How do researchers fabricate data and how to detect fabrication?

Chris Hartgerink
@chartgerink
www.chjh.nl
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"I had a student who fabricated the results of his MA study, but he simply copy-pasted subjects"

-Anonymous

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“I had a student who fabricated the results of his MA study, but he simply copy-pasted subjects”

“this did not require a genius to find out.”

-Anonymous

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TABLE 1

Mean Number of Fragments Completed as Category-Related Words, as a Function of Prime Emotion and Exposure Duration: Study 1

Exposure duration and fragment type	Prime emotion			
	Disgust	Fear	Anger	Neutral
Quick (120 ms)				
Disgust fragments	2.33_a (0.62)	1.20_b (0.94)	1.20_b (0.68)	1.53_b (0.74)
Fear fragments	0.80_b (0.78)	1.87_a (0.92)	1.13_b (0.92)	1.00_b (0.93)
Anger fragments	0.93_b (0.70)	0.93_b (0.70)	1.80_a (0.86)	0.80_b (0.78)
Negative fragments	2.27_a (0.46)	2.33_a (0.82)	2.20_a (0.41)	1.33_b (0.98)
Super-quick (40 ms)				
Disgust fragments	1.27_a (0.96)	1.07_a (0.80)	1.27_a (0.96)	1.33_a (0.72)
Fear fragments	1.07_a (0.59)	0.87_a (0.74)	1.07_a (0.59)	1.00_a (0.66)
Anger fragments	0.87_a (0.74)	1.07_a (0.80)	0.87_a (0.74)	0.87_a (0.83)
Negative fragments	1.80_a (0.56)	2.07_a (0.80)	2.27_a (0.46)	0.93_b (0.88)

Note. Standard deviations are given in parentheses. For each fragment type, the score could range from 0 to 3. Within each row, means with different subscripts differ significantly from each other ($p < .05$).

Conclusions

- Applied statistical tools to 36 genuine datasets, 36 fabricated datasets
- How do they perform in detecting fabrication?
- PPV = 91%, NPV = 59%, detected 10/36

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How can we detect data fabrication?*

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**today: summary results*

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1. Variance of variance analysis

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$$\tilde{s}_j^2 \sim \left[\frac{\chi^2_{N_j-1}}{N_j-1} \right] / MS_w$$

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What do (potentially) fabricated variances look like?

Density

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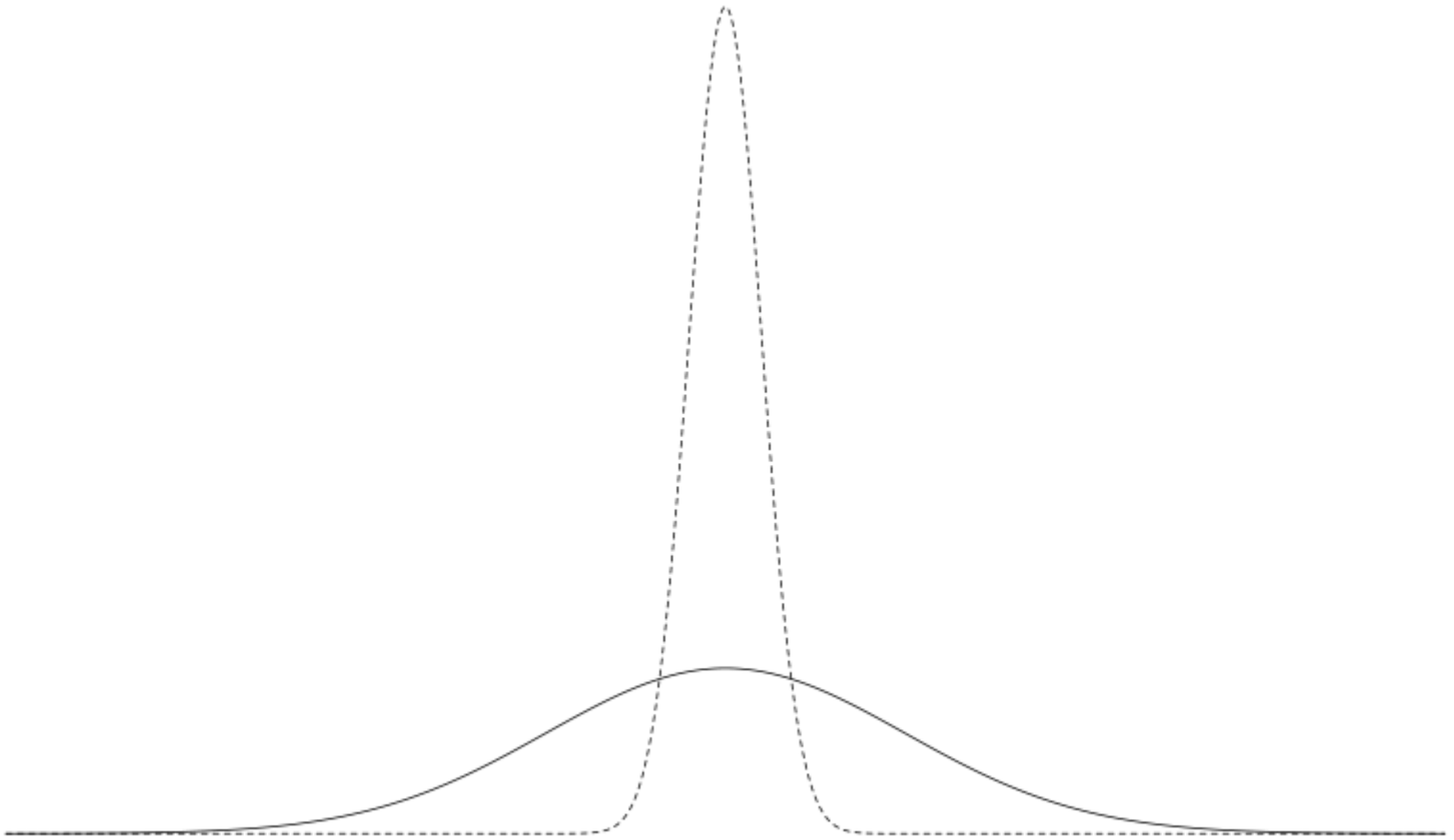
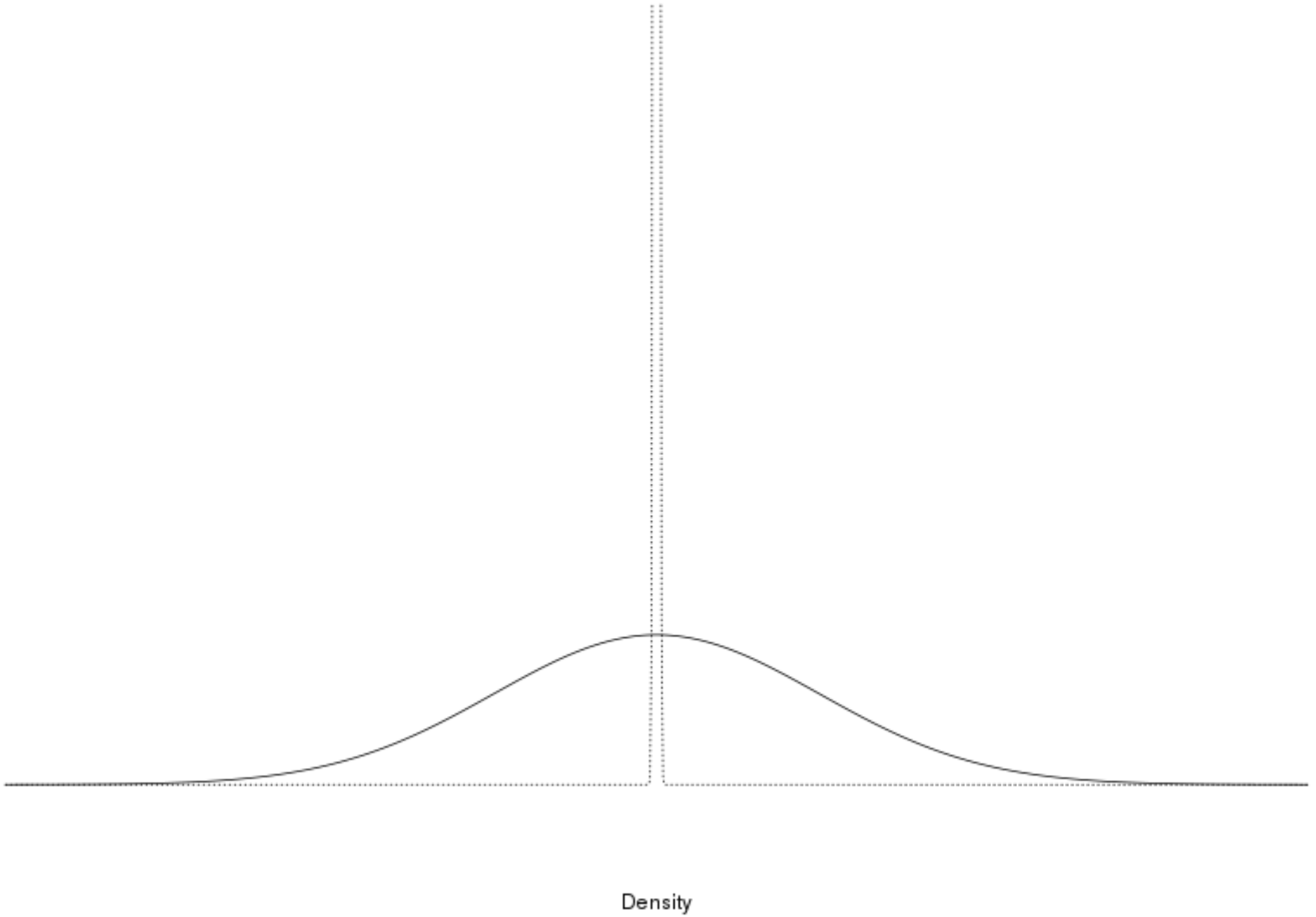
What do (potentially) fabricated variances look like?

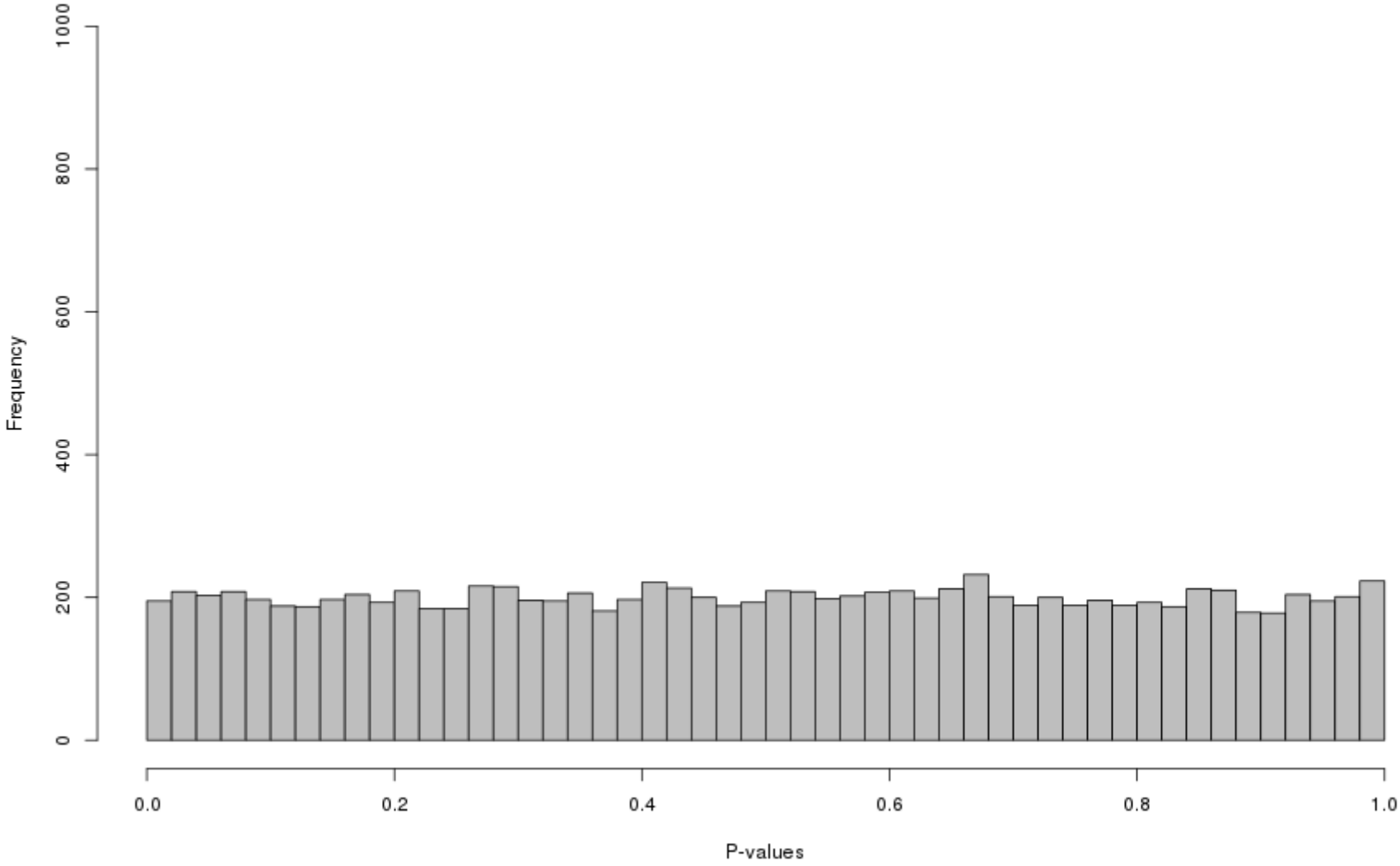


What do (potentially) fabricated variances look like?



2. Nonsignificant *p*-values

What do (potentially) fabricated p-values look like?



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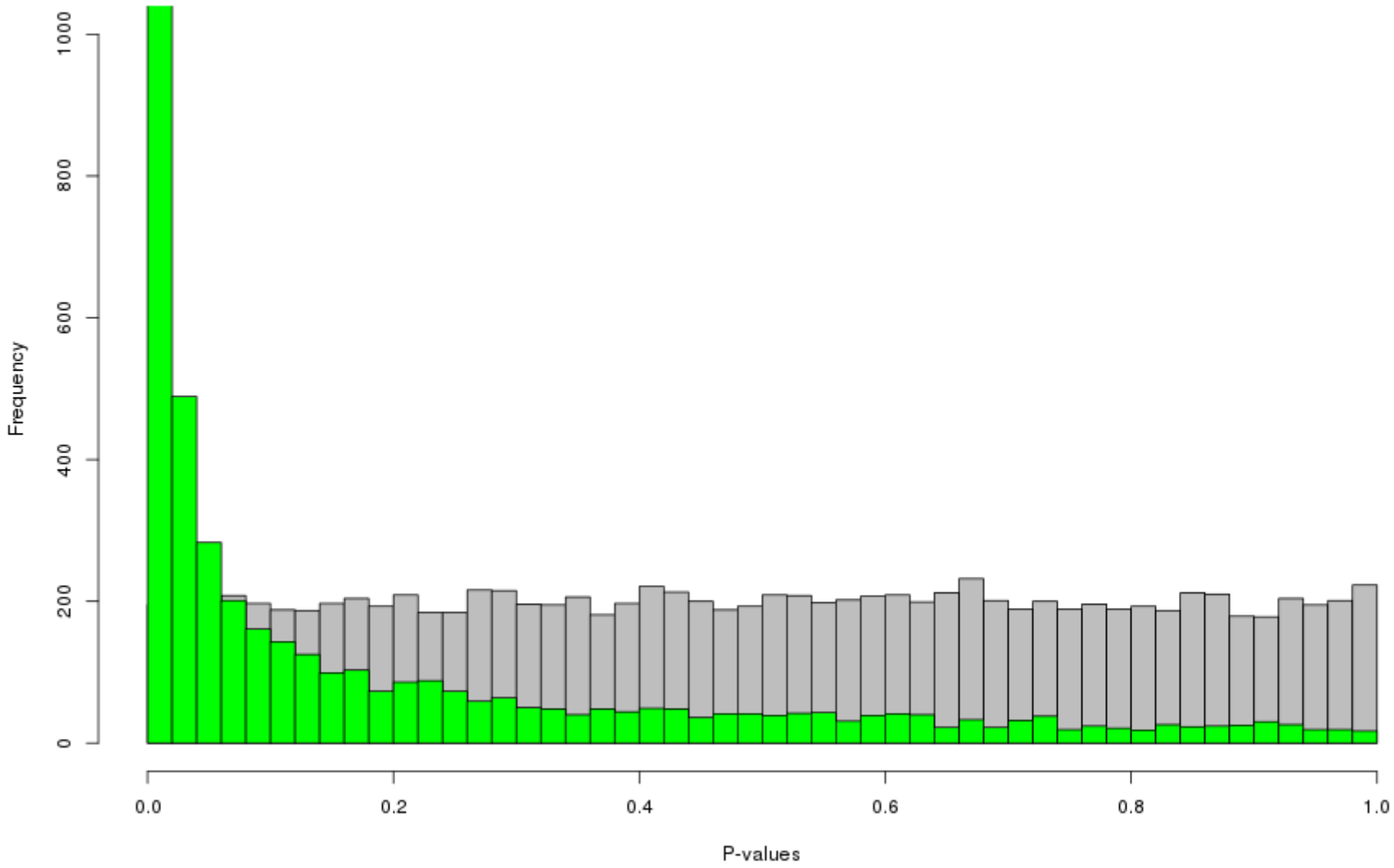
What do (potentially) fabricated p-values look like?



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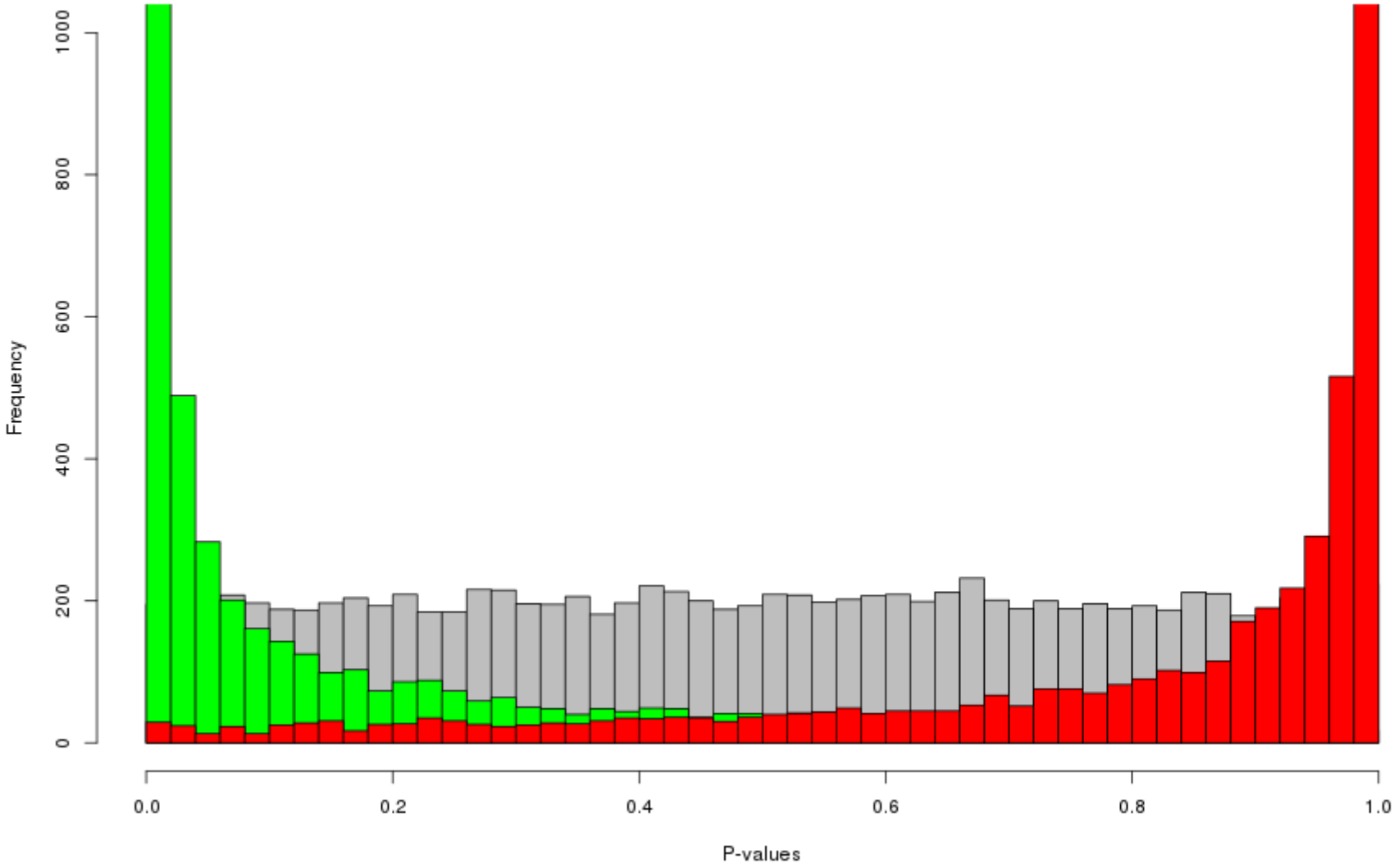
What do (potentially) fabricated p-values look like?



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3. Simple meta-analysis of 1 + 2*

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**Fisher method*

3. Simple meta-analysis of 1 + 2

$$\chi^2_{2k} = -2\sum \ln(p_i)$$

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Test this on genuine and fabricated data

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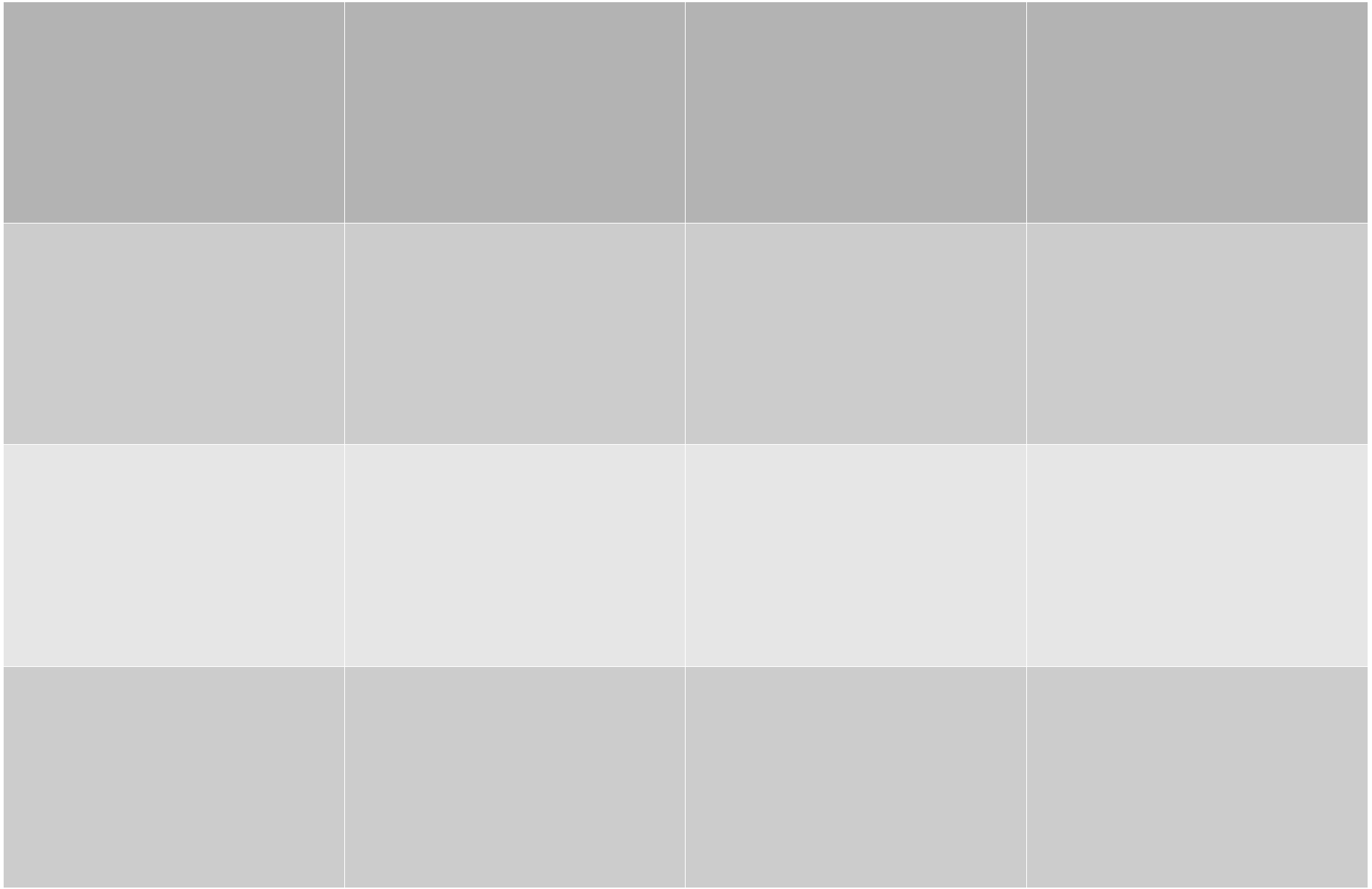

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	Genuine data (Many Labs 1)		

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	36		

	Genuine data (Many Labs 1)	Fabricated data (asked psychology researchers)	
	36		

	Genuine data (Many Labs 1)	Fabricated data (asked psychology researchers)	
	36	36	

	Genuine data (Many Labs 1)	Fabricated data (asked psychology researchers)	
“Genuine”			
“Fabricated”			
	36	36	

	Genuine data (Many Labs 1)	Fabricated data (asked psychology researchers)	
“Genuine”			
“Fabricated”			
	36	~~36~~ 34	

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For the best performing method

*Fisher method, at $\alpha = .05$

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	Genuine data (Many Labs 1)	Fabricated data (asked psychology researchers)	
“Genuine”			
“Fabricated”	1		
	36	34	

	Genuine data (Many Labs 1)	Fabricated data (asked psychology researchers)	
“Genuine”			
“Fabricated”	1	10	
	36	34	

	Genuine data (Many Labs 1)	Fabricated data (asked psychology researchers)	
“Genuine”			
“Fabricated”	1	10	11
	36	34	

	Genuine data (Many Labs 1)	Fabricated data (asked psychology researchers)	
“Genuine”	35		
“Fabricated”	1	10	11
	36	34	

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	Genuine data (Many Labs 1)	Fabricated data (asked psychology researchers)	
“Genuine”	35	24	
“Fabricated”	1	10	11
	36	34	

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	Genuine data (Many Labs 1)	Fabricated data (asked psychology researchers)	
“Genuine”	35	24	59
“Fabricated”	1	10	11
	36	34	

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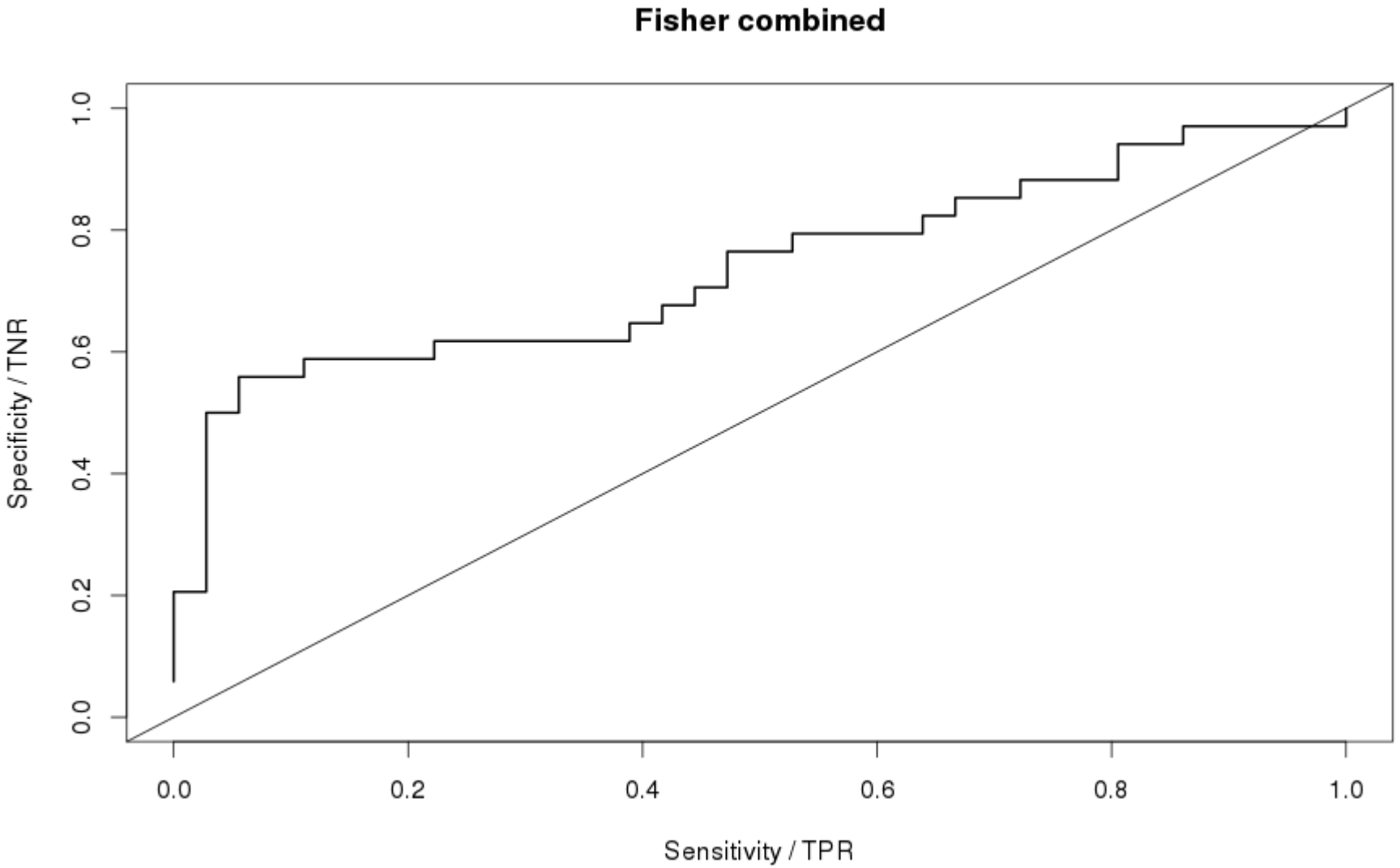

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PPV = 91%

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NPV = 59%

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Conclusions

- Applied statistical tools to 36 genuine datasets, 36 fabricated datasets
- How do they perform in detecting fabrication?
- PPV = 91%, NPV = 59%, detected 10/36
- Slides at osf.io/ucfpv
- Data, materials etc. osf.io/b24pq

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