Some "non-linear" linear models

$$\hat{y} = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \ldots + \beta_n x_n$$

predicted y

intercept

"slopes along different parameters"

what can x_n be here? For example, I can say $x_4 = x_3^2$?

Put it all together with an example: Hubble’s Law

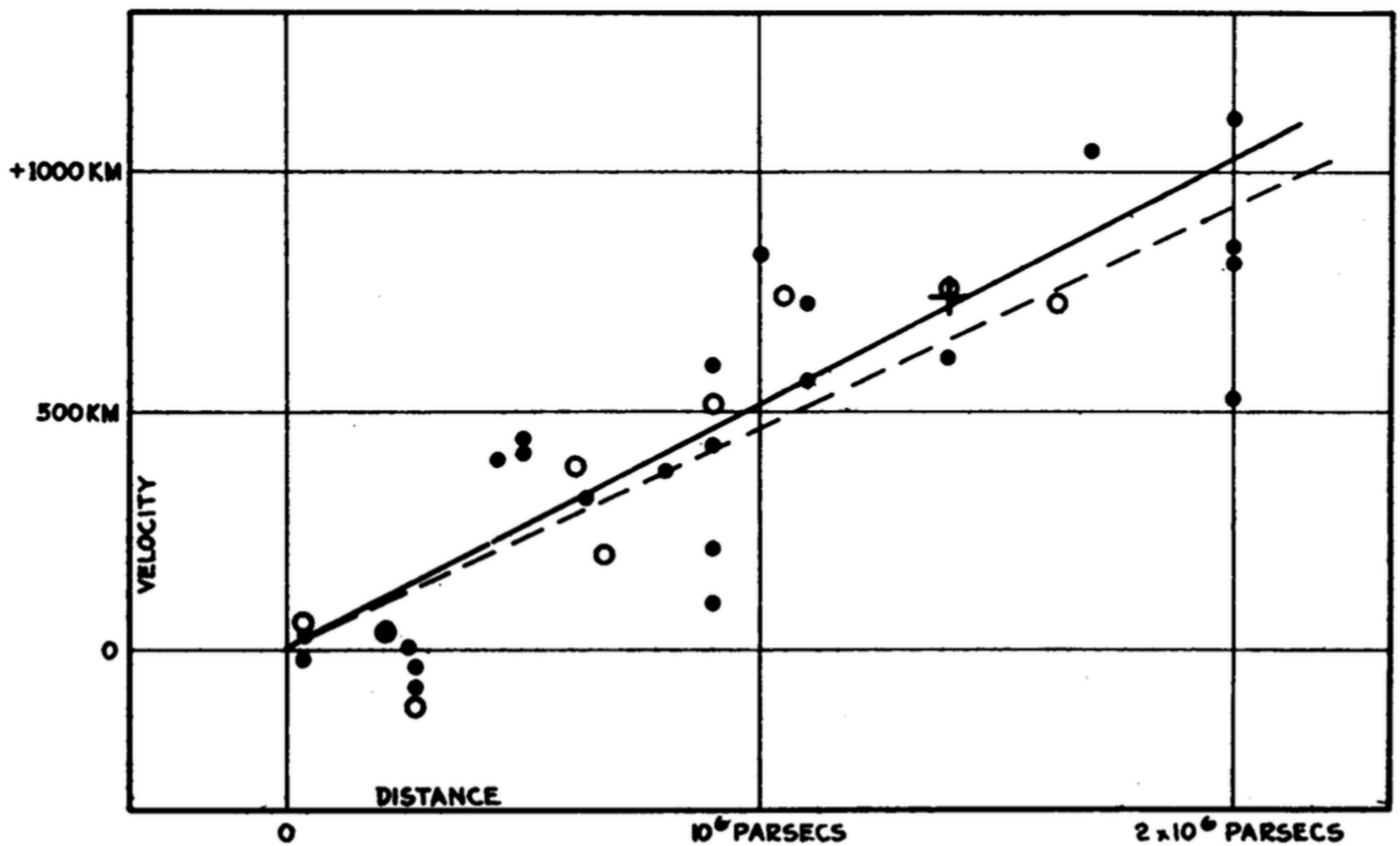

FIGURE 1

Velocity-Distance Relation among Extra-Galactic Nebulae.

Hubble 1929

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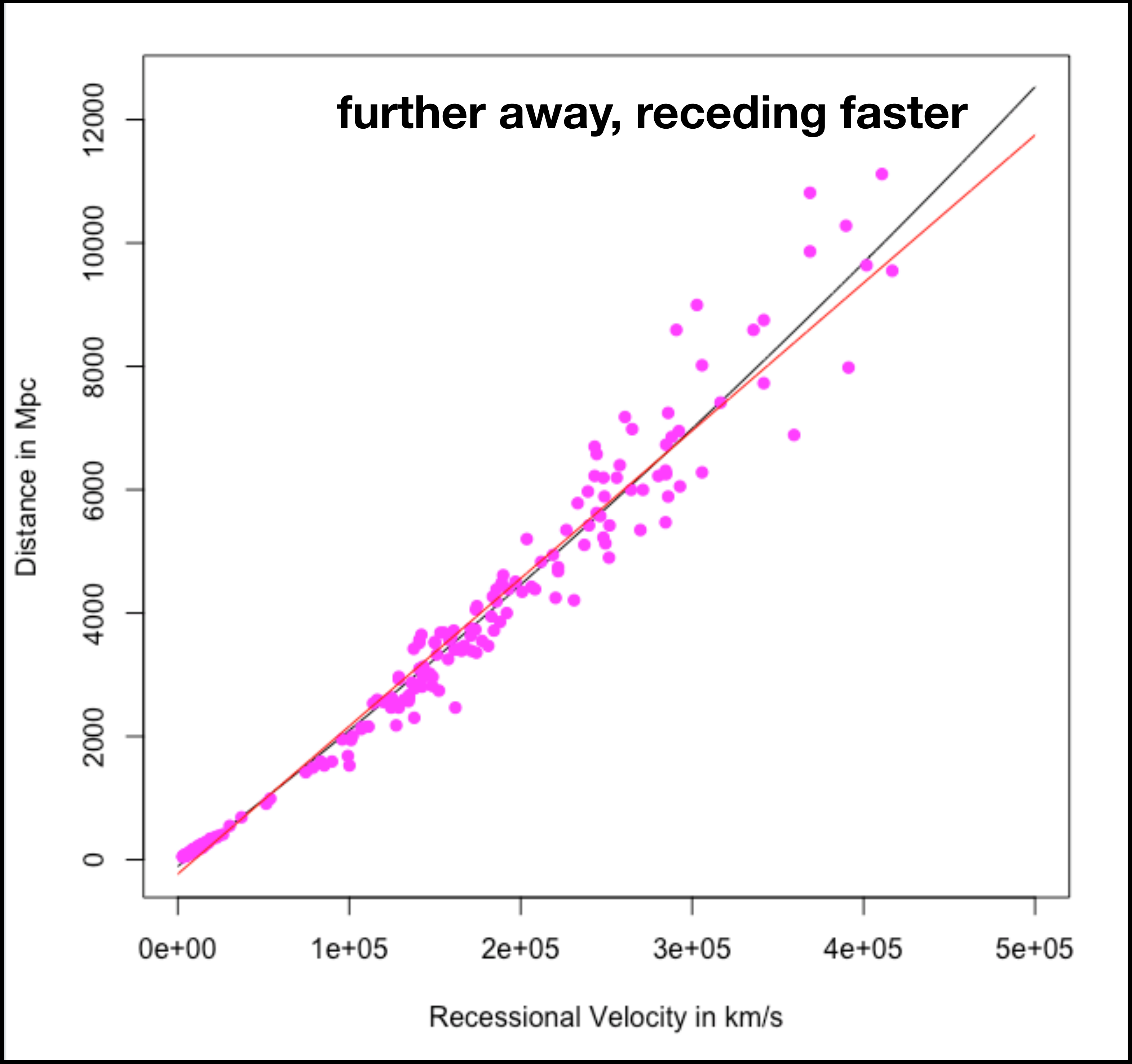
“slopes along different parameters”

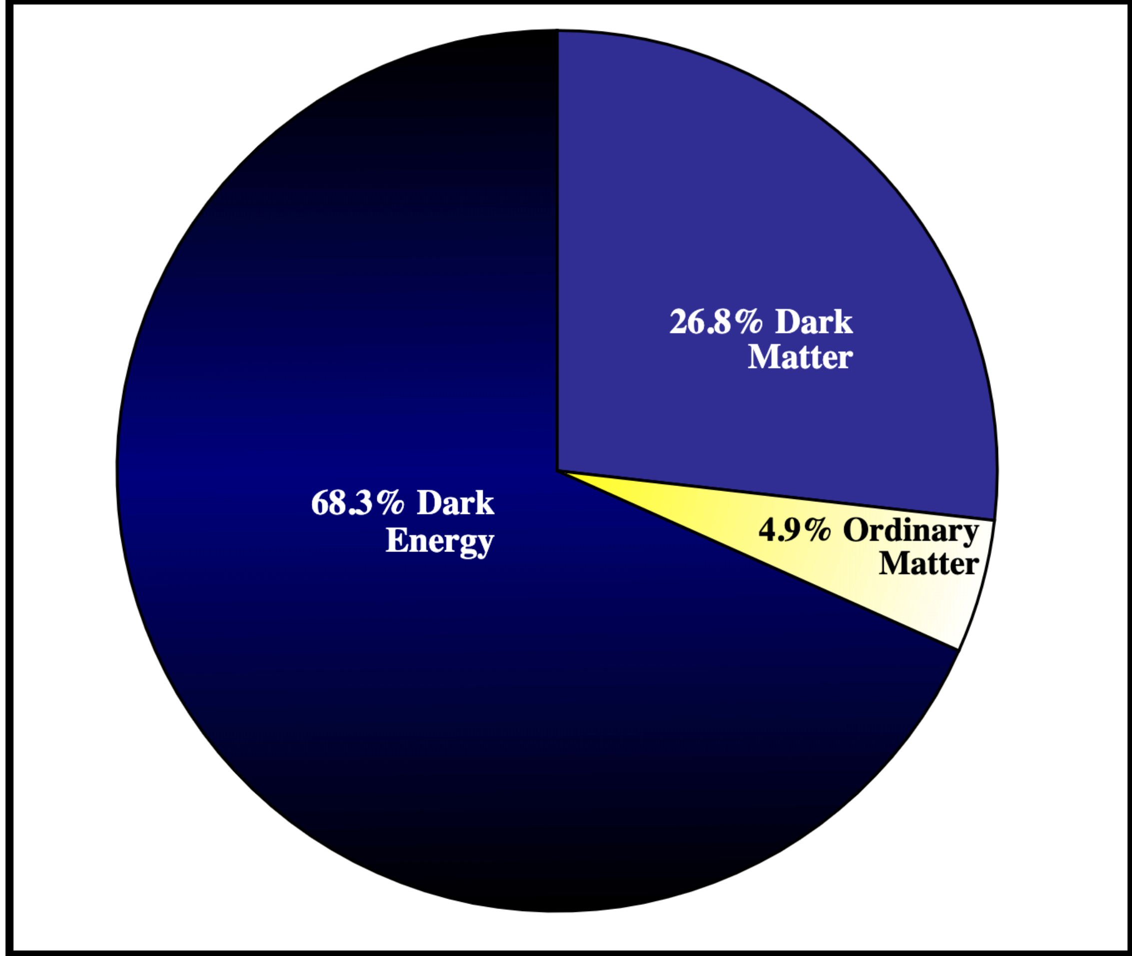
what can x_n be here? For example, I can say $x_4 = x_3^2$?

Yes!

Let’s do this in R for the Hubble data



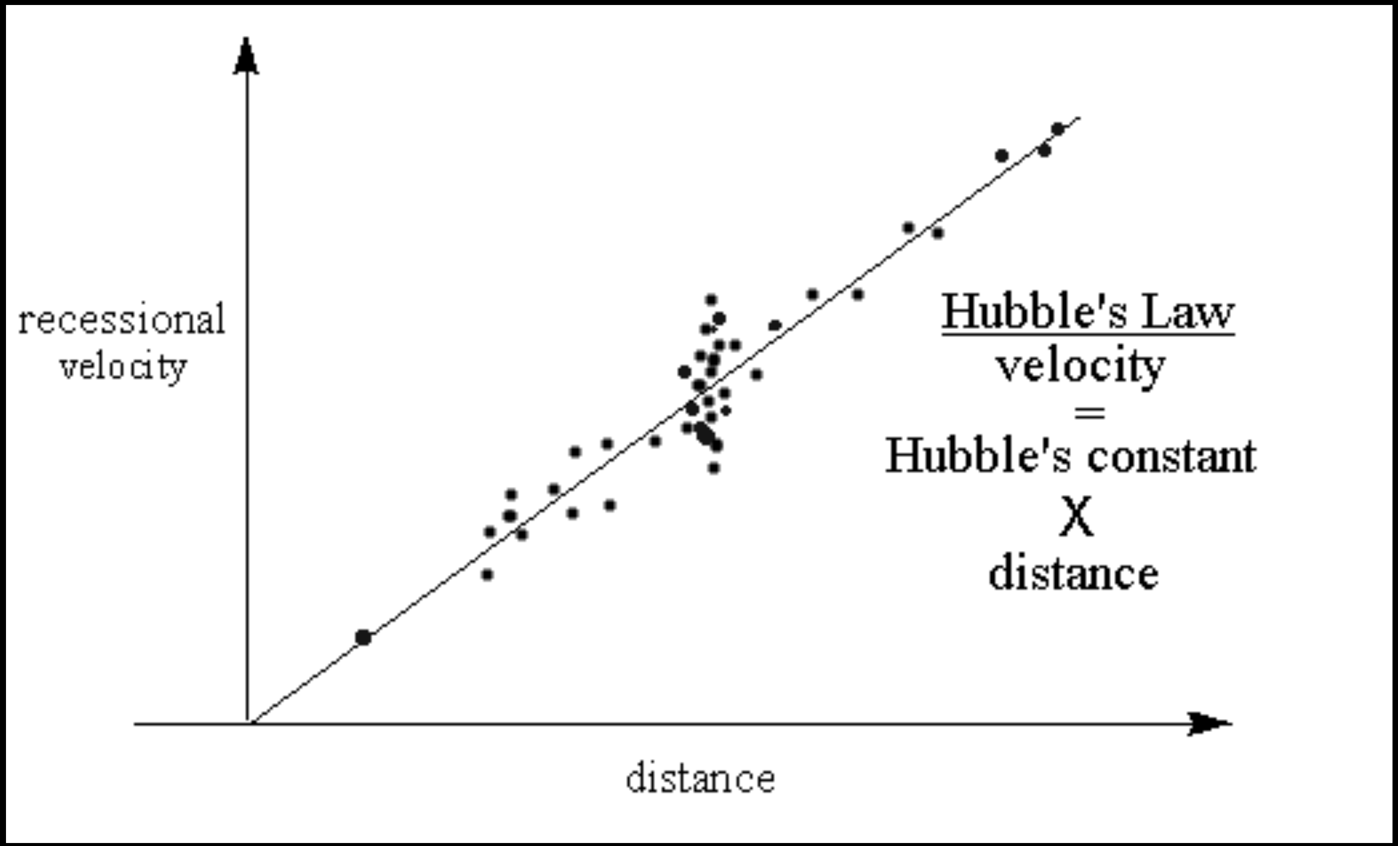
further away, receding faster
Distance in Mpc
0
2000
4000
6000
8000
10000
12000
0e+00
1e+05
2e+05
3e+05
4e+05
5e+05
Recessional Velocity in km/s



26.8% Dark Matter
68.3% Dark Energy
4.9% Ordinary Matter

http://adamdempsey90.github.io/python/dark_energy/dark_energy.html

Hubble's Law



In essence: galaxies that are further away from us look like they are moving away from us faster than those near by