It is often desired to estimate the relative potencies of a number of drugs in a class that is based on some effect. For example, the agents might be vasodilators, or analgesics, or hormones, etc. Potency refers to the amount (mg, g, moles, etc.) of drug needed to produce a level of effect. Relative potency is the ratio of the amounts of each needed to produce the specified effect. Thus, one drug, the standard (S), is assigned unit potency and the second drug (U) is compared to that of S. The other drugs in the class are similarly compared.

The comparison is best made from the dose–response relations of each, or from the log dose–response relations of each.* The latter will often yield linear graphs as discussed in Procedure 8. If the relative potency is constant at each level of effect, the log dose–response lines will be parallel as in Figure 10.1. In practice, it may be necessary to construct parallel lines from the points of each as described in Procedure 7. The relative potency is determined from the horizontal distance \( d \) between the lines:

\[
\begin{align*}
  d &= \log(\text{dose})_u - \log(\text{dose})_s \\
  &= \log \left( \frac{\text{dose}_u}{\text{dose}_s} \right)
\end{align*}
\]

and

\[
\text{relative potency} = \frac{\text{dose}_u}{\text{dose}_s} = \text{antilog } d. \tag{10.1}
\]

A statistical analysis is given in Procedure 11. With reference to the lines of Figure 10.1, the determination of the relative potency of U to S is illustrated.

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* In this and the following procedure, graded dose–response data are used. Relative potency is also determined from quantal data as described in Procedure 9. (See also Procedures 46 and 47.)
The distance $d$ is determined by dropping perpendiculars to the horizontal axis from equieffective points on each line. Thus $d = 0.33 - 0.12 = 0.21$. Hence,

\[
\text{relative potency} = \text{antilog } (0.21) = 1.62.
\]

Simpler methods may be used to determine relative potency*. One such method is called a “2 and 2” dose assay. Doses $D_1$ and $D_2$ of drug $S$ are administered and the effects $E_s(1)$ and $E_s(2)$ are measured. Identical doses of drug $U$ are given and its effects $E_u(1)$ and $E_u(2)$ are determined. From these values parallel lines are constructed as shown in Figure 10.2. We denote by $x$ the quantity, $\log D_2 - \log D_1 = \log(D_2/D_1)$. The slope $m$ is the average of the slopes. Thus, for $U$ the slope is $[E_u(2) - E_u(1)]/x$ and for $S$ the slope is $[E_s(2) - E_s(1)]/x$. The average slope $m$ is given by $[E_s(2) - E_s(1) + E_u(2) - E_u(1)]/(2x)$. The

* This method is useful because of the simplicity of the computation (Eq. 10.2); procedure 11 is preferred when error estimates of the potency ratio are desired.