Theory vs. Practice of Parameter values

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Two issues

- *The joy of estimating :rt and :lf (and sometimes :bll and :ga and :ans)*
- *Meaning of parameters*

Estimating parameters

- *In many ACT-R models, declarative chunks are created that you might want to retrieve later on*
- *In such a model, the desired behavior is that new chunks are hard to recall, unless they have a very strong context association, or have already been recreated a number of times*

Estimating parameters

- *Problem: this balance is hard to achieve, because sometimes you end up in a situation where you retrieve everything right away, or a situation in which you retrieve nothing at all*
- *To get into the desired situation, you have to carefully estimate, often through trial-and-error values for the retrieval threshold, base-level decay, goal activation, etc.*
- *Not easy to predict in advance due to the relatively unpredictable influence of spreading activation*

But Wait...
Didn't ACT-R have principled parameters?

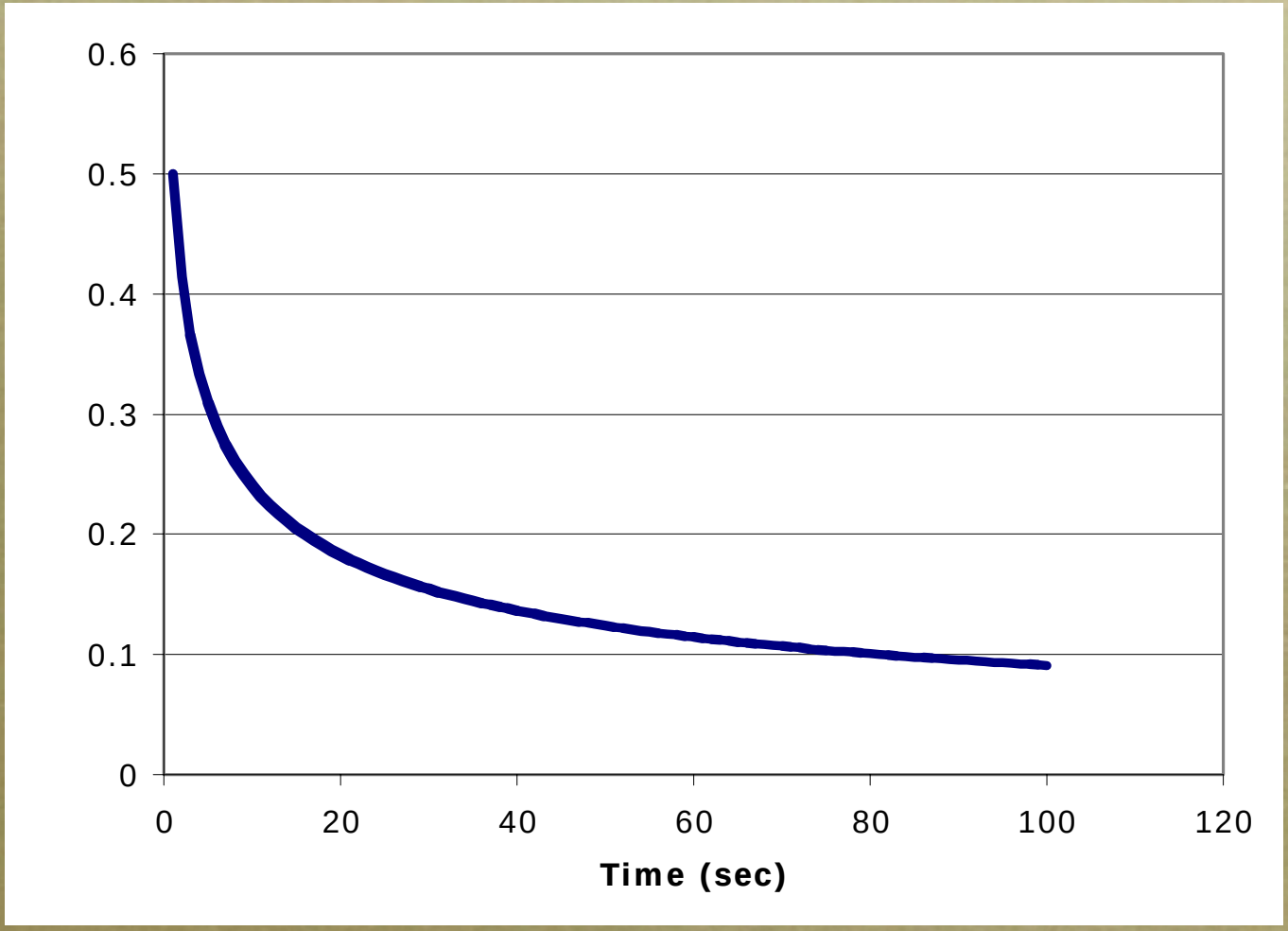
- *Earlier ACT-R books: The activation of a chunk represents an estimation of the log odds that you need that chunk in your current context:*
  - $A_i \sim \log P(chunk_i \text{ needed} / chunk_i \text{ not needed})$
- *That means an activation of zero represents a probability that you need that chunk is 50%, which is extremely high*

Why are activation too high?

- *The culprit is base-level learning*
- *Based on one experience:*
- *$A = \log t^{-d}$, with d by default 0.5*

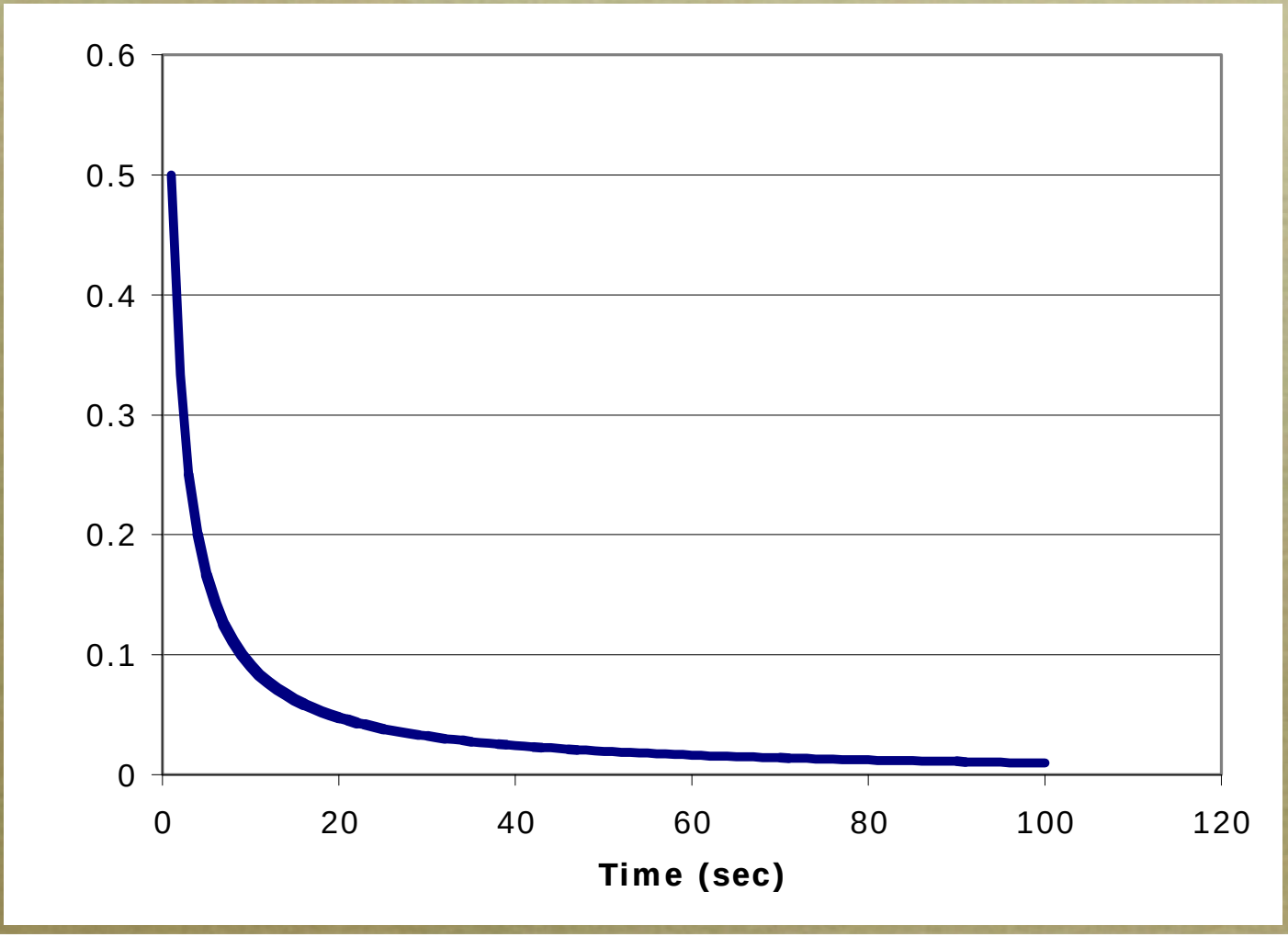
Default estimate

- *Basis: single reference, d = 0.5*



What about higher d's?

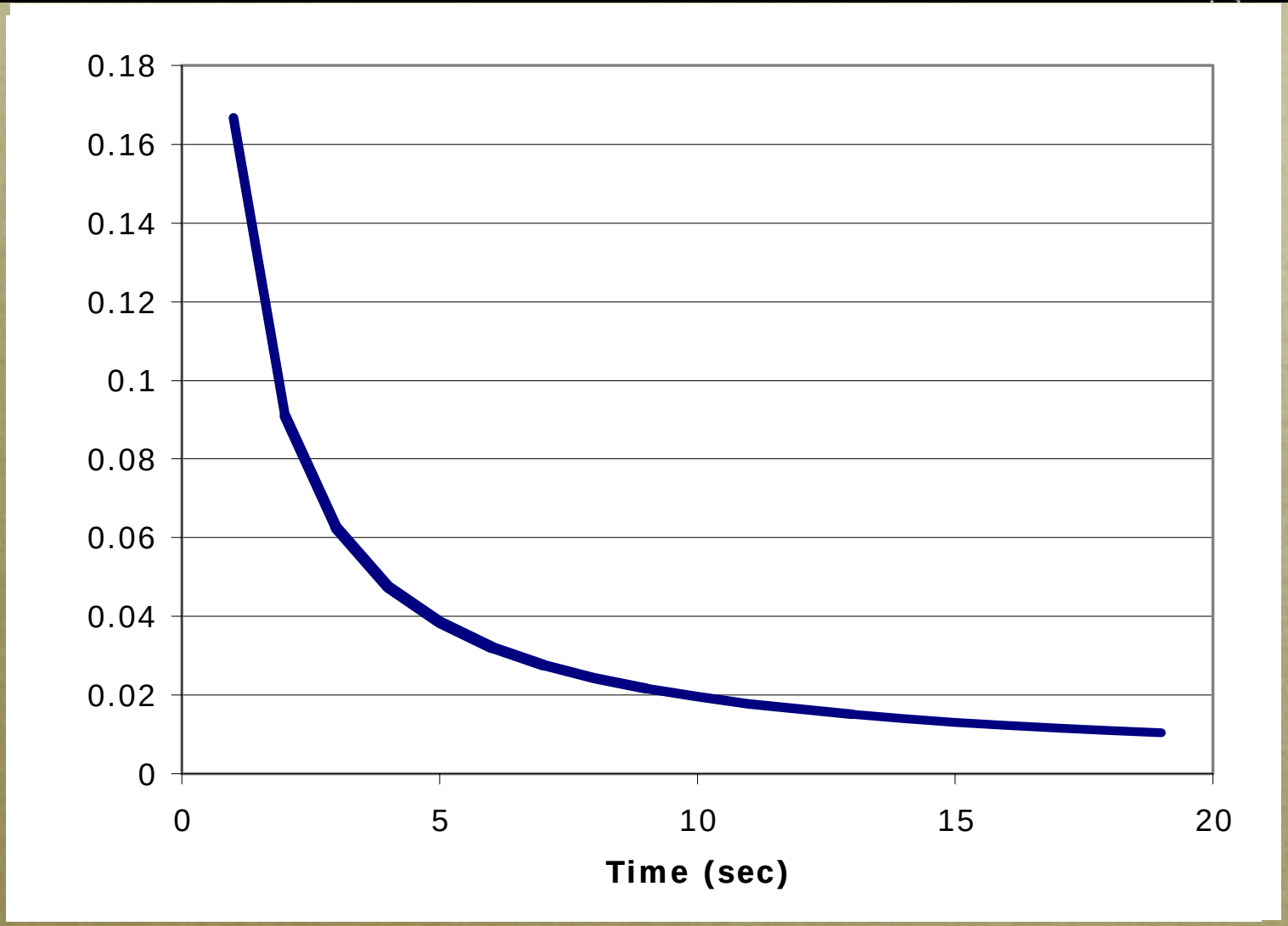
- *Single reference, d = 1*



Still...

- *Probability after 1 second is still always 50%, which seems too high*
- *Hidden parameter in base-level learning equation:*
- $A = \log xt^{-d}$
- *x = 1 might just be too high*

Try d=1 and x=0.2



Consequences

- *Maybe solves the d=0.5 or 0.4 problem*
- *Retrieval threshold will be negative*
- *Have to look at parameters in in other equations*
- *Have to look at associations (maybe get the learning there going again?)*
- *Pay-off: true zero-parameter estimation?*