What Determines an Appropriate Fit between Theory and Data?

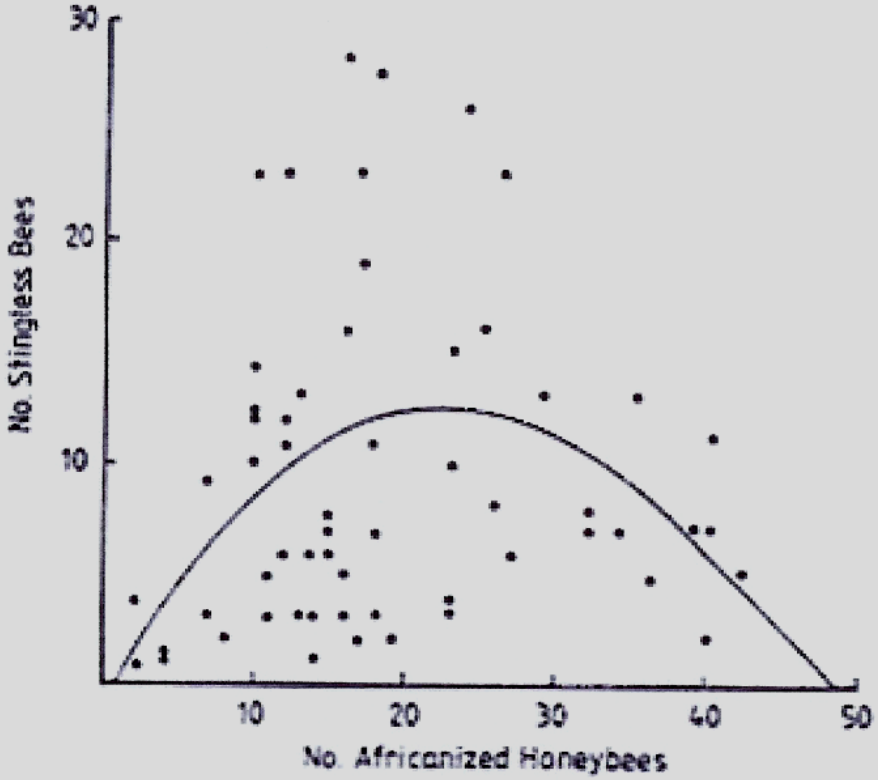

FIGURE 1. The relations of Africanized and stingless (meliponine) bee abundances on flowering *Melochia villosa*. The full line is a quadratic polynomial (given by $y = -0.316 + 1.08x - 0.023x^2$) which gave the best fit to the points.

Which is Correct, if Either ?

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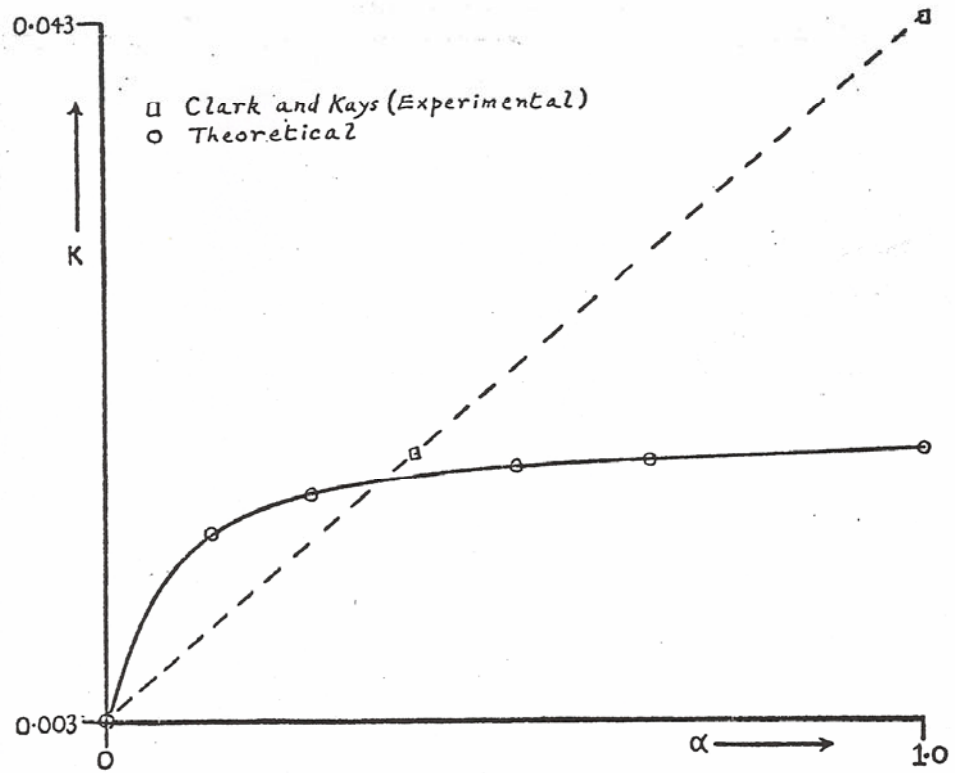


FIG. 1. *K* against aspect ratio for the case of constant wall temperature.

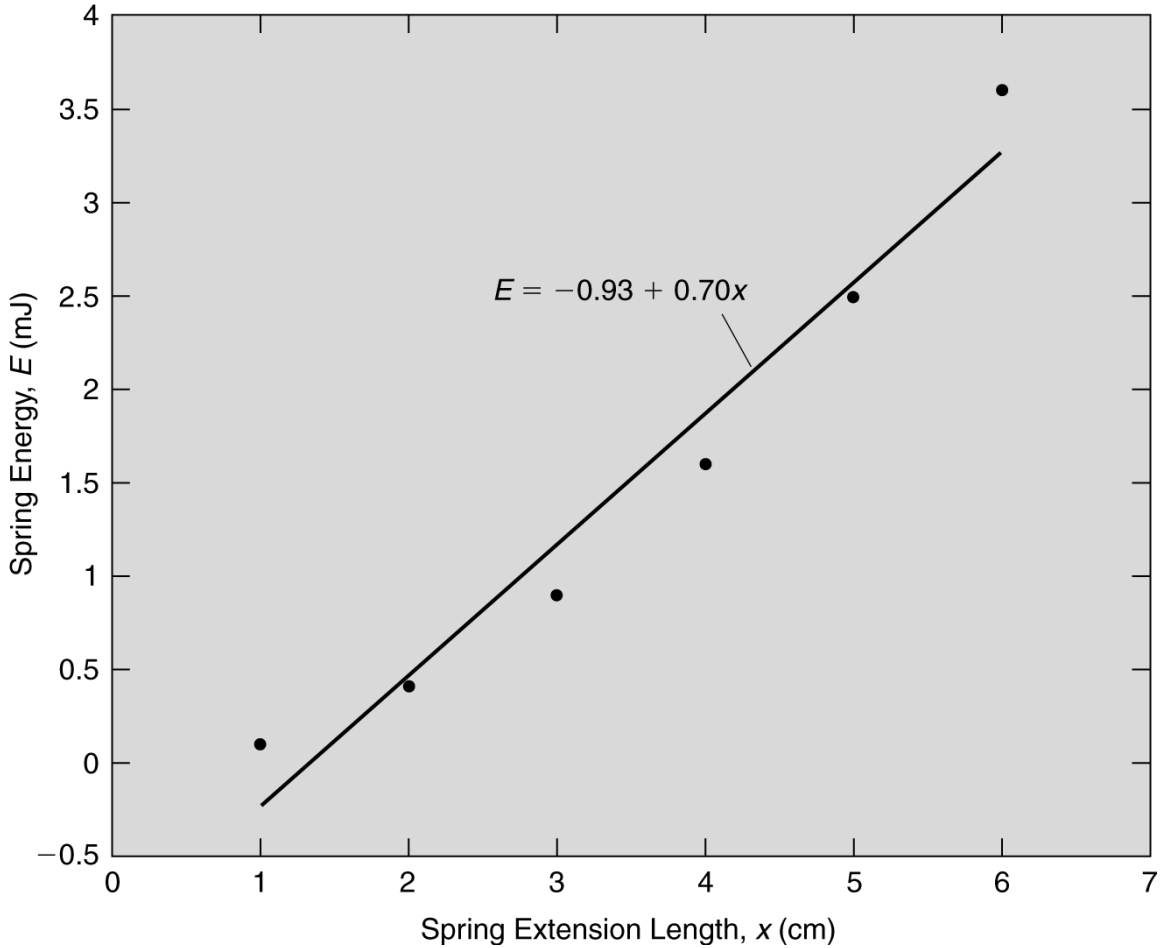
Determining an Appropriate Fit

- To determine a 'fit' between two variables (x and y), one must consider the *magnitudes of the uncertainties* in x and y (u_x and u_y) and *the underlying physical model*.
- There are 6 possibilities to consider:

Case	u_x	u_y	Correct Fit
1			yes
2			no
3			yes
4			no
5			yes
6			no

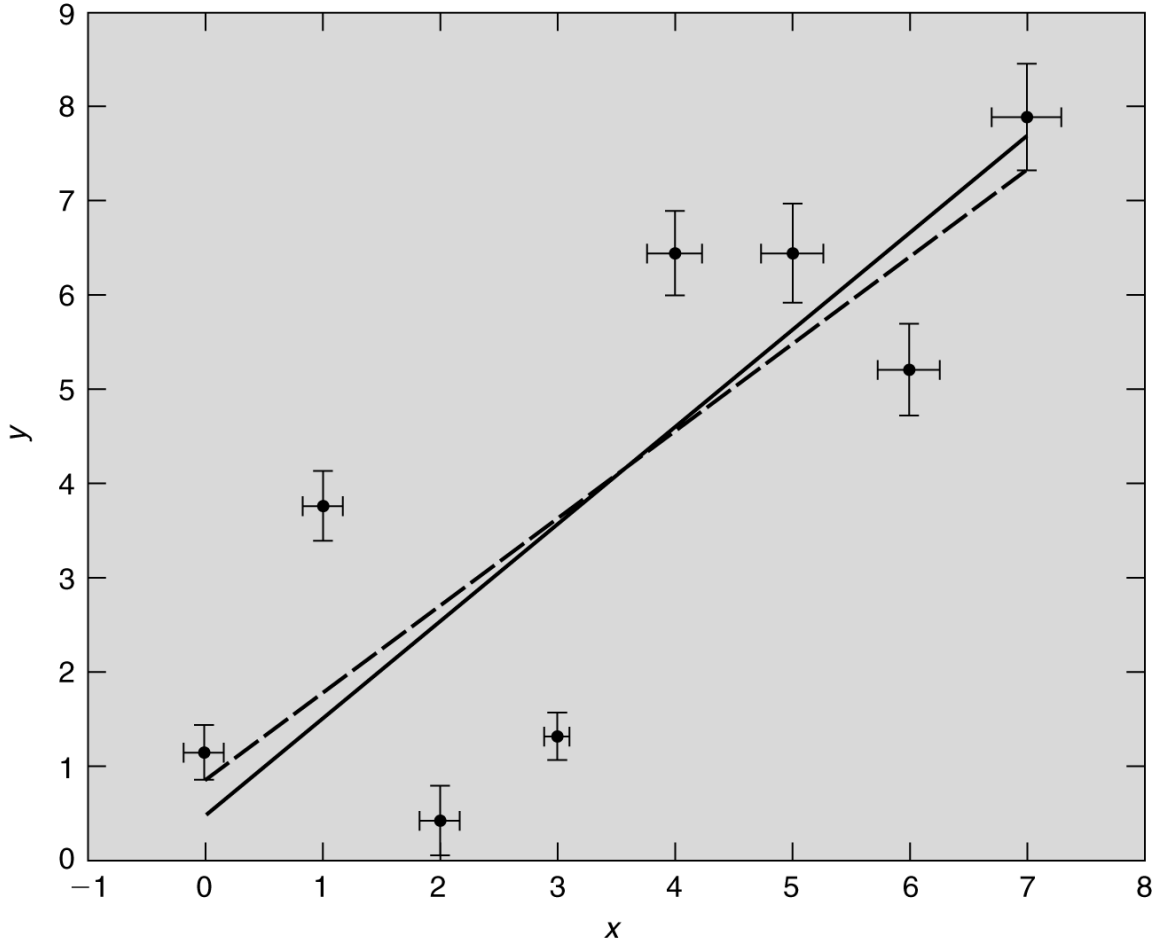
Case 2

- u_x=0; u_y=0, incorrect fit
- correct model: $E=0.5kx^2$



Case 5

- $u_x \neq 0$; $u_y \neq 0$, correct fit



Case 5

- when $\sigma_x^2/\sigma_y^2=\lambda$ is known