0.14	0.19	0.26	0.26	0.31	0.32	0.26	0.34	0.32	0.31	0.33	0.27	0.33	0.39
	1.00	0.35	0.37	0.50	0.50	0.58	0.59	0.50	0.61	0.58	0.57	0.60	0.51	0.60	0.69
	1.25	0.61	0.60	0.73	0.73	0.81	0.82	0.73	0.83	0.81	0.81	0.82	0.75	0.83	0.89
	1.50	0.82	0.80	0.89	0.89	0.94	0.95	0.89	0.95	0.94	0.94	0.95	0.90	0.95	0.98
36	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.01	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.04	0.04	0.05	0.04	0.05	0.05
	0.50	0.08	0.12	0.19	0.19	0.21	0.21	0.19	0.22	0.21	0.20	0.21	0.19	0.21	0.24
	0.75	0.29	0.32	0.48	0.48	0.52	0.53	0.49	0.55	0.53	0.51	0.53	0.49	0.54	0.59
	1.00	0.62	0.60	0.79	0.78	0.83	0.83	0.79	0.84	0.83	0.83	0.84	0.79	0.84	0.88
	1.25	0.88	0.84	0.95	0.95	0.97	0.97	0.95	0.97	0.97	0.96	0.97	0.95	0.97	0.98
	1.50	0.98	0.95	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	0.99	1.00	1.00

Table 30 continued: Power, r = .60, large n, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
48	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.02	0.04	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07
	0.50	0.13	0.19	0.28	0.27	0.30	0.30	0.28	0.31	0.31	0.30	0.30	0.29	0.31	0.34
	0.75	0.45	0.47	0.66	0.66	0.69	0.70	0.66	0.71	0.69	0.70	0.70	0.67	0.71	0.75
	1.00	0.82	0.78	0.92	0.92	0.94	0.94	0.92	0.94	0.94	0.94	0.94	0.92	0.94	0.96
	1.25	0.97	0.94	0.99	0.99	1.00	1.00	0.99	1.00	1.00	0.99	1.00	0.99	1.00	1.00
	1.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
72	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.03	0.06	0.10	0.10	0.11	0.11	0.10	0.11	0.11	0.10	0.11	0.09	0.10	0.11
	0.50	0.27	0.32	0.48	0.48	0.50	0.50	0.48	0.51	0.51	0.51	0.50	0.48	0.51	0.53
	0.75	0.75	0.71	0.89	0.89	0.91	0.91	0.89	0.91	0.91	0.90	0.91	0.89	0.90	0.92
	1.00	0.98	0.94	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	0.99	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
96	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.05	0.08	0.14	0.14	0.14	0.14	0.14	0.15	0.15	0.13	0.15	0.14	0.14	0.15
	0.50	0.42	0.43	0.65	0.65	0.68	0.67	0.65	0.68	0.67	0.66	0.67	0.65	0.67	0.69
	0.75	0.90	0.84	0.97	0.97	0.98	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.98
	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 31: Power, r = .70, large n, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
12	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.03
	0.50	0.01	0.03	0.04	0.04	0.05	0.06	0.04	0.08	0.06	0.05	0.06	0.04	0.06	0.09
	0.75	0.03	0.07	0.08	0.09	0.13	0.14	0.08	0.17	0.13	0.13	0.14	0.10	0.15	0.22
	1.00	0.08	0.14	0.15	0.17	0.26	0.28	0.16	0.31	0.27	0.26	0.27	0.19	0.29	0.44
	1.25	0.16	0.22	0.25	0.28	0.43	0.46	0.27	0.50	0.44	0.43	0.45	0.31	0.48	0.68
	1.50	0.29	0.34	0.38	0.42	0.63	0.65	0.40	0.69	0.63	0.60	0.64	0.46	0.68	0.86
24	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.02	0.03	0.03	0.03	0.04	0.03	0.04	0.04	0.04	0.04	0.03	0.04	0.04
	0.50	0.03	0.08	0.13	0.13	0.15	0.16	0.13	0.18	0.16	0.15	0.16	0.13	0.16	0.19
	0.75	0.12	0.20	0.33	0.34	0.40	0.41	0.34	0.44	0.41	0.40	0.42	0.35	0.42	0.50
	1.00	0.33	0.38	0.60	0.61	0.69	0.71	0.61	0.72	0.70	0.70	0.71	0.63	0.72	0.80
	1.25	0.61	0.61	0.83	0.83	0.90	0.91	0.84	0.92	0.89	0.90	0.91	0.85	0.92	0.96
	1.50	0.84	0.79	0.95	0.95	0.98	0.98	0.95	0.98	0.98	0.98	0.98	0.96	0.98	0.99
36	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.01	0.03	0.05	0.05	0.05	0.06	0.05	0.06	0.06	0.06	0.06	0.05	0.06	0.06
	0.50	0.06	0.12	0.25	0.25	0.27	0.28	0.25	0.29	0.29	0.27	0.28	0.25	0.28	0.32
	0.75	0.28	0.33	0.60	0.60	0.64	0.65	0.61	0.67	0.65	0.65	0.66	0.61	0.66	0.72
	1.00	0.63	0.61	0.88	0.88	0.91	0.91	0.88	0.92	0.91	0.91	0.93	0.89	0.92	0.95
	1.25	0.90	0.84	0.98	0.98	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.98	0.99	1.00
	1.50	0.99	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 31 continued: Power, r = .70, large *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
48	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.01	0.04	0.08	0.07	0.08	0.08	0.08	0.09	0.08	0.08	0.08	0.07	0.08	0.09
	0.50	0.11	0.17	0.37	0.37	0.40	0.40	0.37	0.41	0.40	0.39	0.40	0.37	0.41	0.44
	0.75	0.45	0.46	0.78	0.77	0.81	0.81	0.78	0.82	0.81	0.81	0.82	0.79	0.82	0.86
	1.00	0.84	0.77	0.97	0.97	0.98	0.98	0.97	0.98	0.98	0.98	0.98	0.97	0.98	0.99
	1.25	0.98	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
72	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.02	0.06	0.13	0.12	0.13	0.13	0.13	0.14	0.14	0.13	0.13	0.12	0.13	0.14
	0.50	0.25	0.31	0.60	0.59	0.62	0.62	0.60	0.64	0.63	0.62	0.63	0.60	0.63	0.65
	0.75	0.76	0.71	0.95	0.95	0.96	0.96	0.95	0.96	0.96	0.97	0.96	0.95	0.96	0.97
	1.00	0.98	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
96	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.03	0.08	0.18	0.18	0.19	0.19	0.18	0.20	0.20	0.19	0.19	0.18	0.19	0.19
	0.50	0.41	0.44	0.77	0.77	0.79	0.79	0.77	0.80	0.79	0.79	0.79	0.77	0.79	0.80
	0.75	0.93	0.85	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 32: Power, r = .80, large *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
12	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.02	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.03	0.02	0.02	0.03	0.03
	0.50	0.01	0.03	0.05	0.05	0.08	0.09	0.05	0.10	0.08	0.08	0.08	0.06	0.09	0.13
	0.75	0.02	0.07	0.11	0.12	0.19	0.21	0.12	0.24	0.20	0.20	0.21	0.15	0.22	0.34
	1.00	0.06	0.13	0.22	0.23	0.38	0.41	0.22	0.43	0.38	0.38	0.41	0.28	0.44	0.62
	1.25	0.14	0.23	0.36	0.38	0.60	0.63	0.36	0.65	0.60	0.60	0.63	0.45	0.67	0.85
	1.50	0.27	0.35	0.52	0.54	0.79	0.81	0.52	0.83	0.78	0.78	0.82	0.63	0.84	0.96
24	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.02	0.04	0.04	0.05	0.05	0.04	0.06	0.05	0.05	0.05	0.04	0.05	0.06
	0.50	0.01	0.07	0.18	0.18	0.23	0.24	0.18	0.25	0.24	0.23	0.23	0.20	0.25	0.30
	0.75	0.09	0.19	0.46	0.46	0.56	0.58	0.46	0.59	0.56	0.57	0.59	0.51	0.60	0.69
	1.00	0.30	0.37	0.77	0.77	0.86	0.86	0.77	0.87	0.85	0.86	0.87	0.81	0.88	0.93
	1.25	0.62	0.60	0.93	0.93	0.97	0.97	0.93	0.98	0.97	0.98	0.98	0.96	0.98	0.99
	1.50	0.86	0.79	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	0.99	1.00	1.00
36	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.03	0.08	0.07	0.08	0.09	0.08	0.09	0.10	0.08	0.08	0.07	0.08	0.09
	0.50	0.04	0.13	0.37	0.36	0.41	0.42	0.36	0.42	0.42	0.40	0.42	0.38	0.42	0.47
	0.75	0.25	0.33	0.77	0.76	0.82	0.83	0.77	0.83	0.82	0.82	0.83	0.79	0.84	0.88
	1.00	0.65	0.61	0.97	0.97	0.98	0.98	0.97	0.99	0.98	0.98	0.99	0.97	0.99	0.99
	1.25	0.93	0.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	0.99	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 32 continued: Power, r = .80, large *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
48	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.04	0.10	0.10	0.11	0.11	0.10	0.12	0.13	0.11	0.11	0.11	0.12	0.13
	0.50	0.07	0.18	0.53	0.52	0.56	0.57	0.53	0.58	0.57	0.57	0.57	0.54	0.58	0.62
	0.75	0.44	0.47	0.92	0.91	0.94	0.94	0.92	0.94	0.93	0.94	0.94	0.92	0.94	0.96
	1.00	0.87	0.78	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	0.99	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
72	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.01	0.06	0.19	0.18	0.20	0.20	0.19	0.21	0.21	0.19	0.20	0.19	0.20	0.21
	0.50	0.21	0.30	0.77	0.77	0.80	0.80	0.77	0.81	0.79	0.79	0.81	0.79	0.81	0.83
	0.75	0.79	0.69	0.99	0.99	0.99	1.00	0.99	0.99	0.99	0.99	0.99	0.99	1.00	1.00
	1.00	0.99	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
96	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.01	0.08	0.26	0.26	0.28	0.28	0.26	0.28	0.29	0.29	0.28	0.27	0.28	0.30
	0.50	0.38	0.44	0.90	0.90	0.91	0.92	0.90	0.92	0.91	0.92	0.92	0.91	0.92	0.93
	0.75	0.95	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 33: Power, r= .85, large *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
12	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.02	0.02	0.02	0.03	0.04	0.02	0.04	0.04	0.03	0.03	0.02	0.03	0.04
	0.50	0.00	0.03	0.06	0.06	0.09	0.12	0.06	0.12	0.12	0.10	0.11	0.08	0.12	0.18
	0.75	0.02	0.06	0.14	0.15	0.25	0.30	0.14	0.30	0.28	0.26	0.29	0.20	0.31	0.46
	1.00	0.05	0.13	0.27	0.28	0.47	0.54	0.28	0.54	0.50	0.50	0.54	0.38	0.57	0.76
	1.25	0.13	0.22	0.44	0.45	0.70	0.76	0.44	0.76	0.71	0.72	0.77	0.58	0.80	0.94
	1.50	0.27	0.34	0.62	0.63	0.86	0.90	0.62	0.90	0.86	0.88	0.91	0.76	0.93	0.99
24	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.02	0.05	0.05	0.06	0.07	0.05	0.08	0.08	0.07	0.07	0.06	0.07	0.08
	0.50	0.01	0.08	0.25	0.25	0.31	0.33	0.25	0.34	0.33	0.32	0.33	0.28	0.34	0.40
	0.75	0.08	0.20	0.60	0.60	0.70	0.72	0.60	0.73	0.70	0.71	0.73	0.65	0.74	0.82
	1.00	0.30	0.39	0.87	0.87	0.93	0.94	0.87	0.94	0.93	0.94	0.95	0.91	0.96	0.98
	1.25	0.64	0.61	0.98	0.98	0.99	0.99	0.98	1.00	0.99	0.99	1.00	0.99	1.00	1.00
	1.50	0.89	0.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
36	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.03	0.09	0.09	0.11	0.11	0.09	0.12	0.13	0.11	0.11	0.10	0.11	0.12
	0.50	0.02	0.13	0.47	0.47	0.53	0.54	0.47	0.55	0.53	0.53	0.55	0.50	0.55	0.61
	0.75	0.22	0.33	0.87	0.87	0.92	0.92	0.87	0.93	0.90	0.92	0.93	0.90	0.93	0.96
	1.00	0.66	0.60	0.99	0.99	1.00	1.00	0.99	1.00	0.99	1.00	1.00	0.99	1.00	1.00
	1.25	0.94	0.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 33 continued: Power, r = .85, large *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
48	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.04	0.14	0.14	0.16	0.16	0.14	0.17	0.18	0.16	0.16	0.15	0.16	0.18
	0.50	0.05	0.18	0.66	0.66	0.71	0.72	0.66	0.72	0.70	0.71	0.72	0.68	0.72	0.76
	0.75	0.44	0.47	0.97	0.97	0.98	0.98	0.98	0.98	0.98	0.98	0.99	0.98	0.99	0.99
	1.00	0.90	0.78	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	0.99	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
72	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.06	0.25	0.25	0.26	0.27	0.25	0.27	0.29	0.27	0.27	0.26	0.27	0.29
	0.50	0.18	0.31	0.89	0.89	0.90	0.91	0.89	0.91	0.89	0.91	0.91	0.90	0.91	0.93
	0.75	0.82	0.71	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
96	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
	0.25	0.01	0.09	0.37	0.37	0.38	0.39	0.37	0.40	0.41	0.38	0.39	0.37	0.39	0.40
	0.50	0.38	0.44	0.97	0.97	0.97	0.98	0.97	0.98	0.97	0.97	0.98	0.97	0.98	0.98
	0.75	0.97	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 34: Power, r= .90, large *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
12	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.02	0.02	0.02	0.03	0.05	0.02	0.04	0.04	0.04	0.04	0.03	0.04	0.06
	0.50	0.00	0.03	0.08	0.08	0.13	0.19	0.08	0.17	0.16	0.15	0.17	0.12	0.18	0.28
	0.75	0.01	0.07	0.19	0.20	0.34	0.44	0.20	0.41	0.38	0.40	0.44	0.30	0.47	0.66
	1.00	0.04	0.13	0.37	0.38	0.61	0.72	0.38	0.69	0.64	0.69	0.74	0.55	0.77	0.92
	1.25	0.11	0.22	0.58	0.58	0.83	0.89	0.58	0.88	0.84	0.89	0.92	0.76	0.94	0.99
	1.50	0.24	0.34	0.76	0.76	0.95	0.97	0.76	0.97	0.95	0.97	0.99	0.91	0.99	1.00
24	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.02	0.07	0.07	0.08	0.11	0.07	0.11	0.10	0.10	0.10	0.09	0.10	0.12
	0.50	0.00	0.08	0.34	0.35	0.42	0.49	0.35	0.48	0.46	0.48	0.50	0.43	0.51	0.59
	0.75	0.05	0.19	0.75	0.76	0.84	0.88	0.75	0.88	0.84	0.88	0.90	0.84	0.91	0.95
	1.00	0.27	0.38	0.96	0.96	0.98	0.99	0.96	0.99	0.98	0.99	0.99	0.98	1.00	1.00
	1.25	0.63	0.59	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	0.90	0.78	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
36	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.03	0.13	0.13	0.15	0.18	0.13	0.18	0.17	0.18	0.18	0.15	0.17	0.20
	0.50	0.01	0.13	0.64	0.64	0.70	0.74	0.65	0.74	0.71	0.74	0.75	0.70	0.76	0.81
	0.75	0.19	0.33	0.96	0.96	0.98	0.99	0.96	0.99	0.98	0.99	0.99	0.98	0.99	1.00
	1.00	0.68	0.61	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	0.96	0.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 34 continued: Power, r = .90, large *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
48	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.04	0.22	0.21	0.23	0.26	0.22	0.26	0.26	0.24	0.26	0.23	0.25	0.28
	0.50	0.03	0.18	0.84	0.83	0.86	0.88	0.84	0.88	0.87	0.89	0.89	0.87	0.89	0.92
	0.75	0.44	0.47	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	0.93	0.78	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
72	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.06	0.38	0.38	0.40	0.42	0.38	0.42	0.42	0.41	0.42	0.40	0.42	0.44
	0.50	0.14	0.31	0.97	0.97	0.98	0.98	0.97	0.98	0.98	0.98	0.99	0.98	0.99	0.99
	0.75	0.86	0.70	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
96	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.09	0.53	0.53	0.55	0.56	0.53	0.57	0.56	0.56	0.57	0.55	0.57	0.59
	0.50	0.35	0.44	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.75	0.98	0.85	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 35: Power, r = .95, large n, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
12	0.00	0.00	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.02	0.03	0.03	0.05	0.12	0.03	0.05	0.07	0.07	0.08	0.06	0.08	0.12
	0.50	0.00	0.03	0.12	0.12	0.25	0.40	0.13	0.24	0.26	0.34	0.37	0.26	0.40	0.58
	0.75	0.00	0.07	0.32	0.31	0.57	0.73	0.33	0.57	0.56	0.74	0.78	0.59	0.81	0.94
	1.00	0.03	0.14	0.55	0.54	0.83	0.92	0.57	0.85	0.83	0.95	0.97	0.86	0.98	1.00
	1.25	0.09	0.22	0.76	0.75	0.96	0.99	0.77	0.97	0.95	0.99	1.00	0.97	1.00	1.00
	1.50	0.23	0.34	0.89	0.89	0.99	1.00	0.90	1.00	0.99	1.00	1.00	1.00	1.00	1.00
24	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.02	0.13	0.13	0.17	0.25	0.14	0.16	0.19	0.20	0.22	0.18	0.22	0.27
	0.50	0.00	0.07	0.61	0.61	0.71	0.81	0.62	0.73	0.71	0.82	0.85	0.77	0.85	0.91
	0.75	0.04	0.19	0.94	0.94	0.98	0.99	0.94	0.98	0.97	1.00	1.00	0.99	1.00	1.00
	1.00	0.25	0.37	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	0.66	0.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	0.92	0.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
36	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.03	0.28	0.28	0.31	0.39	0.29	0.33	0.34	0.37	0.40	0.34	0.39	0.43
	0.50	0.00	0.13	0.91	0.91	0.94	0.96	0.91	0.95	0.93	0.97	0.98	0.96	0.98	0.99
	0.75	0.16	0.34	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	0.72	0.61	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	0.98	0.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 35 continued: Power, r = .95, large *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
48	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.04	0.43	0.43	0.46	0.52	0.43	0.47	0.47	0.52	0.54	0.50	0.54	0.58
	0.50	0.01	0.18	0.98	0.98	0.99	0.99	0.98	0.99	0.98	1.00	1.00	0.99	1.00	1.00
	0.75	0.41	0.47	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	0.96	0.78	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
72	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.07	0.69	0.69	0.71	0.75	0.69	0.72	0.70	0.77	0.76	0.75	0.77	0.79
	0.50	0.09	0.32	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.75	0.91	0.71	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
96	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.09	0.86	0.86	0.87	0.89	0.86	0.88	0.85	0.90	0.89	0.89	0.90	0.91
	0.50	0.32	0.43	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.75	1.00	0.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 36: Power, r = .99, large n, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
12	0.00	0.00	0.01	0.01	0.01	0.01	0.21	0.01	0.04	0.04	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.02	0.06	0.05	0.12	0.50	0.06	0.18	0.16	0.43	0.47	0.32	0.50	0.69
	0.50	0.00	0.03	0.28	0.23	0.49	0.86	0.28	0.58	0.51	0.98	0.99	0.92	0.99	1.00
	0.75	0.00	0.07	0.59	0.52	0.83	0.98	0.59	0.89	0.83	1.00	1.00	1.00	1.00	1.00
	1.00	0.02	0.13	0.81	0.76	0.97	1.00	0.81	0.99	0.97	1.00	1.00	1.00	1.00	1.00
	1.25	0.08	0.23	0.92	0.89	1.00	1.00	0.92	1.00	0.99	1.00	1.00	1.00	1.00	1.00
	1.50	0.22	0.35	0.97	0.96	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	0.00	0.00	0.01	0.01	0.01	0.01	0.11	0.01	0.02	0.03	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.02	0.42	0.37	0.45	0.79	0.42	0.50	0.47	0.91	0.92	0.86	0.92	0.96
	0.50	0.00	0.08	0.93	0.91	0.98	1.00	0.93	0.99	0.97	1.00	1.00	1.00	1.00	1.00
	0.75	0.01	0.18	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	0.21	0.38	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	0.68	0.60	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	0.95	0.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
36	0.00	0.00	0.01	0.01	0.01	0.01	0.07	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.03	0.78	0.75	0.81	0.95	0.78	0.83	0.79	0.99	0.99	0.99	0.99	1.00
	0.50	0.00	0.13	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.75	0.10	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	0.74	0.61	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	0.99	0.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 36 continued: Power, r = .99, large *n*, nominal size = .01

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
48	0.00	0.00	0.01	0.01	0.01	0.01	0.05	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.04	0.93	0.93	0.96	0.99	0.93	0.97	0.95	1.00	1.00	1.00	1.00	1.00
	0.50	0.00	0.18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.75	0.39	0.47	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	0.98	0.77	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
72	0.00	0.00	0.01	0.01	0.01	0.01	0.04	0.01	0.01	0.04	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.06	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.50	0.03	0.30	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.75	0.97	0.70	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
96	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01
	0.25	0.00	0.09	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.50	0.24	0.44	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.75	1.00	0.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 37: Power, r = .40, small *n*, nominal size = .05

				Tight t											
				Known ρ				Unknown ρ			Analysis of covariance		"Theoretical" power		
				Paired		Pooled		Paired	Pooled						
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Noncentral t Paired	Noncentral t Pooled	Normal
4	0.00	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.56	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.06	0.06	0.06	0.06	0.07	0.07	0.06	0.56	0.07	0.05	0.06	0.06	0.06	0.08
	1.00	0.09	0.09	0.08	0.07	0.11	0.10	0.08	0.58	0.10	0.07	0.07	0.08	0.10	0.19
	1.50	0.14	0.15	0.10	0.10	0.17	0.16	0.11	0.60	0.16	0.09	0.10	0.10	0.17	0.37
	2.00	0.20	0.22	0.14	0.13	0.25	0.24	0.14	0.63	0.24	0.11	0.13	0.14	0.25	0.59
	2.50	0.29	0.29	0.17	0.17	0.34	0.33	0.18	0.67	0.33	0.13	0.16	0.17	0.34	0.78
	3.00	0.37	0.38	0.21	0.20	0.44	0.42	0.21	0.71	0.42	0.16	0.19	0.20	0.44	0.91
6	0.00	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.09	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.06	0.07	0.07	0.07	0.07	0.08	0.07	0.13	0.07	0.08	0.08	0.07	0.08	0.10
	1.00	0.14	0.16	0.12	0.13	0.16	0.17	0.13	0.26	0.17	0.14	0.15	0.13	0.18	0.27
	1.50	0.28	0.28	0.20	0.21	0.31	0.33	0.22	0.44	0.33	0.25	0.28	0.22	0.34	0.52
	2.00	0.45	0.45	0.31	0.32	0.49	0.51	0.33	0.62	0.51	0.38	0.43	0.33	0.53	0.76
	2.50	0.63	0.63	0.42	0.44	0.67	0.70	0.45	0.79	0.69	0.53	0.60	0.45	0.71	0.92
	3.00	0.78	0.78	0.54	0.55	0.82	0.84	0.56	0.89	0.83	0.66	0.74	0.57	0.84	0.98
8	0.00	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.08	0.09	0.09	0.09	0.10	0.10	0.09	0.13	0.10	0.09	0.09	0.09	0.10	0.12
	1.00	0.22	0.23	0.19	0.19	0.26	0.26	0.20	0.32	0.26	0.22	0.24	0.19	0.26	0.34
	1.50	0.42	0.43	0.36	0.36	0.49	0.49	0.37	0.56	0.49	0.40	0.46	0.36	0.49	0.64
	2.00	0.66	0.66	0.55	0.54	0.72	0.73	0.55	0.78	0.73	0.62	0.68	0.55	0.73	0.87
	2.50	0.84	0.84	0.72	0.71	0.88	0.89	0.72	0.91	0.88	0.80	0.86	0.73	0.89	0.97
	3.00	0.94	0.94	0.85	0.84	0.96	0.96	0.85	0.97	0.96	0.91	0.95	0.86	0.97	1.00

Table 37 continued: Power, r = .40, small *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
10	0.00	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.09	0.11	0.10	0.11	0.12	0.12	0.11	0.15	0.12	0.11	0.12	0.10	0.12	0.14
	1.00	0.28	0.29	0.26	0.27	0.32	0.33	0.27	0.38	0.33	0.29	0.32	0.27	0.33	0.41
	1.50	0.56	0.55	0.49	0.50	0.62	0.63	0.50	0.68	0.63	0.55	0.61	0.50	0.62	0.73
	2.00	0.81	0.79	0.73	0.74	0.85	0.86	0.74	0.88	0.85	0.79	0.85	0.73	0.85	0.93
	2.50	0.94	0.93	0.88	0.89	0.96	0.96	0.89	0.97	0.96	0.93	0.96	0.89	0.96	0.99
	3.00	0.99	0.99	0.96	0.96	0.99	0.99	0.96	0.99	0.99	0.98	0.99	0.97	0.99	1.00
12	0.00	0.03	0.05	0.04	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.10	0.12	0.11	0.12	0.13	0.14	0.12	0.16	0.13	0.12	0.14	0.12	0.14	0.16
	1.00	0.33	0.34	0.31	0.33	0.38	0.39	0.32	0.43	0.39	0.36	0.39	0.34	0.40	0.47
	1.50	0.66	0.65	0.60	0.61	0.71	0.72	0.61	0.75	0.71	0.67	0.71	0.62	0.72	0.81
	2.00	0.88	0.87	0.83	0.84	0.91	0.92	0.84	0.93	0.92	0.89	0.91	0.85	0.92	0.97
	2.50	0.98	0.97	0.95	0.96	0.99	0.99	0.95	0.99	0.99	0.97	0.98	0.96	0.99	1.00
	3.00	1.00	1.00	0.99	0.99	1.00	1.00	0.99	1.00	1.00	0.99	1.00	0.99	1.00	1.00
14	0.00	0.03	0.05	0.04	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.12	0.14	0.13	0.14	0.15	0.16	0.13	0.18	0.15	0.14	0.15	0.14	0.16	0.18
	1.00	0.40	0.41	0.39	0.40	0.45	0.46	0.40	0.49	0.46	0.43	0.46	0.40	0.47	0.53
	1.50	0.74	0.73	0.70	0.72	0.79	0.79	0.71	0.82	0.79	0.76	0.79	0.72	0.80	0.86
	2.00	0.94	0.93	0.91	0.91	0.96	0.96	0.91	0.97	0.96	0.94	0.96	0.92	0.96	0.98
	2.50	0.99	0.99	0.98	0.98	1.00	1.00	0.98	1.00	1.00	0.99	1.00	0.99	1.00	1.00
	3.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 38: Power, r = .50, small n, nominal size = .05

				Tight t									"Theoretical" power		
				Known ρ				Unknown ρ			Analysis of covariance				
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
4	0.00	0.04	0.05	0.06	0.05	0.05	0.05	0.05	0.58	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.05	0.06	0.06	0.06	0.06	0.07	0.06	0.58	0.06	0.06	0.06	0.06	0.07	0.09
	1.00	0.08	0.10	0.08	0.08	0.10	0.11	0.08	0.60	0.10	0.07	0.08	0.08	0.11	0.21
	1.50	0.14	0.15	0.11	0.10	0.17	0.17	0.11	0.62	0.16	0.09	0.11	0.11	0.18	0.41
	2.00	0.20	0.22	0.15	0.14	0.25	0.25	0.14	0.65	0.24	0.12	0.14	0.14	0.27	0.64
	2.50	0.27	0.29	0.18	0.17	0.34	0.34	0.18	0.69	0.33	0.15	0.17	0.18	0.37	0.82
	3.00	0.36	0.38	0.22	0.20	0.44	0.44	0.21	0.73	0.43	0.17	0.20	0.21	0.47	0.93
6	0.00	0.04	0.05	0.05	0.05	0.06	0.05	0.06	0.09	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.06	0.08	0.07	0.07	0.09	0.09	0.08	0.14	0.09	0.08	0.08	0.07	0.09	0.11
	1.00	0.13	0.16	0.13	0.13	0.19	0.18	0.14	0.27	0.18	0.15	0.16	0.14	0.20	0.29
	1.50	0.26	0.29	0.22	0.22	0.36	0.35	0.23	0.46	0.35	0.27	0.30	0.24	0.37	0.56
	2.00	0.44	0.47	0.33	0.33	0.56	0.55	0.35	0.65	0.55	0.42	0.47	0.36	0.57	0.81
	2.50	0.63	0.64	0.45	0.46	0.74	0.73	0.47	0.81	0.73	0.57	0.64	0.48	0.75	0.94
	3.00	0.78	0.78	0.57	0.58	0.87	0.87	0.59	0.91	0.86	0.70	0.78	0.60	0.88	0.99
8	0.00	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.07	0.09	0.09	0.09	0.10	0.10	0.09	0.14	0.10	0.10	0.10	0.09	0.11	0.13
	1.00	0.20	0.22	0.21	0.20	0.27	0.28	0.21	0.34	0.27	0.24	0.26	0.21	0.28	0.37
	1.50	0.41	0.43	0.38	0.38	0.52	0.53	0.39	0.59	0.52	0.44	0.50	0.40	0.54	0.69
	2.00	0.66	0.66	0.58	0.58	0.76	0.77	0.59	0.81	0.76	0.66	0.73	0.60	0.78	0.90
	2.50	0.85	0.84	0.76	0.75	0.91	0.91	0.76	0.94	0.91	0.84	0.89	0.77	0.92	0.98
	3.00	0.95	0.94	0.88	0.87	0.98	0.98	0.88	0.98	0.98	0.93	0.97	0.89	0.98	1.00

Table 38 continued: Power, r = .50, small *n*, nominal size = .05

				Tight t											
				Known ρ				Unknown ρ			Analysis of covariance		"Theoretical" power		
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
10	0.00	0.03	0.05	0.04	0.05	0.04	0.05	0.05	0.06	0.04	0.05	0.05	0.05	0.05	0.05
	0.50	0.08	0.10	0.10	0.10	0.12	0.12	0.10	0.15	0.12	0.11	0.12	0.11	0.13	0.15
	1.00	0.26	0.29	0.27	0.28	0.34	0.36	0.28	0.40	0.35	0.32	0.35	0.29	0.36	0.45
	1.50	0.54	0.55	0.52	0.53	0.65	0.66	0.53	0.71	0.65	0.60	0.65	0.55	0.67	0.78
	2.00	0.81	0.79	0.75	0.76	0.87	0.88	0.76	0.91	0.88	0.83	0.88	0.78	0.89	0.95
	2.50	0.95	0.93	0.90	0.90	0.97	0.98	0.90	0.98	0.97	0.95	0.97	0.92	0.98	1.00
	3.00	0.99	0.99	0.97	0.97	1.00	1.00	0.97	1.00	1.00	0.99	1.00	0.98	1.00	1.00
12	0.00	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.10	0.12	0.13	0.13	0.15	0.15	0.13	0.18	0.15	0.13	0.15	0.13	0.15	0.17
	1.00	0.32	0.34	0.35	0.36	0.42	0.43	0.36	0.47	0.42	0.39	0.42	0.37	0.44	0.52
	1.50	0.66	0.64	0.65	0.66	0.75	0.76	0.65	0.79	0.75	0.71	0.76	0.67	0.77	0.85
	2.00	0.89	0.87	0.87	0.88	0.94	0.94	0.87	0.95	0.94	0.91	0.94	0.89	0.95	0.98
	2.50	0.98	0.97	0.97	0.97	0.99	0.99	0.97	0.99	0.99	0.98	0.99	0.98	0.99	1.00
	3.00	1.00	1.00	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	0.00	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.11	0.14	0.14	0.15	0.16	0.17	0.15	0.19	0.17	0.15	0.17	0.15	0.17	0.19
	1.00	0.38	0.40	0.43	0.44	0.49	0.50	0.43	0.54	0.50	0.47	0.50	0.44	0.51	0.58
	1.50	0.75	0.72	0.74	0.75	0.83	0.84	0.75	0.86	0.83	0.80	0.84	0.77	0.84	0.90
	2.00	0.94	0.92	0.94	0.94	0.97	0.97	0.94	0.98	0.97	0.96	0.98	0.95	0.98	0.99
	2.50	0.99	0.99	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	0.99	1.00	1.00
	3.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 39: Power, r = .60, small *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
4	0.00	0.03	0.05	0.06	0.05	0.05	0.05	0.06	0.62	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.04	0.06	0.06	0.06	0.06	0.07	0.07	0.62	0.06	0.06	0.06	0.06	0.07	0.10
	1.00	0.07	0.10	0.08	0.08	0.11	0.11	0.09	0.64	0.11	0.07	0.08	0.08	0.12	0.24
	1.50	0.13	0.15	0.11	0.11	0.18	0.19	0.12	0.66	0.18	0.10	0.11	0.12	0.20	0.47
	2.00	0.19	0.22	0.15	0.14	0.27	0.28	0.15	0.69	0.27	0.12	0.14	0.16	0.30	0.71
	2.50	0.27	0.30	0.18	0.18	0.37	0.39	0.19	0.73	0.37	0.15	0.18	0.19	0.41	0.88
	3.00	0.36	0.39	0.22	0.21	0.47	0.49	0.23	0.77	0.47	0.18	0.21	0.23	0.52	0.96
6	0.00	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.09	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.05	0.07	0.08	0.08	0.09	0.09	0.08	0.14	0.09	0.07	0.08	0.08	0.09	0.12
	1.00	0.13	0.15	0.15	0.14	0.21	0.22	0.15	0.29	0.21	0.15	0.19	0.15	0.22	0.33
	1.50	0.26	0.29	0.25	0.24	0.39	0.40	0.25	0.49	0.39	0.29	0.35	0.27	0.42	0.63
	2.00	0.44	0.46	0.37	0.36	0.60	0.61	0.38	0.69	0.60	0.46	0.53	0.40	0.64	0.86
	2.50	0.63	0.64	0.50	0.49	0.77	0.79	0.51	0.84	0.77	0.62	0.70	0.53	0.81	0.97
	3.00	0.78	0.78	0.62	0.61	0.89	0.90	0.63	0.93	0.89	0.75	0.83	0.66	0.92	1.00
8	0.00	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.05	0.09	0.10	0.09	0.11	0.11	0.10	0.15	0.12	0.10	0.11	0.10	0.12	0.14
	1.00	0.18	0.22	0.23	0.22	0.31	0.31	0.23	0.37	0.31	0.26	0.29	0.24	0.32	0.42
	1.50	0.40	0.42	0.43	0.42	0.58	0.58	0.43	0.64	0.58	0.49	0.55	0.45	0.60	0.76
	2.00	0.65	0.65	0.64	0.63	0.81	0.81	0.64	0.85	0.81	0.73	0.80	0.66	0.84	0.94
	2.50	0.85	0.84	0.81	0.79	0.94	0.94	0.81	0.96	0.94	0.89	0.93	0.83	0.95	0.99
	3.00	0.95	0.94	0.91	0.91	0.99	0.99	0.91	0.99	0.99	0.96	0.99	0.93	0.99	1.00

Table 39 continued: Power, r = .60, small *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
10	0.00	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.07	0.11	0.11	0.12	0.14	0.14	0.12	0.17	0.14	0.13	0.14	0.12	0.14	0.17
	1.00	0.25	0.29	0.31	0.31	0.40	0.40	0.31	0.45	0.40	0.37	0.40	0.33	0.41	0.51
	1.50	0.54	0.54	0.58	0.59	0.72	0.72	0.59	0.77	0.71	0.67	0.72	0.61	0.74	0.84
	2.00	0.81	0.79	0.81	0.82	0.92	0.92	0.82	0.94	0.92	0.88	0.92	0.84	0.93	0.98
	2.50	0.95	0.93	0.94	0.94	0.99	0.99	0.94	0.99	0.99	0.97	0.99	0.95	0.99	1.00
	3.00	0.99	0.98	0.98	0.99	1.00	1.00	0.99	1.00	1.00	0.99	1.00	0.99	1.00	1.00
12	0.00	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.08	0.12	0.13	0.14	0.16	0.16	0.14	0.19	0.16	0.15	0.16	0.14	0.17	0.19
	1.00	0.32	0.35	0.39	0.40	0.47	0.48	0.40	0.52	0.48	0.46	0.49	0.42	0.50	0.58
	1.50	0.66	0.64	0.71	0.72	0.82	0.82	0.71	0.84	0.82	0.78	0.82	0.74	0.83	0.90
	2.00	0.90	0.88	0.91	0.92	0.97	0.97	0.91	0.98	0.97	0.95	0.97	0.93	0.97	0.99
	2.50	0.99	0.97	0.98	0.98	1.00	1.00	0.98	1.00	1.00	0.99	1.00	0.99	1.00	1.00
	3.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	0.00	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.10	0.14	0.16	0.16	0.19	0.19	0.16	0.21	0.19	0.18	0.19	0.17	0.19	0.22
	1.00	0.38	0.41	0.48	0.49	0.56	0.57	0.49	0.60	0.56	0.54	0.57	0.50	0.58	0.65
	1.50	0.76	0.74	0.81	0.82	0.89	0.89	0.82	0.90	0.89	0.86	0.89	0.83	0.90	0.94
	2.00	0.96	0.93	0.96	0.97	0.99	0.99	0.97	0.99	0.99	0.98	0.99	0.97	0.99	1.00
	2.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 40: Power, r = .70, small *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
4	0.00	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.65	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.04	0.06	0.06	0.06	0.06	0.07	0.06	0.66	0.07	0.06	0.06	0.06	0.07	0.11
	1.00	0.06	0.09	0.08	0.08	0.11	0.12	0.09	0.67	0.12	0.08	0.09	0.09	0.14	0.29
	1.50	0.11	0.14	0.11	0.11	0.19	0.21	0.12	0.69	0.20	0.11	0.12	0.13	0.23	0.56
	2.00	0.17	0.21	0.14	0.14	0.29	0.31	0.15	0.72	0.30	0.14	0.16	0.17	0.35	0.80
	2.50	0.25	0.29	0.17	0.17	0.40	0.43	0.19	0.75	0.41	0.17	0.20	0.22	0.48	0.94
	3.00	0.34	0.38	0.21	0.21	0.51	0.55	0.23	0.79	0.53	0.20	0.24	0.26	0.60	0.99
6	0.00	0.02	0.05	0.05	0.05	0.05	0.06	0.06	0.09	0.06	0.05	0.05	0.05	0.05	0.05
	0.50	0.04	0.07	0.08	0.08	0.10	0.11	0.09	0.15	0.10	0.08	0.09	0.08	0.10	0.14
	1.00	0.11	0.15	0.15	0.15	0.23	0.26	0.16	0.32	0.24	0.19	0.21	0.18	0.26	0.40
	1.50	0.25	0.29	0.26	0.26	0.44	0.47	0.29	0.54	0.45	0.35	0.40	0.31	0.50	0.73
	2.00	0.42	0.46	0.39	0.40	0.65	0.68	0.43	0.74	0.66	0.53	0.61	0.46	0.73	0.93
	2.50	0.61	0.63	0.52	0.54	0.83	0.85	0.56	0.88	0.83	0.70	0.78	0.61	0.89	0.99
	3.00	0.77	0.78	0.64	0.66	0.93	0.94	0.68	0.96	0.93	0.82	0.90	0.74	0.96	1.00
8	0.00	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.05	0.09	0.11	0.10	0.14	0.14	0.11	0.16	0.14	0.12	0.13	0.11	0.13	0.17
	1.00	0.17	0.22	0.26	0.24	0.36	0.36	0.26	0.41	0.36	0.32	0.35	0.28	0.38	0.51
	1.50	0.38	0.42	0.47	0.46	0.66	0.66	0.48	0.70	0.66	0.59	0.65	0.53	0.70	0.84
	2.00	0.65	0.66	0.69	0.68	0.88	0.88	0.69	0.91	0.88	0.81	0.87	0.75	0.91	0.98
	2.50	0.85	0.83	0.86	0.85	0.97	0.97	0.86	0.98	0.97	0.93	0.97	0.89	0.98	1.00
	3.00	0.96	0.94	0.94	0.94	1.00	1.00	0.94	1.00	0.99	0.98	1.00	0.96	1.00	1.00

Table 40 continued: Power, r = .70, small *n*, nominal size = .05

				Tight t											
				Known ρ				Unknown ρ			Analysis of covariance		"Theoretical" power		
				Paired		Pooled		Paired	Pooled						
		Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Noncentral t Paired	Noncentral t Pooled	Normal
n	Δ/σ														
10	0.00	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.05	0.11	0.13	0.13	0.16	0.17	0.13	0.19	0.16	0.14	0.16	0.14	0.16	0.20
	1.00	0.23	0.29	0.35	0.35	0.47	0.48	0.35	0.51	0.47	0.43	0.48	0.40	0.49	0.60
	1.50	0.54	0.55	0.65	0.65	0.80	0.81	0.65	0.83	0.80	0.77	0.81	0.70	0.83	0.91
	2.00	0.82	0.80	0.87	0.87	0.96	0.96	0.87	0.97	0.96	0.94	0.96	0.90	0.97	0.99
	2.50	0.96	0.93	0.97	0.97	0.99	1.00	0.97	1.00	0.99	0.99	1.00	0.98	1.00	1.00
	3.00	0.99	0.99	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	0.00	0.01	0.05	0.05	0.05	0.04	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.06	0.13	0.15	0.16	0.19	0.19	0.16	0.22	0.19	0.18	0.19	0.17	0.20	0.23
	1.00	0.30	0.35	0.46	0.47	0.56	0.57	0.46	0.60	0.57	0.55	0.58	0.50	0.59	0.68
	1.50	0.67	0.66	0.78	0.78	0.88	0.89	0.78	0.90	0.88	0.86	0.89	0.83	0.91	0.95
	2.00	0.92	0.88	0.95	0.95	0.99	0.99	0.95	0.99	0.99	0.98	0.99	0.97	0.99	1.00
	2.50	0.99	0.98	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	0.00	0.01	0.05	0.05	0.05	0.05	0.06	0.05	0.06	0.05	0.06	0.05	0.05	0.05	0.05
	0.50	0.08	0.14	0.19	0.19	0.22	0.23	0.19	0.25	0.22	0.21	0.22	0.20	0.23	0.26
	1.00	0.37	0.41	0.55	0.56	0.64	0.65	0.55	0.67	0.64	0.62	0.66	0.59	0.67	0.75
	1.50	0.77	0.73	0.87	0.88	0.93	0.94	0.87	0.95	0.93	0.92	0.94	0.90	0.95	0.98
	2.00	0.96	0.93	0.98	0.98	1.00	1.00	0.98	1.00	0.99	0.99	1.00	0.99	1.00	1.00
	2.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 41: Power, r = .80, small *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
4	0.00	0.02	0.05	0.05	0.05	0.05	0.06	0.05	0.70	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.03	0.06	0.06	0.06	0.07	0.08	0.07	0.71	0.08	0.06	0.07	0.07	0.08	0.13
	1.00	0.06	0.10	0.09	0.09	0.14	0.15	0.09	0.72	0.14	0.08	0.10	0.11	0.17	0.38
	1.50	0.11	0.15	0.12	0.12	0.24	0.26	0.13	0.74	0.24	0.12	0.14	0.16	0.30	0.71
	2.00	0.17	0.22	0.16	0.16	0.35	0.38	0.17	0.77	0.36	0.16	0.19	0.21	0.45	0.92
	2.50	0.23	0.29	0.20	0.20	0.48	0.52	0.21	0.79	0.49	0.20	0.24	0.26	0.59	0.99
	3.00	0.31	0.38	0.23	0.23	0.60	0.64	0.25	0.82	0.61	0.24	0.28	0.31	0.72	1.00
6	0.00	0.01	0.05	0.05	0.05	0.05	0.06	0.06	0.09	0.06	0.05	0.05	0.05	0.05	0.05
	0.50	0.03	0.08	0.08	0.08	0.11	0.13	0.09	0.16	0.11	0.10	0.11	0.10	0.13	0.18
	1.00	0.09	0.16	0.17	0.17	0.29	0.33	0.19	0.37	0.29	0.25	0.28	0.22	0.35	0.53
	1.50	0.22	0.29	0.31	0.31	0.54	0.59	0.34	0.62	0.55	0.46	0.52	0.40	0.64	0.86
	2.00	0.41	0.45	0.46	0.45	0.76	0.80	0.49	0.82	0.77	0.66	0.75	0.58	0.86	0.98
	2.50	0.61	0.63	0.61	0.60	0.91	0.93	0.63	0.94	0.91	0.81	0.89	0.73	0.96	1.00
	3.00	0.78	0.78	0.74	0.73	0.97	0.98	0.75	0.98	0.97	0.91	0.96	0.85	0.99	1.00
8	0.00	0.01	0.05	0.05	0.05	0.05	0.06	0.05	0.07	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.03	0.09	0.12	0.12	0.15	0.18	0.13	0.19	0.16	0.14	0.16	0.14	0.17	0.22
	1.00	0.15	0.22	0.32	0.30	0.43	0.48	0.32	0.50	0.44	0.41	0.46	0.37	0.51	0.65
	1.50	0.38	0.42	0.57	0.55	0.75	0.79	0.58	0.80	0.76	0.72	0.79	0.66	0.84	0.94
	2.00	0.66	0.65	0.78	0.76	0.93	0.95	0.79	0.95	0.93	0.91	0.95	0.87	0.97	1.00
	2.50	0.86	0.84	0.92	0.91	0.99	0.99	0.92	0.99	0.99	0.98	0.99	0.96	1.00	1.00
	3.00	0.96	0.94	0.97	0.97	1.00	1.00	0.97	1.00	1.00	0.99	1.00	0.99	1.00	1.00

Table 41 continued: Power, r = .80, small *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled						
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Noncentral t Paired	Noncentral t Pooled	Normal
10	0.00	0.01	0.05	0.05	0.05	0.05	0.06	0.05	0.07	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.04	0.11	0.15	0.15	0.19	0.22	0.15	0.23	0.20	0.19	0.20	0.18	0.21	0.26
	1.00	0.20	0.29	0.44	0.44	0.57	0.61	0.45	0.62	0.57	0.57	0.62	0.52	0.64	0.75
	1.50	0.53	0.55	0.75	0.75	0.88	0.90	0.76	0.91	0.88	0.88	0.92	0.84	0.93	0.98
	2.00	0.83	0.79	0.93	0.93	0.99	0.99	0.93	0.99	0.99	0.98	0.99	0.97	1.00	1.00
	2.50	0.97	0.93	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	0.00	0.01	0.05	0.05	0.05	0.05	0.06	0.05	0.07	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.04	0.12	0.19	0.19	0.23	0.26	0.19	0.27	0.24	0.23	0.25	0.22	0.26	0.30
	1.00	0.27	0.34	0.57	0.57	0.68	0.71	0.57	0.72	0.68	0.69	0.73	0.64	0.74	0.82
	1.50	0.67	0.64	0.88	0.88	0.95	0.96	0.88	0.96	0.94	0.95	0.97	0.93	0.97	0.99
	2.00	0.93	0.87	0.98	0.98	1.00	1.00	0.98	1.00	1.00	1.00	1.00	0.99	1.00	1.00
	2.50	0.99	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.05	0.14	0.22	0.23	0.28	0.30	0.23	0.31	0.28	0.28	0.29	0.26	0.30	0.34
	1.00	0.35	0.41	0.68	0.68	0.77	0.79	0.68	0.81	0.77	0.77	0.81	0.74	0.82	0.88
	1.50	0.79	0.73	0.95	0.95	0.98	0.98	0.95	0.99	0.98	0.98	0.99	0.97	0.99	1.00
	2.00	0.98	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 42: Power, r = .85, small *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
4	0.00	0.01	0.05	0.05	0.05	0.05	0.06	0.05	0.73	0.06	0.05	0.05	0.05	0.05	0.05
	0.50	0.03	0.06	0.06	0.06	0.08	0.09	0.06	0.74	0.09	0.06	0.07	0.07	0.09	0.16
	1.00	0.05	0.09	0.09	0.08	0.16	0.18	0.09	0.75	0.17	0.10	0.11	0.12	0.20	0.48
	1.50	0.10	0.15	0.12	0.12	0.28	0.32	0.13	0.77	0.30	0.14	0.16	0.18	0.36	0.81
	2.00	0.16	0.21	0.16	0.15	0.42	0.47	0.17	0.79	0.44	0.19	0.22	0.23	0.53	0.97
	2.50	0.23	0.30	0.21	0.20	0.56	0.62	0.21	0.82	0.58	0.23	0.27	0.29	0.68	1.00
	3.00	0.32	0.40	0.25	0.23	0.69	0.75	0.26	0.84	0.70	0.28	0.32	0.35	0.80	1.00
6	0.00	0.01	0.05	0.06	0.05	0.05	0.07	0.06	0.09	0.06	0.05	0.05	0.05	0.05	0.05
	0.50	0.02	0.08	0.09	0.08	0.12	0.16	0.10	0.18	0.13	0.11	0.13	0.11	0.15	0.21
	1.00	0.08	0.16	0.20	0.18	0.33	0.40	0.21	0.41	0.34	0.30	0.35	0.27	0.43	0.64
	1.50	0.21	0.29	0.36	0.33	0.60	0.67	0.36	0.68	0.61	0.54	0.63	0.47	0.74	0.94
	2.00	0.40	0.45	0.53	0.49	0.82	0.88	0.54	0.87	0.83	0.76	0.84	0.67	0.93	1.00
	2.50	0.60	0.63	0.68	0.64	0.94	0.96	0.68	0.96	0.95	0.88	0.95	0.82	0.99	1.00
	3.00	0.78	0.78	0.80	0.77	0.98	0.99	0.80	0.99	0.99	0.95	0.99	0.91	1.00	1.00
8	0.00	0.01	0.05	0.05	0.05	0.05	0.07	0.05	0.07	0.06	0.05	0.05	0.05	0.05	0.05
	0.50	0.03	0.09	0.13	0.13	0.17	0.22	0.14	0.21	0.19	0.18	0.20	0.16	0.21	0.27
	1.00	0.13	0.22	0.36	0.34	0.50	0.58	0.37	0.57	0.52	0.52	0.58	0.45	0.61	0.77
	1.50	0.38	0.42	0.64	0.61	0.82	0.87	0.64	0.87	0.83	0.83	0.89	0.76	0.92	0.98
	2.00	0.67	0.65	0.85	0.83	0.97	0.98	0.85	0.98	0.96	0.96	0.99	0.93	0.99	1.00
	2.50	0.88	0.83	0.95	0.94	1.00	1.00	0.95	1.00	0.99	0.99	1.00	0.99	1.00	1.00
	3.00	0.97	0.94	0.99	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 42 continued: Power, r = .85, small *n*, nominal size = .05

				Tight t												
				Known ρ				Unknown ρ			Analysis of covariance		"Theoretical" power		
				Paired		Pooled		Paired	Pooled						
		Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Noncentral t Paired	Noncentral t Pooled	Normal
n	Δ/σ														
10	0.00	0.00	0.05	0.05	0.05	0.05	0.07	0.05	0.07	0.06	0.04	0.05	0.05	0.05	0.05
	0.50	0.03	0.11	0.17	0.17	0.22	0.27	0.17	0.25	0.23	0.23	0.25	0.21	0.26	0.32
	1.00	0.19	0.29	0.51	0.51	0.65	0.71	0.52	0.70	0.65	0.68	0.73	0.62	0.75	0.85
	1.50	0.54	0.56	0.83	0.83	0.93	0.95	0.83	0.95	0.93	0.94	0.97	0.91	0.97	0.99
	2.00	0.85	0.80	0.96	0.96	0.99	1.00	0.97	1.00	0.99	0.99	1.00	0.99	1.00	1.00
	2.50	0.97	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	0.00	0.00	0.05	0.05	0.05	0.05	0.06	0.05	0.07	0.06	0.05	0.05	0.05	0.05	0.05
	0.50	0.03	0.12	0.22	0.22	0.26	0.31	0.22	0.31	0.28	0.28	0.31	0.27	0.32	0.38
	1.00	0.25	0.35	0.64	0.64	0.75	0.79	0.65	0.79	0.76	0.79	0.83	0.75	0.84	0.91
	1.50	0.68	0.65	0.92	0.93	0.98	0.99	0.93	0.99	0.98	0.98	0.99	0.97	0.99	1.00
	2.00	0.94	0.87	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.50	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	0.00	0.00	0.05	0.05	0.05	0.05	0.06	0.05	0.06	0.06	0.05	0.05	0.05	0.05	0.05
	0.50	0.04	0.13	0.28	0.28	0.33	0.37	0.28	0.37	0.34	0.34	0.37	0.32	0.37	0.43
	1.00	0.34	0.40	0.76	0.76	0.84	0.87	0.76	0.87	0.84	0.87	0.90	0.84	0.90	0.94
	1.50	0.80	0.73	0.97	0.97	0.99	0.99	0.97	1.00	0.99	1.00	1.00	0.99	1.00	1.00
	2.00	0.98	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 43: Power, r = .90, small *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
4	0.00	0.01	0.05	0.05	0.05	0.05	0.07	0.05	0.78	0.06	0.05	0.05	0.05	0.05	0.05
	0.50	0.02	0.06	0.06	0.06	0.09	0.11	0.07	0.79	0.09	0.07	0.07	0.08	0.11	0.21
	1.00	0.04	0.09	0.09	0.09	0.19	0.24	0.10	0.80	0.21	0.12	0.13	0.14	0.26	0.63
	1.50	0.09	0.14	0.13	0.13	0.34	0.41	0.14	0.81	0.36	0.17	0.19	0.21	0.47	0.93
	2.00	0.14	0.22	0.17	0.17	0.50	0.58	0.18	0.83	0.53	0.22	0.26	0.28	0.66	1.00
	2.50	0.21	0.29	0.21	0.21	0.65	0.73	0.23	0.85	0.67	0.27	0.32	0.35	0.81	1.00
	3.00	0.30	0.39	0.25	0.25	0.78	0.84	0.27	0.87	0.79	0.33	0.38	0.41	0.91	1.00
6	0.00	0.00	0.05	0.05	0.05	0.05	0.09	0.06	0.09	0.06	0.05	0.05	0.05	0.05	0.05
	0.50	0.02	0.08	0.10	0.09	0.15	0.22	0.11	0.20	0.17	0.15	0.17	0.14	0.19	0.29
	1.00	0.07	0.17	0.22	0.21	0.41	0.52	0.24	0.47	0.43	0.41	0.48	0.35	0.57	0.80
	1.50	0.21	0.30	0.39	0.37	0.70	0.79	0.42	0.74	0.71	0.69	0.78	0.60	0.88	0.99
	2.00	0.40	0.47	0.57	0.55	0.88	0.94	0.60	0.91	0.89	0.88	0.94	0.80	0.98	1.00
	2.50	0.60	0.64	0.72	0.70	0.97	0.99	0.75	0.98	0.97	0.95	0.99	0.91	1.00	1.00
	3.00	0.78	0.78	0.84	0.82	0.99	1.00	0.85	0.99	0.99	0.98	1.00	0.97	1.00	1.00
8	0.00	0.00	0.05	0.06	0.05	0.05	0.09	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05
	0.50	0.02	0.09	0.16	0.14	0.21	0.30	0.16	0.23	0.23	0.24	0.25	0.21	0.28	0.37
	1.00	0.12	0.21	0.44	0.40	0.60	0.71	0.44	0.63	0.62	0.67	0.73	0.59	0.77	0.90
	1.50	0.36	0.42	0.73	0.70	0.89	0.94	0.73	0.92	0.90	0.93	0.97	0.88	0.98	1.00
	2.00	0.66	0.66	0.91	0.88	0.99	0.99	0.90	0.99	0.99	0.99	1.00	0.98	1.00	1.00
	2.50	0.88	0.84	0.98	0.97	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	0.97	0.94	1.00	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 43 continued: Power, r = .90, small *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
10	0.00	0.00	0.05	0.05	0.04	0.05	0.08	0.05	0.06	0.06	0.05	0.05	0.05	0.05	0.05
	0.50	0.02	0.11	0.22	0.21	0.27	0.36	0.22	0.31	0.30	0.31	0.35	0.29	0.36	0.44
	1.00	0.17	0.29	0.60	0.59	0.74	0.82	0.60	0.78	0.76	0.82	0.86	0.77	0.89	0.95
	1.50	0.53	0.54	0.90	0.89	0.97	0.98	0.89	0.98	0.97	0.98	0.99	0.98	1.00	1.00
	2.00	0.85	0.79	0.98	0.98	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.50	0.97	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	0.00	0.00	0.05	0.05	0.05	0.05	0.07	0.05	0.06	0.06	0.05	0.05	0.05	0.05	0.05
	0.50	0.02	0.13	0.28	0.27	0.34	0.42	0.28	0.37	0.37	0.40	0.42	0.36	0.43	0.51
	1.00	0.24	0.36	0.76	0.75	0.86	0.91	0.76	0.89	0.87	0.92	0.94	0.88	0.95	0.98
	1.50	0.69	0.66	0.97	0.97	0.99	1.00	0.97	1.00	0.99	1.00	1.00	1.00	1.00	1.00
	2.00	0.95	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.50	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	0.00	0.00	0.05	0.05	0.05	0.05	0.08	0.05	0.07	0.07	0.05	0.05	0.05	0.05	0.05
	0.50	0.03	0.14	0.34	0.34	0.41	0.49	0.35	0.45	0.44	0.46	0.50	0.44	0.51	0.57
	1.00	0.32	0.41	0.85	0.85	0.93	0.95	0.85	0.94	0.93	0.96	0.97	0.94	0.98	0.99
	1.50	0.82	0.73	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.00	0.99	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 44: Power, r = .95, small n, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
4	0.00	0.00	0.05	0.04	0.05	0.05	0.10	0.05	0.84	0.06	0.05	0.05	0.05	0.05	0.05
	0.50	0.01	0.06	0.05	0.06	0.11	0.19	0.06	0.85	0.12	0.09	0.10	0.10	0.16	0.36
	1.00	0.03	0.09	0.09	0.09	0.27	0.39	0.10	0.85	0.28	0.16	0.18	0.20	0.42	0.89
	1.50	0.07	0.15	0.13	0.13	0.46	0.60	0.14	0.86	0.47	0.23	0.27	0.29	0.69	1.00
	2.00	0.13	0.22	0.17	0.17	0.64	0.76	0.19	0.88	0.64	0.30	0.35	0.38	0.87	1.00
	2.50	0.20	0.30	0.21	0.21	0.78	0.88	0.23	0.89	0.78	0.37	0.43	0.47	0.96	1.00
	3.00	0.28	0.39	0.25	0.25	0.88	0.94	0.28	0.91	0.88	0.44	0.51	0.55	0.99	1.00
6	0.00	0.00	0.05	0.05	0.04	0.05	0.16	0.05	0.11	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.01	0.07	0.12	0.10	0.19	0.36	0.13	0.26	0.20	0.24	0.27	0.21	0.33	0.50
	1.00	0.06	0.16	0.29	0.26	0.51	0.71	0.30	0.58	0.52	0.65	0.72	0.55	0.83	0.98
	1.50	0.19	0.29	0.48	0.44	0.80	0.92	0.50	0.84	0.80	0.89	0.95	0.82	0.99	1.00
	2.00	0.39	0.46	0.66	0.62	0.94	0.98	0.68	0.95	0.94	0.97	1.00	0.95	1.00	1.00
	2.50	0.60	0.63	0.80	0.75	0.99	1.00	0.82	0.99	0.99	0.99	1.00	0.99	1.00	1.00
	3.00	0.78	0.78	0.89	0.86	1.00	1.00	0.90	1.00	1.00	0.99	1.00	1.00	1.00	1.00
8	0.00	0.00	0.05	0.05	0.05	0.05	0.14	0.05	0.06	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.01	0.09	0.18	0.17	0.27	0.46	0.19	0.28	0.28	0.39	0.44	0.35	0.48	0.62
	1.00	0.09	0.23	0.52	0.49	0.72	0.87	0.54	0.74	0.72	0.90	0.94	0.84	0.96	0.99
	1.50	0.34	0.43	0.81	0.78	0.95	0.99	0.82	0.96	0.95	0.99	1.00	0.99	1.00	1.00
	2.00	0.66	0.66	0.95	0.93	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.50	0.88	0.84	0.99	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	0.97	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 44 continued: Power, r = .95, small *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
10	0.00	0.00	0.05	0.04	0.04	0.05	0.13	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	0.50	0.01	0.11	0.28	0.27	0.37	0.56	0.29	0.38	0.38	0.54	0.58	0.49	0.60	0.72
	1.00	0.15	0.29	0.74	0.73	0.88	0.95	0.75	0.89	0.88	0.97	0.99	0.96	0.99	1.00
	1.50	0.54	0.56	0.95	0.95	0.99	1.00	0.96	0.99	0.99	1.00	1.00	1.00	1.00	1.00
	2.00	0.87	0.80	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.50	0.98	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	0.00	0.00	0.05	0.05	0.05	0.05	0.12	0.06	0.05	0.06	0.05	0.05	0.05	0.05	0.05
	0.50	0.01	0.13	0.39	0.38	0.48	0.65	0.39	0.48	0.48	0.66	0.69	0.61	0.71	0.79
	1.00	0.22	0.36	0.88	0.87	0.95	0.98	0.88	0.95	0.95	1.00	1.00	0.99	1.00	1.00
	1.50	0.71	0.65	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.00	0.96	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.50	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	0.00	0.00	0.05	0.05	0.05	0.05	0.11	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05
	0.50	0.01	0.14	0.48	0.47	0.57	0.71	0.49	0.57	0.57	0.74	0.78	0.71	0.79	0.85
	1.00	0.30	0.40	0.95	0.94	0.98	0.99	0.95	0.98	0.98	1.00	1.00	1.00	1.00	1.00
	1.50	0.83	0.72	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.00	0.99	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 45: Power, r = .99, small n, noninal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
4	0.00	0.00	0.05	0.05	0.04	0.05	0.41	0.05	0.92	0.09	0.05	0.05	0.05	0.05	0.05
	0.50	0.00	0.07	0.06	0.06	0.18	0.50	0.06	0.92	0.21	0.17	0.21	0.22	0.49	0.94
	1.00	0.02	0.10	0.10	0.09	0.41	0.71	0.10	0.93	0.43	0.33	0.39	0.42	0.92	1.00
	1.50	0.05	0.15	0.15	0.14	0.62	0.87	0.15	0.93	0.64	0.47	0.56	0.60	1.00	1.00
	2.00	0.10	0.22	0.20	0.19	0.78	0.96	0.20	0.93	0.79	0.59	0.69	0.73	1.00	1.00
	2.50	0.17	0.30	0.25	0.23	0.89	0.99	0.25	0.94	0.89	0.70	0.80	0.84	1.00	1.00
	3.00	0.26	0.39	0.29	0.27	0.95	1.00	0.30	0.95	0.95	0.78	0.87	0.90	1.00	1.00
6	0.00	0.00	0.05	0.06	0.04	0.05	0.48	0.06	0.25	0.09	0.05	0.05	0.05	0.05	0.05
	0.50	0.00	0.08	0.15	0.12	0.28	0.69	0.15	0.47	0.31	0.71	0.80	0.62	0.89	0.99
	1.00	0.04	0.16	0.37	0.29	0.65	0.92	0.37	0.80	0.67	0.98	1.00	0.98	1.00	1.00
	1.50	0.17	0.30	0.60	0.50	0.89	0.99	0.60	0.95	0.89	1.00	1.00	1.00	1.00	1.00
	2.00	0.39	0.46	0.77	0.68	0.98	1.00	0.77	0.99	0.98	1.00	1.00	1.00	1.00	1.00
	2.50	0.61	0.64	0.89	0.82	1.00	1.00	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	0.79	0.78	0.95	0.90	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
8	0.00	0.00	0.05	0.05	0.04	0.05	0.45	0.05	0.15	0.08	0.05	0.05	0.05	0.05	0.05
	0.50	0.00	0.09	0.27	0.23	0.40	0.79	0.27	0.52	0.43	0.94	0.97	0.90	0.98	1.00
	1.00	0.07	0.22	0.67	0.60	0.85	0.98	0.67	0.92	0.86	1.00	1.00	1.00	1.00	1.00
	1.50	0.34	0.43	0.90	0.86	0.98	1.00	0.90	1.00	0.98	1.00	1.00	1.00	1.00	1.00
	2.00	0.67	0.65	0.98	0.96	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.50	0.89	0.83	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	0.97	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 45 continued: Power, r = .99, small *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
10	0.00	0.00	0.05	0.05	0.04	0.05	0.42	0.05	0.12	0.08	0.05	0.05	0.05	0.05	0.05
	0.50	0.00	0.11	0.43	0.39	0.54	0.87	0.43	0.63	0.56	0.99	1.00	0.98	1.00	1.00
	1.00	0.12	0.29	0.87	0.84	0.96	1.00	0.87	0.98	0.95	1.00	1.00	1.00	1.00	1.00
	1.50	0.54	0.55	0.98	0.97	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.00	0.88	0.79	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.50	0.98	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
12	0.00	0.00	0.05	0.05	0.04	0.05	0.38	0.05	0.10	0.08	0.05	0.05	0.05	0.05	0.05
	0.50	0.00	0.12	0.59	0.56	0.68	0.93	0.59	0.75	0.69	1.00	1.00	1.00	1.00	1.00
	1.00	0.19	0.35	0.96	0.95	0.99	1.00	0.96	1.00	0.99	1.00	1.00	1.00	1.00	1.00
	1.50	0.72	0.65	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.00	0.97	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.50	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
14	0.00	0.00	0.05	0.05	0.04	0.05	0.35	0.05	0.09	0.08	0.05	0.05	0.05	0.05	0.05
	0.50	0.00	0.14	0.74	0.71	0.80	0.97	0.74	0.85	0.80	1.00	1.00	1.00	1.00	1.00
	1.00	0.28	0.40	0.99	0.98	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	0.85	0.73	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.00	0.99	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	2.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	3.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 46: Power, r = .40, large n, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled						
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Noncentral t Paired	Noncentral t Pooled	Normal
12	0.00	0.03	0.05	0.04	0.05	0.04	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05	0.05
	0.25	0.05	0.07	0.06	0.06	0.06	0.06	0.06	0.08	0.06	0.07	0.07	0.07	0.07	0.08
	0.50	0.10	0.12	0.11	0.12	0.13	0.13	0.11	0.15	0.13	0.12	0.13	0.12	0.14	0.16
	0.75	0.19	0.22	0.19	0.21	0.23	0.24	0.20	0.27	0.24	0.22	0.24	0.21	0.25	0.29
	1.00	0.32	0.34	0.31	0.33	0.38	0.39	0.32	0.42	0.38	0.36	0.38	0.34	0.40	0.47
	1.25	0.49	0.49	0.45	0.47	0.55	0.56	0.46	0.59	0.55	0.51	0.55	0.48	0.57	0.66
	1.50	0.65	0.64	0.59	0.61	0.71	0.72	0.61	0.75	0.72	0.66	0.71	0.62	0.72	0.81
24	0.00	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	0.25	0.07	0.09	0.09	0.09	0.10	0.10	0.09	0.11	0.10	0.10	0.10	0.09	0.10	0.10
	0.50	0.20	0.21	0.23	0.23	0.25	0.25	0.23	0.27	0.25	0.23	0.25	0.23	0.25	0.27
	0.75	0.41	0.42	0.45	0.45	0.48	0.48	0.45	0.50	0.48	0.46	0.48	0.45	0.48	0.52
	1.00	0.66	0.65	0.68	0.68	0.72	0.72	0.68	0.74	0.72	0.70	0.72	0.68	0.72	0.76
	1.25	0.85	0.84	0.85	0.86	0.89	0.89	0.86	0.90	0.89	0.87	0.89	0.86	0.89	0.92
	1.50	0.95	0.94	0.95	0.95	0.97	0.97	0.95	0.97	0.97	0.96	0.97	0.95	0.97	0.98
36	0.00	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	0.25	0.09	0.11	0.12	0.12	0.13	0.13	0.12	0.13	0.13	0.12	0.13	0.12	0.13	0.13
	0.50	0.30	0.30	0.34	0.34	0.36	0.36	0.34	0.37	0.36	0.34	0.36	0.34	0.36	0.37
	0.75	0.59	0.58	0.63	0.63	0.66	0.66	0.63	0.67	0.66	0.65	0.66	0.64	0.66	0.69
	1.00	0.85	0.83	0.87	0.87	0.89	0.89	0.87	0.89	0.89	0.88	0.89	0.87	0.89	0.91
	1.25	0.96	0.95	0.97	0.97	0.98	0.98	0.97	0.98	0.98	0.97	0.98	0.97	0.98	0.98
	1.50	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 46 continued: Power, r = .40, large *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
48	0.00	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05	0.05
	0.25	0.12	0.14	0.15	0.15	0.16	0.16	0.15	0.16	0.16	0.15	0.16	0.15	0.15	0.16
	0.50	0.39	0.40	0.45	0.44	0.46	0.46	0.44	0.47	0.46	0.45	0.46	0.44	0.46	0.47
	0.75	0.73	0.72	0.77	0.77	0.79	0.79	0.77	0.79	0.79	0.79	0.79	0.77	0.79	0.81
	1.00	0.94	0.93	0.95	0.95	0.96	0.96	0.95	0.96	0.96	0.95	0.96	0.95	0.96	0.97
	1.25	0.99	0.99	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	0.99	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
72	0.00	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	0.25	0.16	0.18	0.20	0.20	0.21	0.20	0.20	0.21	0.21	0.20	0.21	0.20	0.21	0.21
	0.50	0.55	0.56	0.61	0.61	0.62	0.62	0.61	0.63	0.62	0.63	0.62	0.61	0.63	0.64
	0.75	0.90	0.88	0.92	0.92	0.93	0.93	0.92	0.93	0.93	0.93	0.93	0.92	0.93	0.93
	1.00	0.99	0.99	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	0.99	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
96	0.00	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	0.25	0.21	0.22	0.26	0.26	0.27	0.26	0.26	0.27	0.27	0.26	0.26	0.26	0.26	0.27
	0.50	0.69	0.68	0.75	0.74	0.75	0.75	0.74	0.75	0.75	0.75	0.75	0.74	0.75	0.76
	0.75	0.96	0.95	0.97	0.97	0.98	0.98	0.97	0.98	0.98	0.98	0.98	0.98	0.98	0.98
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 47: Power, r = .50, large *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled						
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Noncentral t Paired	Noncentral t Pooled	Normal
12	0.00	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05	0.05
	0.25	0.05	0.06	0.06	0.06	0.08	0.08	0.06	0.09	0.08	0.07	0.08	0.07	0.07	0.08
	0.50	0.10	0.12	0.12	0.12	0.15	0.15	0.12	0.17	0.15	0.13	0.15	0.13	0.15	0.17
	0.75	0.19	0.21	0.22	0.23	0.27	0.28	0.22	0.31	0.27	0.25	0.27	0.23	0.27	0.32
	1.00	0.33	0.35	0.35	0.36	0.42	0.43	0.36	0.47	0.43	0.40	0.43	0.37	0.44	0.52
	1.25	0.49	0.51	0.50	0.52	0.60	0.60	0.51	0.64	0.60	0.57	0.61	0.52	0.62	0.71
	1.50	0.65	0.65	0.65	0.66	0.75	0.76	0.66	0.79	0.76	0.72	0.76	0.67	0.77	0.85
24	0.00	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	0.25	0.06	0.09	0.09	0.09	0.10	0.10	0.09	0.11	0.10	0.10	0.10	0.10	0.10	0.11
	0.50	0.17	0.22	0.24	0.24	0.26	0.26	0.24	0.28	0.26	0.26	0.26	0.25	0.27	0.29
	0.75	0.40	0.42	0.48	0.48	0.51	0.52	0.48	0.53	0.52	0.50	0.52	0.49	0.53	0.56
	1.00	0.66	0.64	0.72	0.72	0.75	0.76	0.72	0.77	0.76	0.75	0.76	0.73	0.77	0.81
	1.25	0.86	0.83	0.89	0.89	0.92	0.92	0.89	0.92	0.92	0.90	0.92	0.90	0.92	0.94
	1.50	0.96	0.94	0.97	0.97	0.98	0.98	0.97	0.98	0.98	0.97	0.98	0.97	0.98	0.99
36	0.00	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	0.25	0.08	0.11	0.13	0.13	0.13	0.13	0.13	0.14	0.13	0.13	0.14	0.13	0.13	0.14
	0.50	0.28	0.31	0.37	0.37	0.38	0.38	0.37	0.39	0.38	0.38	0.38	0.37	0.39	0.41
	0.75	0.59	0.59	0.68	0.68	0.71	0.71	0.68	0.72	0.71	0.70	0.71	0.69	0.71	0.74
	1.00	0.86	0.83	0.90	0.90	0.92	0.92	0.90	0.92	0.92	0.91	0.92	0.90	0.92	0.93
	1.25	0.97	0.96	0.98	0.98	0.99	0.99	0.98	0.99	0.99	0.98	0.99	0.98	0.99	0.99
	1.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 47 continued: Power, r = .50, large *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
48	0.00	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05	0.05
	0.25	0.10	0.14	0.16	0.16	0.16	0.16	0.16	0.17	0.17	0.16	0.17	0.16	0.17	0.17
	0.50	0.38	0.39	0.48	0.48	0.50	0.50	0.48	0.51	0.50	0.49	0.50	0.48	0.50	0.52
	0.75	0.75	0.72	0.82	0.82	0.83	0.83	0.82	0.84	0.83	0.83	0.83	0.82	0.84	0.85
	1.00	0.94	0.93	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.98
	1.25	0.99	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
72	0.00	0.03	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	0.25	0.14	0.18	0.22	0.22	0.22	0.22	0.22	0.23	0.23	0.22	0.23	0.22	0.23	0.23
	0.50	0.55	0.55	0.66	0.66	0.67	0.67	0.66	0.68	0.67	0.67	0.67	0.66	0.68	0.69
	0.75	0.91	0.88	0.94	0.94	0.95	0.95	0.94	0.95	0.95	0.95	0.95	0.95	0.95	0.96
	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
96	0.00	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	0.25	0.20	0.23	0.28	0.29	0.29	0.29	0.29	0.29	0.29	0.28	0.29	0.28	0.29	0.29
	0.50	0.71	0.68	0.80	0.80	0.80	0.80	0.80	0.81	0.81	0.79	0.81	0.79	0.80	0.81
	0.75	0.98	0.95	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 48: Power, r = .60, large *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
12	0.00	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05	0.05
	0.25	0.03	0.07	0.07	0.07	0.08	0.08	0.07	0.09	0.08	0.07	0.07	0.07	0.08	0.08
	0.50	0.08	0.12	0.13	0.14	0.15	0.16	0.14	0.18	0.16	0.15	0.16	0.14	0.17	0.19
	0.75	0.17	0.22	0.24	0.25	0.29	0.30	0.25	0.34	0.29	0.28	0.30	0.26	0.31	0.37
	1.00	0.31	0.35	0.39	0.40	0.48	0.49	0.39	0.52	0.48	0.45	0.48	0.42	0.50	0.58
	1.25	0.48	0.50	0.55	0.56	0.66	0.67	0.56	0.71	0.66	0.63	0.67	0.59	0.68	0.77
	1.50	0.66	0.65	0.71	0.72	0.81	0.82	0.71	0.84	0.81	0.78	0.82	0.74	0.83	0.90
24	0.00	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05	0.05
	0.25	0.05	0.09	0.10	0.11	0.11	0.11	0.11	0.12	0.11	0.11	0.11	0.11	0.11	0.12
	0.50	0.17	0.22	0.28	0.28	0.31	0.31	0.28	0.33	0.31	0.30	0.31	0.29	0.31	0.33
	0.75	0.41	0.42	0.54	0.54	0.59	0.59	0.55	0.61	0.59	0.57	0.59	0.55	0.59	0.63
	1.00	0.67	0.65	0.79	0.79	0.83	0.83	0.79	0.84	0.83	0.81	0.83	0.80	0.83	0.86
	1.25	0.88	0.83	0.93	0.93	0.95	0.95	0.93	0.96	0.95	0.94	0.95	0.94	0.96	0.97
	1.50	0.97	0.94	0.98	0.98	0.99	0.99	0.98	0.99	0.99	0.99	0.99	0.99	0.99	1.00
36	0.00	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	0.25	0.06	0.11	0.14	0.14	0.15	0.15	0.15	0.16	0.15	0.14	0.15	0.14	0.15	0.16
	0.50	0.27	0.30	0.42	0.42	0.45	0.45	0.42	0.46	0.45	0.43	0.44	0.42	0.45	0.47
	0.75	0.61	0.59	0.75	0.75	0.78	0.77	0.75	0.79	0.77	0.76	0.78	0.76	0.78	0.80
	1.00	0.87	0.83	0.94	0.94	0.95	0.95	0.94	0.95	0.95	0.95	0.95	0.94	0.95	0.96
	1.25	0.98	0.95	0.99	0.99	1.00	1.00	0.99	1.00	0.99	0.99	0.99	0.99	1.00	1.00
	1.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 48 continued: Power, r = .60, large *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
48	0.00	0.02	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	0.25	0.08	0.14	0.18	0.17	0.18	0.18	0.18	0.19	0.18	0.18	0.18	0.18	0.19	0.19
	0.50	0.36	0.39	0.53	0.53	0.55	0.55	0.53	0.57	0.56	0.55	0.56	0.55	0.56	0.58
	0.75	0.75	0.72	0.87	0.87	0.89	0.89	0.87	0.89	0.89	0.88	0.89	0.87	0.89	0.90
	1.00	0.96	0.92	0.98	0.98	0.99	0.99	0.98	0.99	0.99	0.99	0.99	0.99	0.99	0.99
	1.25	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
72	0.00	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	0.25	0.13	0.18	0.25	0.25	0.26	0.26	0.25	0.26	0.26	0.25	0.26	0.25	0.26	0.26
	0.50	0.56	0.55	0.73	0.73	0.74	0.74	0.73	0.75	0.74	0.74	0.74	0.73	0.74	0.76
	0.75	0.93	0.88	0.97	0.97	0.98	0.97	0.97	0.98	0.97	0.97	0.98	0.97	0.98	0.98
	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
96	0.00	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	0.25	0.18	0.23	0.32	0.32	0.33	0.33	0.32	0.33	0.33	0.32	0.33	0.32	0.33	0.33
	0.50	0.71	0.67	0.84	0.84	0.85	0.85	0.84	0.85	0.85	0.85	0.85	0.85	0.86	0.86
	0.75	0.98	0.95	0.99	0.99	1.00	1.00	0.99	1.00	1.00	0.99	1.00	0.99	1.00	1.00
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 49: Power, $\rho = .70$, large n, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
12	0.00	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05	0.05
	0.25	0.02	0.07	0.07	0.07	0.08	0.08	0.07	0.10	0.08	0.08	0.08	0.08	0.09	0.09
	0.50	0.06	0.12	0.15	0.15	0.18	0.19	0.15	0.21	0.18	0.18	0.18	0.17	0.20	0.23
	0.75	0.15	0.22	0.28	0.29	0.35	0.36	0.28	0.39	0.35	0.34	0.36	0.32	0.38	0.44
	1.00	0.29	0.35	0.45	0.46	0.55	0.57	0.46	0.59	0.55	0.54	0.57	0.50	0.59	0.68
	1.25	0.47	0.49	0.64	0.64	0.74	0.76	0.64	0.78	0.74	0.73	0.76	0.68	0.78	0.86
	1.50	0.66	0.65	0.78	0.79	0.88	0.88	0.79	0.90	0.88	0.86	0.90	0.83	0.91	0.95
24	0.00	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	0.25	0.03	0.09	0.12	0.12	0.13	0.13	0.12	0.14	0.13	0.12	0.13	0.12	0.13	0.14
	0.50	0.14	0.21	0.33	0.33	0.35	0.36	0.33	0.38	0.35	0.36	0.36	0.35	0.37	0.40
	0.75	0.37	0.42	0.62	0.62	0.66	0.67	0.62	0.69	0.67	0.67	0.68	0.65	0.69	0.73
	1.00	0.68	0.65	0.86	0.86	0.89	0.89	0.86	0.90	0.89	0.89	0.90	0.88	0.91	0.93
	1.25	0.89	0.83	0.97	0.97	0.98	0.98	0.97	0.98	0.98	0.98	0.98	0.97	0.98	0.99
	1.50	0.98	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
36	0.00	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	0.25	0.05	0.12	0.16	0.16	0.17	0.17	0.16	0.18	0.17	0.17	0.17	0.17	0.18	0.18
	0.50	0.24	0.31	0.50	0.49	0.52	0.52	0.50	0.54	0.52	0.52	0.53	0.51	0.53	0.56
	0.75	0.61	0.59	0.84	0.83	0.85	0.86	0.84	0.86	0.85	0.85	0.86	0.84	0.86	0.88
	1.00	0.90	0.83	0.97	0.97	0.98	0.98	0.97	0.98	0.98	0.98	0.98	0.98	0.98	0.99
	1.25	0.99	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 49 continued: Power, ρ = .70, large *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled						
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Noncentral t Paired	Noncentral t Pooled	Normal
48	0.00	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.04	0.05	0.05	0.05	0.05
	0.25	0.06	0.14	0.21	0.21	0.21	0.21	0.21	0.22	0.22	0.22	0.22	0.21	0.22	0.23
	0.50	0.35	0.40	0.63	0.63	0.65	0.66	0.63	0.66	0.66	0.65	0.66	0.64	0.66	0.68
	0.75	0.78	0.73	0.94	0.94	0.94	0.94	0.94	0.95	0.94	0.94	0.95	0.94	0.95	0.95
	1.00	0.97	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
72	0.00	0.01	0.05	0.05	0.05	0.05	0.06	0.05	0.06	0.06	0.05	0.05	0.05	0.05	0.05
	0.25	0.11	0.18	0.31	0.31	0.31	0.31	0.31	0.32	0.32	0.30	0.32	0.30	0.31	0.32
	0.50	0.57	0.55	0.82	0.82	0.83	0.84	0.82	0.84	0.83	0.82	0.84	0.82	0.83	0.84
	0.75	0.94	0.88	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
96	0.00	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	0.25	0.15	0.23	0.39	0.39	0.39	0.40	0.39	0.40	0.40	0.39	0.40	0.39	0.40	0.40
	0.50	0.74	0.68	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93
	0.75	0.99	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 50: Power, r = .80, large n, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
12	0.00	0.01	0.05	0.05	0.05	0.05	0.06	0.05	0.07	0.06	0.05	0.05	0.05	0.05	0.05
	0.25	0.01	0.07	0.09	0.09	0.10	0.11	0.09	0.12	0.10	0.09	0.10	0.09	0.10	0.11
	0.50	0.05	0.12	0.19	0.19	0.24	0.26	0.19	0.27	0.24	0.24	0.25	0.22	0.26	0.30
	0.75	0.12	0.22	0.36	0.37	0.45	0.48	0.37	0.50	0.46	0.46	0.49	0.42	0.50	0.58
	1.00	0.28	0.35	0.56	0.57	0.68	0.71	0.57	0.72	0.68	0.68	0.73	0.64	0.74	0.82
	1.25	0.47	0.50	0.75	0.75	0.86	0.87	0.75	0.88	0.86	0.85	0.89	0.82	0.90	0.95
	1.50	0.68	0.65	0.88	0.88	0.95	0.96	0.88	0.96	0.95	0.95	0.97	0.93	0.97	0.99
24	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.05	0.05	0.05	0.05	0.05
	0.25	0.02	0.09	0.14	0.14	0.15	0.16	0.15	0.17	0.16	0.15	0.16	0.15	0.16	0.18
	0.50	0.11	0.22	0.43	0.43	0.47	0.48	0.43	0.50	0.48	0.47	0.49	0.46	0.50	0.53
	0.75	0.36	0.42	0.76	0.76	0.81	0.82	0.76	0.82	0.81	0.80	0.83	0.80	0.83	0.86
	1.00	0.70	0.64	0.95	0.95	0.96	0.97	0.95	0.97	0.96	0.97	0.97	0.96	0.97	0.98
	1.25	0.92	0.82	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	0.99	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
36	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.05	0.05	0.05	0.05	0.05
	0.25	0.02	0.11	0.21	0.21	0.22	0.22	0.21	0.24	0.23	0.22	0.23	0.22	0.23	0.24
	0.50	0.21	0.30	0.63	0.63	0.65	0.66	0.63	0.67	0.66	0.66	0.68	0.65	0.68	0.71
	0.75	0.62	0.59	0.93	0.93	0.95	0.95	0.93	0.95	0.94	0.94	0.95	0.94	0.95	0.96
	1.00	0.93	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 50 continued: Power, r = .80, large *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
48	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.05	0.05	0.05	0.05
	0.25	0.04	0.14	0.27	0.27	0.28	0.29	0.27	0.29	0.29	0.29	0.29	0.28	0.29	0.30
	0.50	0.33	0.39	0.77	0.77	0.79	0.80	0.77	0.80	0.80	0.80	0.80	0.79	0.81	0.82
	0.75	0.82	0.71	0.98	0.98	0.98	0.99	0.98	0.99	0.98	0.99	0.99	0.99	0.99	0.99
	1.00	0.98	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
72	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05
	0.25	0.07	0.18	0.39	0.40	0.41	0.41	0.40	0.41	0.42	0.42	0.41	0.41	0.41	0.42
	0.50	0.58	0.55	0.92	0.92	0.93	0.93	0.92	0.93	0.93	0.94	0.94	0.93	0.94	0.94
	0.75	0.97	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
96	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05
	0.25	0.11	0.23	0.51	0.51	0.51	0.52	0.51	0.52	0.52	0.52	0.52	0.52	0.52	0.53
	0.50	0.77	0.67	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
	0.75	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 51: Power, r = .85, large n, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
12	0.00	0.00	0.05	0.05	0.05	0.05	0.07	0.05	0.06	0.06	0.05	0.05	0.05	0.05	0.05
	0.25	0.01	0.07	0.09	0.09	0.10	0.13	0.09	0.13	0.12	0.11	0.11	0.10	0.12	0.13
	0.50	0.03	0.13	0.22	0.22	0.27	0.32	0.22	0.30	0.29	0.28	0.30	0.27	0.32	0.38
	0.75	0.11	0.22	0.42	0.42	0.51	0.57	0.42	0.56	0.53	0.55	0.59	0.51	0.60	0.69
	1.00	0.26	0.36	0.64	0.64	0.75	0.81	0.65	0.80	0.76	0.79	0.83	0.75	0.84	0.91
	1.25	0.47	0.51	0.83	0.83	0.92	0.94	0.83	0.93	0.92	0.93	0.95	0.90	0.96	0.98
	1.50	0.68	0.66	0.93	0.93	0.98	0.99	0.93	0.98	0.97	0.98	0.99	0.97	0.99	1.00
24	0.00	0.00	0.05	0.05	0.04	0.05	0.05	0.05	0.06	0.06	0.05	0.05	0.05	0.05	0.05
	0.25	0.01	0.09	0.18	0.17	0.19	0.20	0.17	0.21	0.21	0.20	0.20	0.19	0.20	0.21
	0.50	0.09	0.22	0.53	0.53	0.57	0.59	0.53	0.60	0.58	0.58	0.60	0.56	0.60	0.64
	0.75	0.36	0.43	0.85	0.85	0.89	0.90	0.85	0.90	0.88	0.91	0.91	0.89	0.91	0.94
	1.00	0.72	0.66	0.98	0.98	0.99	0.99	0.98	0.99	0.99	0.99	0.99	0.99	0.99	1.00
	1.25	0.94	0.84	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	0.99	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
36	0.00	0.00	0.05	0.06	0.06	0.05	0.06	0.06	0.06	0.07	0.05	0.05	0.05	0.05	0.05
	0.25	0.01	0.11	0.26	0.25	0.27	0.28	0.25	0.29	0.29	0.27	0.28	0.27	0.28	0.30
	0.50	0.19	0.30	0.74	0.73	0.77	0.78	0.74	0.78	0.77	0.78	0.79	0.77	0.79	0.81
	0.75	0.64	0.58	0.97	0.97	0.98	0.98	0.97	0.98	0.98	0.99	0.98	0.98	0.99	0.99
	1.00	0.95	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 51 continued: Power, r = .85, large *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
48	0.00	0.00	0.05	0.06	0.05	0.05	0.05	0.05	0.06	0.07	0.05	0.06	0.05	0.05	0.05
	0.25	0.02	0.13	0.34	0.34	0.36	0.36	0.34	0.37	0.37	0.36	0.37	0.35	0.36	0.38
	0.50	0.32	0.40	0.87	0.86	0.89	0.89	0.87	0.89	0.88	0.89	0.90	0.88	0.90	0.91
	0.75	0.84	0.72	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	0.99	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
72	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05
	0.25	0.05	0.18	0.50	0.50	0.51	0.51	0.50	0.51	0.52	0.51	0.51	0.50	0.51	0.52
	0.50	0.59	0.55	0.97	0.97	0.97	0.98	0.97	0.98	0.97	0.98	0.98	0.97	0.98	0.98
	0.75	0.98	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
96	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.07	0.05	0.05	0.05	0.05	0.05
	0.25	0.09	0.23	0.62	0.61	0.62	0.62	0.61	0.63	0.63	0.63	0.63	0.62	0.63	0.64
	0.50	0.79	0.68	0.99	0.99	1.00	1.00	0.99	0.99	0.99	1.00	1.00	1.00	1.00	1.00
	0.75	1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 52: Power, r = .90, large *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
12	0.00	0.00	0.05	0.05	0.05	0.05	0.08	0.05	0.06	0.06	0.05	0.05	0.05	0.05	0.05
	0.25	0.00	0.07	0.10	0.10	0.12	0.17	0.10	0.14	0.14	0.14	0.14	0.13	0.15	0.17
	0.50	0.02	0.12	0.26	0.26	0.34	0.42	0.27	0.38	0.37	0.40	0.43	0.36	0.43	0.51
	0.75	0.09	0.22	0.52	0.52	0.64	0.71	0.53	0.68	0.65	0.72	0.75	0.67	0.77	0.85
	1.00	0.24	0.35	0.75	0.75	0.86	0.91	0.76	0.89	0.86	0.91	0.94	0.88	0.95	0.98
	1.25	0.47	0.51	0.90	0.90	0.96	0.98	0.90	0.97	0.97	0.98	0.99	0.97	0.99	1.00
	1.50	0.70	0.65	0.97	0.97	0.99	1.00	0.97	1.00	0.99	1.00	1.00	1.00	1.00	1.00
24	0.00	0.00	0.05	0.05	0.05	0.05	0.07	0.05	0.06	0.06	0.05	0.05	0.05	0.05	0.05
	0.25	0.00	0.09	0.22	0.22	0.24	0.27	0.22	0.27	0.26	0.26	0.27	0.25	0.27	0.29
	0.50	0.06	0.21	0.65	0.65	0.70	0.74	0.66	0.73	0.71	0.74	0.76	0.73	0.77	0.80
	0.75	0.33	0.41	0.94	0.94	0.96	0.97	0.94	0.97	0.96	0.98	0.98	0.97	0.98	0.99
	1.00	0.75	0.64	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	0.95	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
36	0.00	0.00	0.05	0.05	0.05	0.05	0.06	0.05	0.06	0.06	0.05	0.05	0.05	0.05	0.05
	0.25	0.01	0.11	0.34	0.34	0.35	0.38	0.34	0.39	0.37	0.38	0.39	0.37	0.39	0.41
	0.50	0.15	0.31	0.86	0.86	0.88	0.90	0.87	0.90	0.89	0.91	0.91	0.90	0.92	0.93
	0.75	0.65	0.59	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	0.96	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 52 continued Power, r = .90, large *n*, nominal size = .05

				Tight t												
				Known ρ				Unknown ρ			Analysis of covariance		"Theoretical" power		
				Paired		Pooled		Paired	Pooled						
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Noncentral t Paired	Noncentral t Pooled	Normal
48	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.05	0.05	0.05	0.05	0.05
	0.25	0.01	0.13	0.46	0.46	0.47	0.50	0.46	0.50	0.49	0.49	0.50	0.48	0.49	0.51
	0.50	0.29	0.40	0.96	0.96	0.97	0.97	0.96	0.97	0.96	0.97	0.97	0.97	0.97	0.98
	0.75	0.88	0.72	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
72	0.00	0.00	0.05	0.05	0.05	0.05	0.06	0.05	0.06	0.06	0.05	0.05	0.05	0.05	0.05
	0.25	0.02	0.19	0.63	0.63	0.65	0.66	0.63	0.66	0.65	0.66	0.66	0.66	0.67	0.68
	0.50	0.60	0.57	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.75	0.99	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
96	0.00	0.00	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05
	0.25	0.06	0.23	0.79	0.79	0.79	0.80	0.78	0.80	0.79	0.79	0.80	0.79	0.79	0.80
	0.50	0.85	0.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.75	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 53: Power, r = .95, large *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
12	0.00	0.00	0.05	0.05	0.05	0.06	0.13	0.05	0.06	0.06	0.05	0.05	0.05	0.05	0.05
	0.25	0.00	0.06	0.13	0.13	0.17	0.30	0.14	0.16	0.18	0.21	0.24	0.21	0.24	0.28
	0.50	0.01	0.12	0.38	0.37	0.48	0.64	0.39	0.48	0.48	0.65	0.69	0.61	0.71	0.79
	0.75	0.07	0.22	0.67	0.67	0.79	0.89	0.68	0.80	0.79	0.94	0.96	0.91	0.96	0.99
	1.00	0.22	0.35	0.88	0.87	0.95	0.98	0.88	0.96	0.95	0.99	1.00	0.99	1.00	1.00
	1.25	0.46	0.49	0.96	0.96	0.99	1.00	0.97	0.99	0.99	1.00	1.00	1.00	1.00	1.00
	1.50	0.70	0.64	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	0.00	0.00	0.05	0.05	0.05	0.05	0.09	0.05	0.05	0.06	0.05	0.06	0.05	0.05	0.05
	0.25	0.00	0.09	0.34	0.33	0.37	0.46	0.34	0.37	0.38	0.44	0.46	0.43	0.47	0.50
	0.50	0.03	0.22	0.86	0.85	0.89	0.93	0.86	0.90	0.89	0.95	0.96	0.95	0.96	0.98
	0.75	0.30	0.43	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	0.78	0.65	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	0.97	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
36	0.00	0.00	0.05	0.05	0.05	0.05	0.07	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05
	0.25	0.00	0.11	0.55	0.54	0.57	0.63	0.55	0.58	0.57	0.63	0.65	0.62	0.65	0.67
	0.50	0.10	0.30	0.98	0.98	0.99	0.99	0.98	0.99	0.98	1.00	1.00	0.99	1.00	1.00
	0.75	0.69	0.59	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	0.99	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 53 continued: Power, r = .95, large *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
48	0.00	0.00	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.07	0.05	0.05	0.05	0.05	0.05
	0.25	0.00	0.14	0.70	0.70	0.71	0.75	0.70	0.72	0.71	0.76	0.78	0.76	0.77	0.79
	0.50	0.23	0.40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.75	0.92	0.72	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	0.92	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
72	0.00	0.00	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.07	0.05	0.05	0.05	0.05	0.05
	0.25	0.00	0.18	0.88	0.88	0.89	0.91	0.88	0.90	0.88	0.91	0.92	0.91	0.92	0.92
	0.50	0.63	0.55	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.75	1.00	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
96	0.00	0.00	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.07	0.05	0.05	0.05	0.05	0.05
	0.25	0.02	0.23	0.96	0.96	0.96	0.97	0.96	0.96	0.95	0.97	0.97	0.97	0.97	0.98
	0.50	0.90	0.68	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.75	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 54: Power, r = .99, large *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
12	0.00	0.00	0.05	0.05	0.04	0.05	0.38	0.05	0.10	0.08	0.05	0.05	0.05	0.05	0.05
	0.25	0.00	0.07	0.22	0.20	0.26	0.65	0.22	0.32	0.29	0.74	0.78	0.69	0.79	0.87
	0.50	0.00	0.13	0.59	0.55	0.69	0.93	0.59	0.75	0.70	1.00	1.00	1.00	1.00	1.00
	0.75	0.04	0.22	0.85	0.83	0.93	0.99	0.85	0.96	0.93	1.00	1.00	1.00	1.00	1.00
	1.00	0.20	0.36	0.96	0.95	0.99	1.00	0.96	1.00	0.99	1.00	1.00	1.00	1.00	1.00
	1.25	0.46	0.51	0.99	0.99	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	0.72	0.66	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
24	0.00	0.00	0.05	0.05	0.04	0.05	0.24	0.05	0.07	0.08	0.05	0.05	0.05	0.05	0.05
	0.25	0.00	0.09	0.67	0.64	0.67	0.89	0.67	0.71	0.68	0.98	0.99	0.98	0.99	0.99
	0.50	0.01	0.22	0.98	0.98	1.00	1.00	0.98	1.00	0.99	1.00	1.00	1.00	1.00	1.00
	0.75	0.27	0.41	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	0.82	0.64	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	0.99	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	0.94	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
36	0.00	0.00	0.05	0.05	0.05	0.05	0.18	0.05	0.06	0.08	0.05	0.05	0.05	0.05	0.05
	0.25	0.00	0.11	0.91	0.91	0.93	0.98	0.91	0.94	0.92	1.00	1.00	1.00	1.00	1.00
	0.50	0.04	0.31	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.75	0.74	0.59	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	0.83	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 54 continued: Power, r = .99, large *n*, nominal size = .05

				Tight t							Analysis of covariance		"Theoretical" power		
				Known ρ				Unknown ρ							
				Paired		Pooled		Paired	Pooled				Noncentral t		
n	Δ/σ	Incorrect predictor sort	Standard random sampling pooled t	Sim.	t table	Sim.	t table	ρ estimated	ρ estimated	ρ from experience	Random sampling	Predictor sort	Paired	Pooled	Normal
48	0.00	0.00	0.05	0.05	0.05	0.05	0.14	0.05	0.05	0.08	0.05	0.05	0.05	0.05	0.05
	0.25	0.00	0.14	0.98	0.98	0.99	1.00	0.98	0.99	0.99	1.00	1.00	1.00	1.00	1.00
	0.50	0.15	0.40	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.75	0.97	0.73	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	0.93	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
72	0.00	0.00	0.05	0.05	0.04	0.05	0.11	0.05	0.05	0.08	0.05	0.05	0.05	0.05	0.05
	0.25	0.00	0.18	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.50	0.70	0.55	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.75	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
96	0.00	0.00	0.05	0.05	0.05	0.05	0.09	0.05	0.05	0.08	0.05	0.05	0.05	0.05	0.05
	0.25	0.00	0.22	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.50	0.98	0.68	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.75	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 55: Power, r = .95, n = 24, nominal size = .01, misspecified model

Approach	Δ/σ								
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
Tight paired t (ρ estimated)	.01	.02	.09	.24	.45	.65	.78	.87	.91
Tight pooled t (ρ estimated)	.00	.01	.05	.15	.33	.55	.73	.85	.92
ANCOVA (pred. sort)	.00	.00	.03	.12	.30	.53	.73	.86	.93

Table 56: Example data

i	MOE	MOR	Sorted MOE	Associated MOR	Pre-treatment MOR		Post-treatment MOR	
					A	B	A	B
1	2.23	6059	0.95	2857	2857		2357	
2	1.40	4740	1.06	3353		3353		3353
3	1.78	5015	1.12	2858		2858		2858
4	2.04	4259	1.19	4118	4118		3618	
5	2.02	6069	1.19	3247		3247		3247
6	1.89	3323	1.20	4035	4035		3535	
7	1.92	4943	1.26	3166	3166		2666	
8	1.85	4966	1.27	3995		3995		3995
9	2.20	5326	1.32	4270		4270		4270
10	1.32	4562	1.32	4562	4562		4062	
11	1.84	5948	1.35	4876	4876		4376	
12	1.66	5653	1.35	5023		5023		5023
13	2.00	4570	1.35	4132	4132		3632	
14	1.32	4270	1.37	4516		4516		4516
15	2.40	8411	1.38	4048	4048		3548	
16	0.95	2857	1.39	4566		4566		4566
17	1.12	2858	1.40	4740		4740		4740
18	1.94	4341	1.51	5931	5931		5431	
19	1.96	4334	1.51	4684	4684		4184	
20	2.08	5017	1.51	4377		4377		4377
21	2.02	4797	1.53	3414		3414		3414
22	2.06	6033	1.54	3891	3891		3391	
23	1.79	4584	1.56	4206	4206		3706	
24	1.19	4118	1.57	5114		5114		5114
25	2.05	4804	1.58	4033	4033		3533	
26	2.06	4679	1.59	4773		4773		4773
27	2.17	6704	1.61	3337		3337		3337
28	1.69	4346	1.61	3703	3703		3203	
29	1.20	4035	1.62	5338		5338		5338
30	1.98	5227	1.63	4627	4627		4127	

Table 56 continued: Example data

i	MOE	MOR	Sorted MOE	Associated MOR	Pre-treatment MOR		Post-treatment MOR	
					A	B	A	B
31	1.38	4048	1.66	3863		3863		3863
32	2.15	6075	1.66	5653	5653		5153	
33	1.54	3891	1.67	5006		5006		5006
34	2.06	4573	1.69	4346	4346		3846	
35	2.38	5707	1.69	3387	3387		2887	
36	1.66	3863	1.71	4960		4960		4960
37	2.52	6274	1.73	4106		4106		4106
38	1.51	4377	1.75	4459	4459		3959	
39	1.63	4627	1.76	3619		3619		3619
40	1.67	5006	1.76	4196	4196		3696	
41	2.24	5986	1.78	5015	5015		4515	
42	1.37	4516	1.79	4584		4584		4584
43	2.40	6969	1.81	5286		5286		5286
44	1.69	3387	1.84	5948	5948		5448	
45	1.76	4196	1.85	4966		4966		4966
46	1.88	6321	1.88	6321	6321		5821	
47	1.56	4206	1.88	5855		5855		5855
48	1.51	4684	1.89	3323	3323		2823	
49	1.97	4832	1.91	6291		6291		6291
50	1.61	3703	1.92	4943	4943		4443	
51	1.35	4132	1.94	4341	4341		3841	
52	1.61	3337	1.95	4793		4793		4793
53	2.33	5164	1.96	4334		4334		4334
54	1.26	3166	1.97	4832	4832		4332	
55	2.00	5966	1.98	5227		5227		5227
56	2.14	6009	2.00	5506	5506		5006	
57	2.32	6134	2.00	5966	5966		5466	
58	1.35	5023	2.00	5551		5551		5551
59	2.03	4333	2.00	4570		4570		4570
60	2.18	5340	2.02	4797	4797		4297	

Table 56 continued: Example data

i	MOE	MOR	Sorted MOE	Associated MOR	Pre-treatment MOR		Post-treatment MOR	
					A	B	A	B
61	1.35	4876	2.02	6069		6069		6069
62	2.18	6876	2.02	6936	6936		6436	
63	1.73	4106	2.03	4333	4333		3833	
64	1.53	3414	2.04	4259		4259		4259
65	2.25	7010	2.04	5514	5514		5014	
66	1.58	4033	2.05	4804		4804		4804
67	1.75	4459	2.06	4679		4679		4679
68	1.62	5338	2.06	6033	6033		5533	
69	2.20	5500	2.06	4573	4573		4073	
70	2.23	5716	2.08	5017		5017		5017
71	1.59	4773	2.12	6491		6491		6491
72	1.57	5114	2.14	6009	6009		5509	
73	1.76	3619	2.15	6075	6075		5575	
74	1.81	5286	2.17	6704		6704		6704
75	2.02	6936	2.18	6164	6164		5664	
76	2.04	5514	2.18	6876		6876		6876
77	1.06	3353	2.18	5340		5340		5340
78	1.88	5855	2.20	5500	5500		5000	
79	1.51	5931	2.20	5326	5326		4826	
80	1.27	3995	2.23	6059		6059		6059
81	1.91	6291	2.23	5716		5716		5716
82	2.00	5506	2.24	5986	5986		5486	
83	2.57	6476	2.25	7010		7010		7010
84	2.12	6491	2.32	6134	6134		5634	
85	2.18	6164	2.33	5164		5164		5164
86	1.39	4566	2.38	5707	5707		5207	
87	1.71	4960	2.40	6969		6969		6969
88	1.19	3247	2.40	8411	8411		7911	
89	2.00	5551	2.52	6274	6274		5774	
90	1.95	4793	2.57	6476		6476		6476