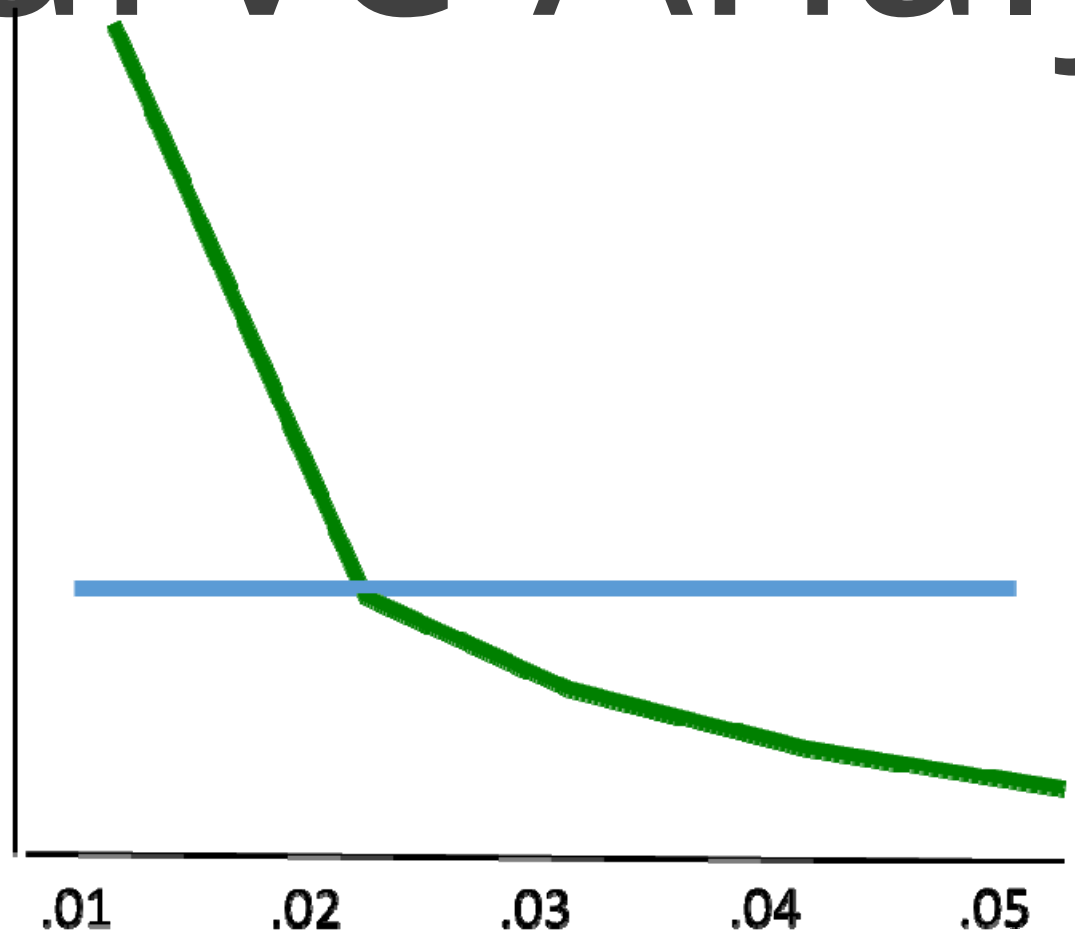
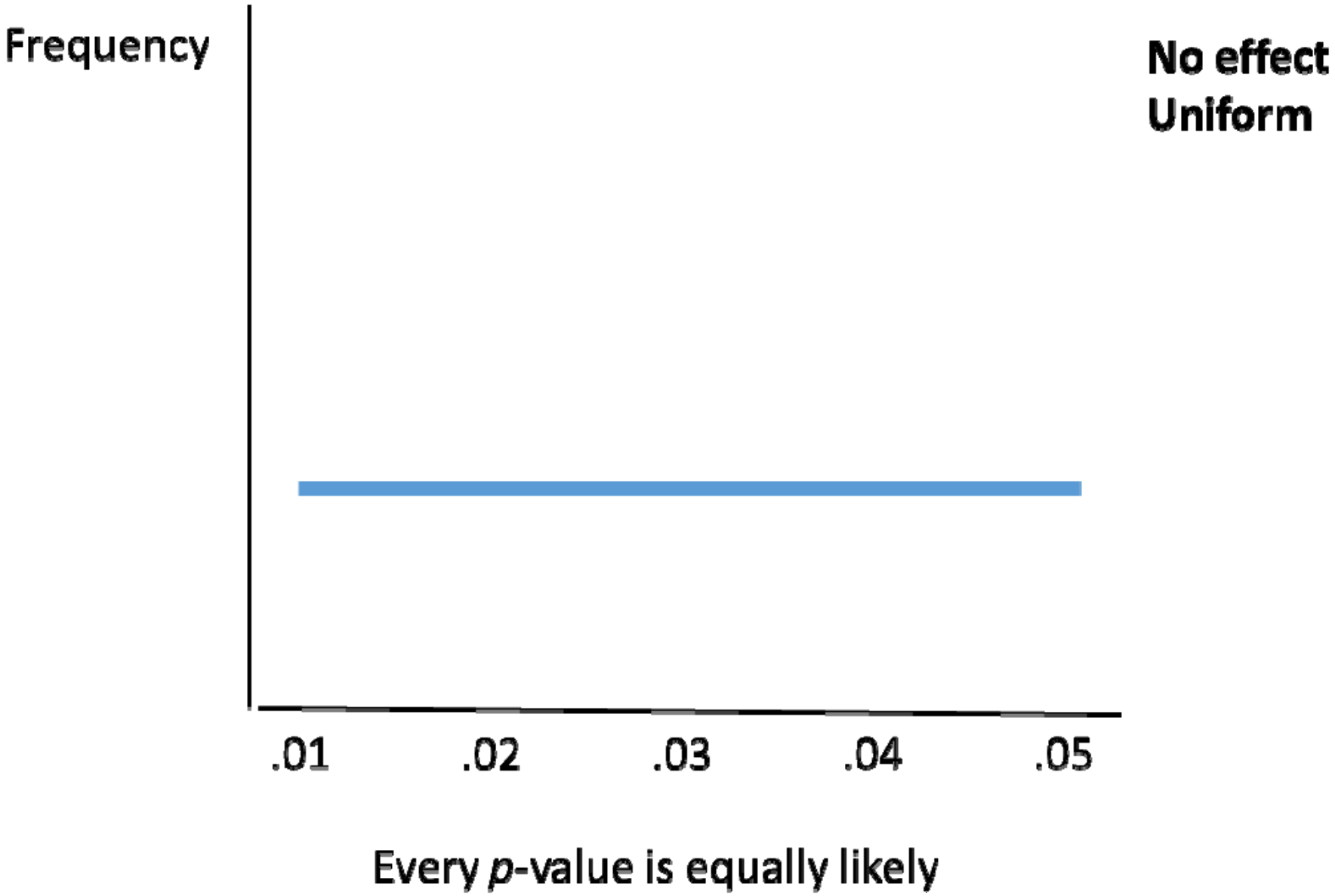
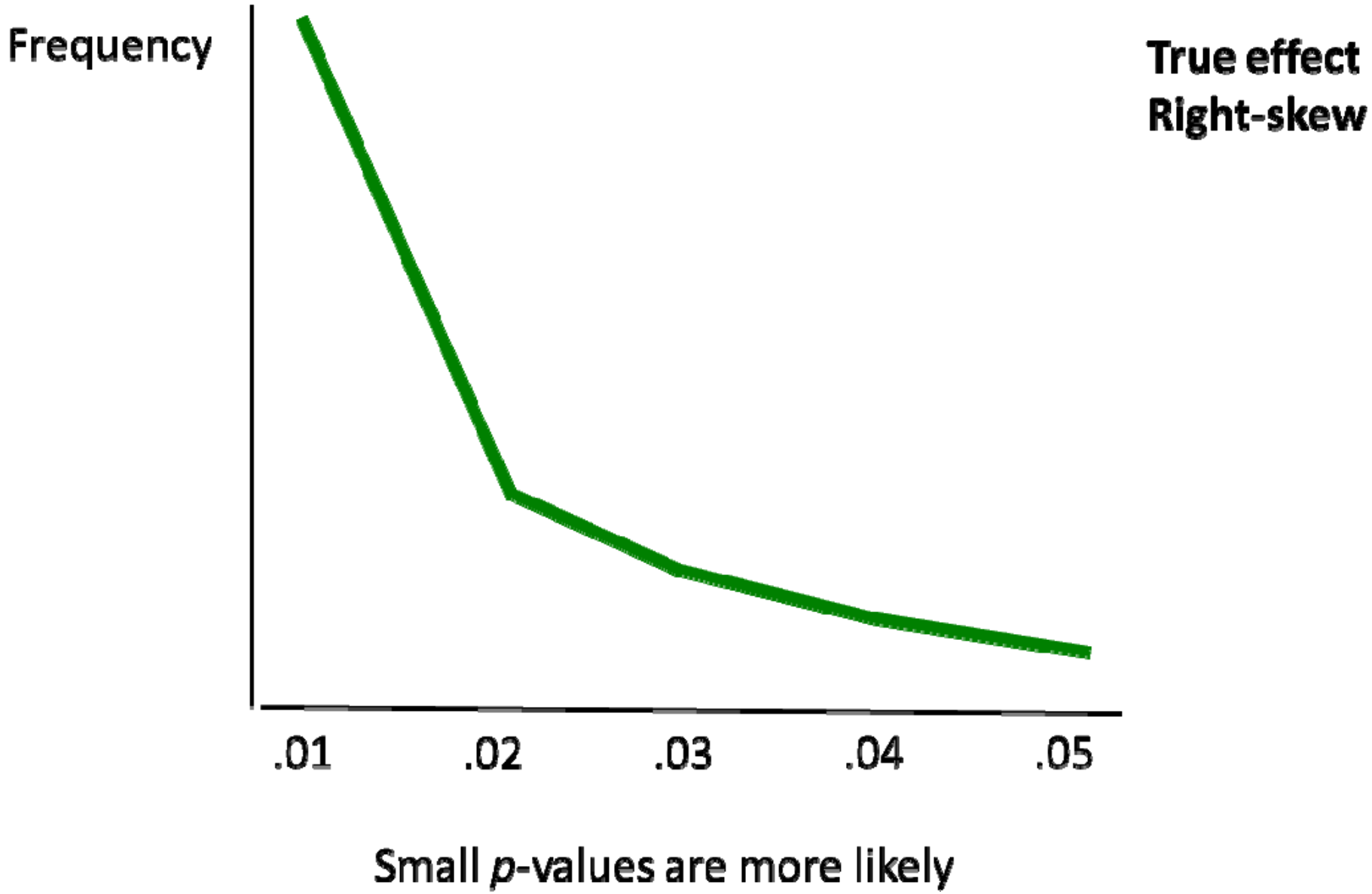
P-curve Analysis



What do *p*-values look like from 100 studies with an effect size of 0?


Frequency
No effect
Uniform
.01
.02
.03
.04
.05
Every *p*-value is equally likely

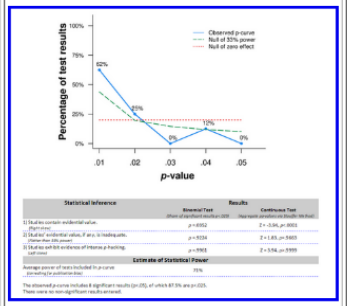
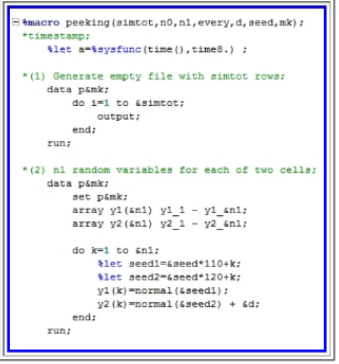
What do *p*-values look like from 100 studies with a true effect?


Frequency
True effect
Right-skew
.01
.02
.03
.04
.05
Small *p*-values are more likely

P-curve analysis: Test whether a **set** of *p*-values has evidential value.

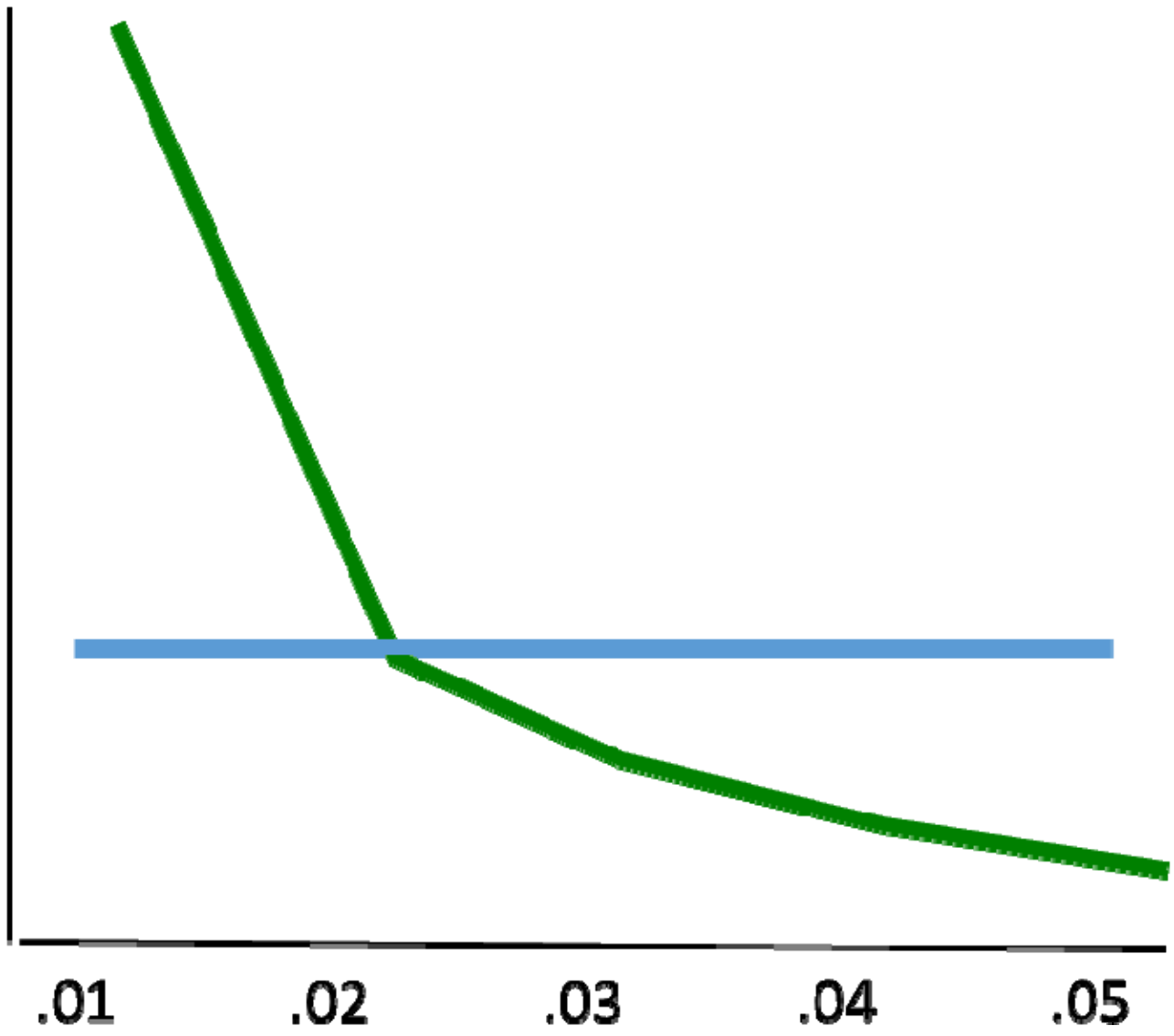
Key to the **file-drawer**: Test is only performed on $p < 0.05$!

P-curve.com

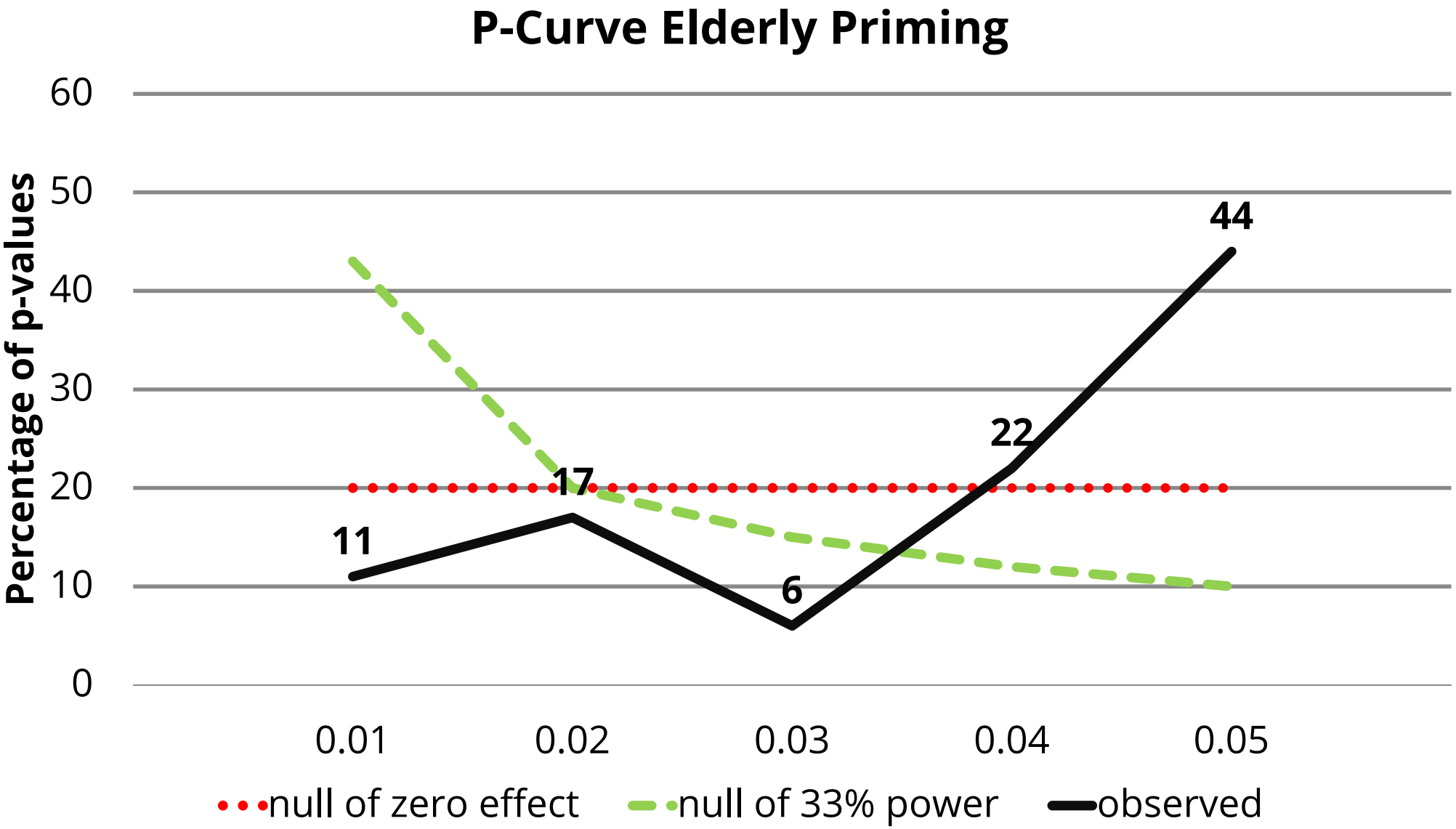
Paper 1 Evidential Value	Paper 2 Effect size	Paper 3 'Better P-curves' (robustness)	The online app 4.0	The User Guide	Supp Materials
					

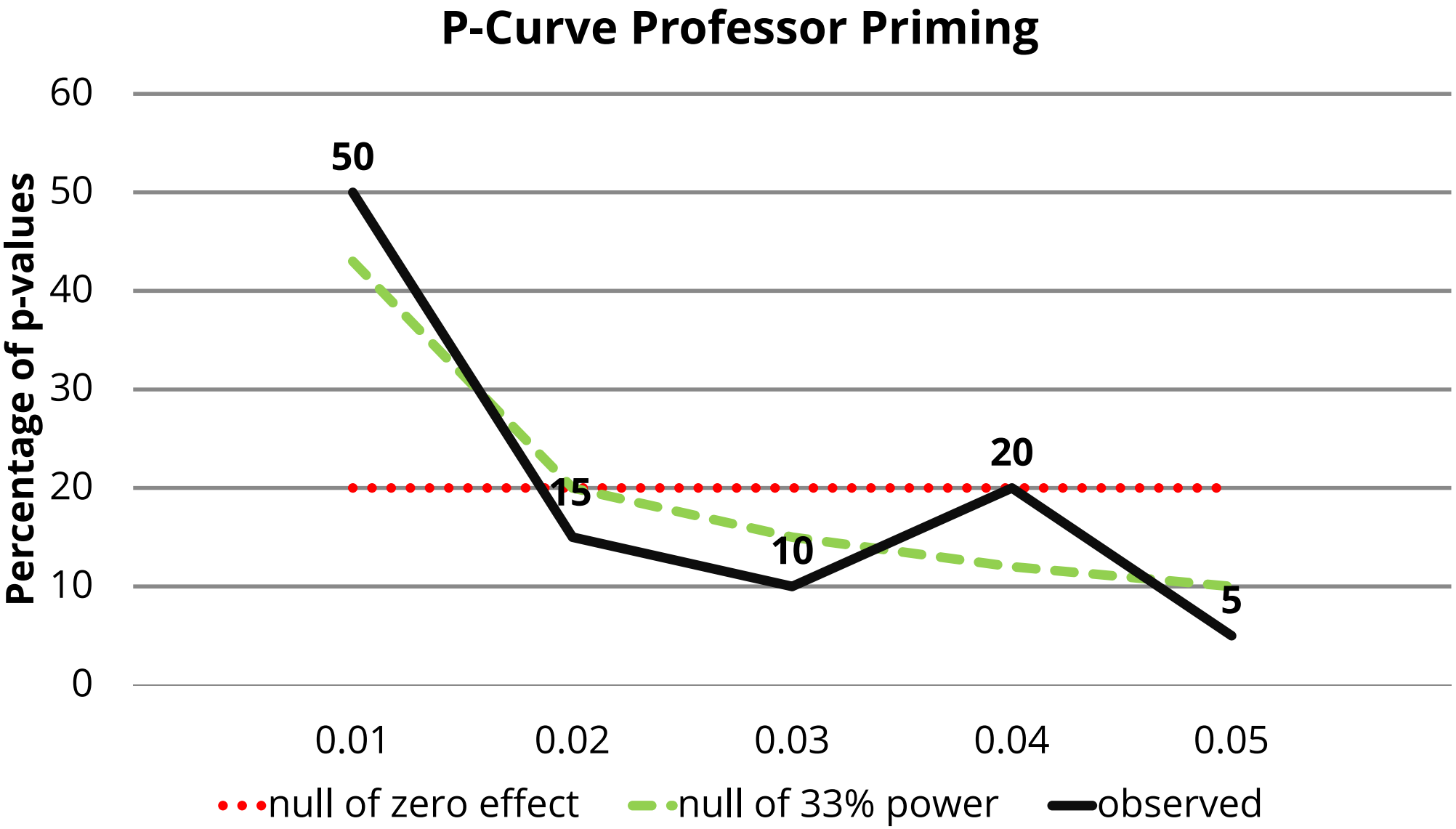

```
%macro peeking(simtot,n0,n1,every,d,seed,mk);
*timestamp;
    %let a=%sysfunc(time(),time8.) ;

*(1) Generate empty file with simtot rows;
    data p&mk;
        do i=1 to &simtot;
            output;
        end;
    run;

*(2) n1 random variables for each of two cells;
    data p&mk;
        set p&mk;
        array y1(&n1) y1_1 - y1_&n1;
        array y2(&n1) y2_1 - y2_&n1;

        do k=1 to &n1;
            %let seed1=&seed*110+k;
            %let seed2=&seed*120+k;
            y1(k)=normal(&seed1);
            y2(k)=normal(&seed2) + &d;
        end;
    run;
```

Does the *p*-value distribution look like one with or one without an effect?


.01
.02
.03
.04
.05

Looking at Elderly Priming and Professor Priming.


P-Curve Elderly Priming
Percentage of p-values
60
50
40
30
20
10
0
0.01
0.02
0.03
0.04
0.05
11
17
6
22
44
null of zero effect
null of 33% power
observed


P-Curve Professor Priming
Percentage of p-values
60
50
40
30
20
10
0
50
15
10
20
5
0.01
0.02
0.03
0.04
0.05
null of zero effect
null of 33% power
observed

You can use this technique for small sets of *p*-values (with care!).

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REPORT

Reading Literary Fiction Improves Theory of Mind

David Comer Kidd*, Emanuele Castano*

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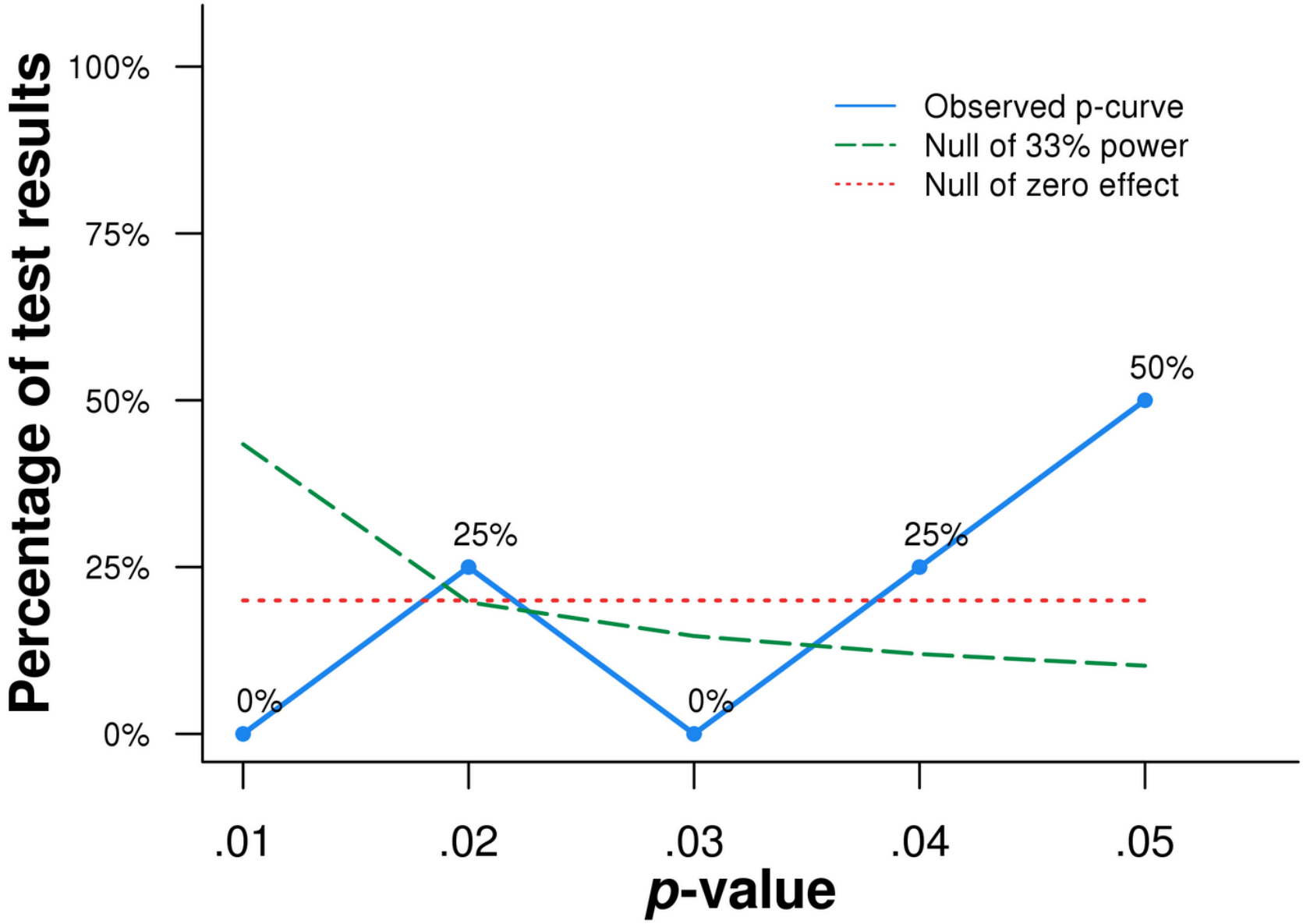
Table 1. RMET and DANVA2-AF analyses.

Experiment	Independent variable	Test	*P*	ω_p^2
Exp. 1 RMET	Condition	$F_{1,82} = 6.40$	0.01	0.05
	Author Recognition Test	$\beta = 0.36$	0.0003	0.13
	Author Recognition Test x Condition	$F_{1,82} = 1.06$	0.30	0.00
Exp. 2 DANVA2-AF	Condition	$F_{2,108} = 2.57$	0.08	0.02
	Author Recognition Test	$\beta = -0.16$	0.08	0.01
	Author Recognition Test x Condition	$F_{2,108} = 1.17$	0.31	0.00
Exp. 3 RMET	Condition	$F_{1,65} = 4.07$	0.04	0.04
	Author Recognition Test	$\beta = -0.01$	0.90	−0.01
	Author Recognition Test x Condition	$F_{1,65} = 0.01$	0.90	−0.01
Exp. 4 RMET	Condition	$F_{1,68} = 4.39$	0.04	0.04
	Author Recognition Test	$\beta = 0.39$	<0.001	0.15
	Author Recognition Test x Condition	$F_{1,68} = 1.50$	0.22	0.00
Exp. 5 RMET	Condition	$F_{2,352} = 3.10$	0.04	0.01
	Author Recognition Test	$\beta = 0.28$	<0.001	0.07
	Author Recognition Test x Condition	$F_{2,352} = 1.37$	0.25	0.00


Percentage of test results
100%
75%
50%
25%
0%
Observed p-curve
Null of 33% power
Null of zero effect
50%
25%
25%
0%
0%
.01
.02
.03
.04
.05
p-value

		Full p-curve (p's<.05)
1) Studies contain evidential value *(Right-skew)*	*p=.9375*	*Z=1.68, p=.9533*
2) Evidential value, if any, is inadequate *(Flatter than when power=33%)*	*p=.077*	*Z=-2.55, p=.0054*

A theory might be true, the data just don’t provide evidence for it.

P-curve tells you if significant *p*-values look more like a **true** or **null** effect.