Rules of Thumb for Pearson Correlation (th_pearson_r)

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Introduction

The *th_pearson_r* determines a classification for a given correlation coefficient.

This document contains the details on how to use the functions, and background info.

1 About the Function

1.1 Input parameters:

- **r**
  the correlation coefficient

- *Optional parameters*
  - **qual**
    the rule-of-thumb to be used for the qualification/classification. Either:
    - "rafter" => Rafter et al. (2003, p. 194)
    - "cohen" => Cohen (1988, p. 82)
    - "rumsey" => Rumsey (2011, p. 284)
    - "rosenthal" => Rosenthal (1996, p. 45)
    - "agnes" => Agnes (2011)
    - "bartz" => Bartz (1999, p. 184, as cited in Warmbrod 2001)
    - "disha" => Disha (2016)
    - "rea" => Rea and Parker (1992)
    - "hopkins" => Hopkins (1997, as cited in Warmbrod 2001)
    - "funder" => Funder and Ozer (2019, p. 166)
    - "gignac" => Gignac and Szodorai (2016, p. 75)
    - "hemphill" => Hemphill (2003, p. 78)
    - "lovakov" => Lovakov and Agadullina (2021, p. 514)

1.2 Output

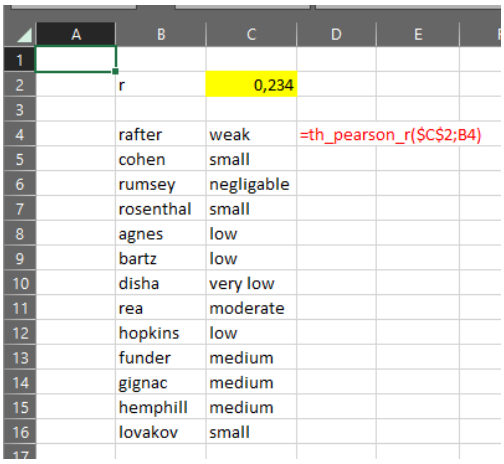
- **qual**
  The qualification using the specified rule of thumb

1.3 Dependencies

- **Excel**
  None. You can run the **th_pearson_r_addHelp** macro so that the function will be available with some help in the 'User Defined' category in the functions overview.
- **Python & R**
  None

2 Examples

2.1 Excel



	A	B	C	D	E
1					
2		r	0,234		
3					
4		rafter	weak	=th_pearson_r(C2;B4)	
5		cohen	small		
6		rumsey	negligable		
7		rosenthal	small		
8		agnes	low		
9		bartz	low		
10		disha	very low		
11		rea	moderate		
12		hopkins	low		
13		funder	medium		
14		gignac	medium		
15		hemphill	medium		
16		lovakov	small		

2.2 Python

```python
from thumb_pearson_r import th_pearson_r

r = 0.234

rules = ["rafter", "cohen", "rumsey", "rosenthal", "agnes",
         "bartz", "disha", "rea", "hopkins", "funder",
         "gignac", "hemphill", "lovakov"]

for i in rules:
    print(th_pearson_r(r, i))
```

```
weak
small
negligable
small
low
low
very low
moderate
low
medium
medium
medium
small
```

2.3 R

```
> source("thumb_pearson_r.R")
>
> r = 0.234
>
> rules = c("rafter", "cohen", "rumsey", "rosenthal", "agnes",
+           "bartz", "disha", "rea", "hopkins", "funder",
+           "gignac", "hemphill", "lovakov")
>
> for (i in rules) {
+   print(th_pearson_r(r, i))
+ }
[1] "weak"
[1] "small"
[1] "negligable"
[1] "small"
[1] "low"
[1] "low"
[1] "very low"
[1] "moderate"
[1] "low"
[1] "medium"
[1] "medium"
[1] "medium"
[1] "small"
```

3 Rules Used

|Pearson r|	Rafter et al. (2003, p. 194)	Cohen (1988, p. 82)	Rumsey (2011, p. 284)	Gignac and Szodorai (2016, p. 75); Hemphill (2003, p. 78)	Lovakov and Agadullina (2021, p. 514)	Rosenthal (1996, p. 45)	Agnes (2011)	Bartz (1994, p. 184, as cited in Warmbrod 2001)	Disha (2016)	Funder and Ozzer (2019)	Rea and Parker (1992)	Hopkins (1997, as cited in Warmbrod 2001)
0,00 < 0,05	weak	negligable	negligable	negligable	very small	negligable	negligable	very low	negligable	negligable very small	negligible	trivial
0,05 < 0,10										small	weak	low
0,10 < 0,15		small		small	small	small			very low			
0,15 < 0,20										medium	moderate	
0,20 < 0,25				medium			low	low				
0,25 < 0,30	moderate				medium					large		moderate
0,30 < 0,35		medium	weak			medium			low			
0,35 < 0,40				medium						very large	relatively strong	
0,40 < 0,45					large		moderate	moderate				high
0,45 < 0,50				large		large			moderate			
0,50 < 0,55		large	moderate				marked	strong			strong	
0,55 < 0,60				large					high			very large
0,60 < 0,65					very large		high	very strong			very strong	
0,65 < 0,70			strong						very high			nearly perfect
0,70 < 0,75												
0,75 < 0,80	strong											
0,80 < 0,85												
0,85 < 0,90												
0,90 < 0,95												
0,95 < 1,00												

4 Sources

ES	d	$r_p \times 1.253 = r_b$	r
Small	.20	.100	.125	.10
Medium	.50	.243	.304	.30
Large	.80	.371	.465	.50

(Cohen, 1988, p. 82)

TABLE 2. Qualitative Interpretation of Strength of Association and Effect Size for Pearson Correlation Coefficient (*r*)

Correlation	Strength of Association	Effect Size
about .10 (or about –.10)	weak	small
about .30 (or about –.30)	moderate	medium
about .50 (or about –.50)	strong	large
about .70 (or about –.70) or greater	very strong	very large

(Rosenthal, 1996, p. 45)

RANGE	INTERPRETATION
0<r<0.2	no or negligible correlation
0.2<r<0.4	low degree of correlation
0.4<r<0.6	moderate degree of
0.6<r<0.8	marked degree of
0.8<r<1	high correlation

(Agnes, 2011)

- **Exactly −1:** A perfect downhill (negative) linear relationship
- **−0.70:** A strong downhill (negative) linear relationship
- **−0.50:** A moderate downhill (negative) relationship
- **−0.30:** A weak downhill (negative) linear relationship
- **0:** No linear relationship
- **+0.30:** A weak uphill (positive) linear relationship
- **+0.50:** A moderate uphill (positive) relationship
- **+0.70:** A strong uphill (positive) linear relationship
- **Exactly +1:** A perfect uphill (positive) linear relationship

(Rumsey, 2011, p. 284)

Size of Correlation	Interpretation
± 1	Perfect Positive/Negative Correlation
± .90 to ± .99	Very High Positive/Negative Correlation
± .70 to ± .90	High Positive/Negative Correlation
± .50 to ± .70	Moderate Positive/Negative Correlation
± .30 to ± .50	Low Positive/Negative Correlation
± .10 to ± .30	Very Low Positive/Negative Correlation
± .00 to ± .10	Markedly Low and Negligible Positive/ Negative Correlation

(Disha, 2016)

EXHIBIT 10.2. INTERPRETATION OF CALCULATED CRAMÉR'S *V*, PHI, AND LAMBDA MEASURES OF ASSOCIATION.

Measure	Interpretation
.00 and under .10	Negligible association
.10 and under .20	Weak association
.20 and under .40	Moderate association
.40 and under .60	Relatively strong association
.60 and under .80	Strong association
.80 to 1.00	Very strong association

(Rea & Parker, 2014)

One way to describe the strength of the correlation between two variables is to categorize the possible values of the correlation coefficient. A general rule of thumb is to call the correlation weak for values between −0.25 and 0.25, moderate for values between 0.25 and 0.75 in absolute value, and strong for values over 0.75 in absolute value. A more exacting

(Rafter et al., 2003, p. 194)

Bartz (1994, p.184)

Value or r	Description
.80 or higher	Very High
.60 to .80	Strong
.40 to .60	Moderate
.20 to .40	Low
.20 or lower	Very Low

Hopkins (1997)

Value or r	Description
0.9 - 1.0	Nearly perfect, distinct
0.7 - 0.9	Very large, very high
0.5 - 0.7	High, large, major
0.3 - 0.5	Moderate, medium
0.1 - 0.3	Low, small, minor
0.0 - 0.1	Trivial, very small, insubstantial

(Warmbrod, 2001, p. 8)

We offer, therefore, the following New Guidelines: Assuming that estimates are reliable (a critical concern, as already discussed), an effect-size *r* of .05 indicates an effect that is *very small* for the explanation of single events but potentially consequential in the not-very-long run, an effect-size *r* of .10 indicates an effect that is still *small* at the level of single events but potentially more ultimately consequential, an effect-size *r* of .20 indicates an effect of *medium* size that is of some explanatory and practical use even in the short run and therefore even more important, and an effect-size *r* of .30 indicates an effect that is *large* and potentially powerful in both the short and the long run.[13] A *very large* effect size (*r* = .40 or greater) in the context of

(Funder & Ozer, 2019, p. 166)

Specifically, in contrast to Cohen's impression-based guidelines of 0.10, 0.30, and 0.50 for small, medium, and large correlations, the results of this quantitative investigation suggest that normative guidelines should be closer to 0.10, 0.20, and 0.30, respectively. A correlation as large as 0.50 may be expected to occur in only 2.7% of cases. The meta-analyti-

(Gignac & Szodorai, 2016, p. 75)

Table 1
The Distribution of Correlation Coefficients Found Among Studies Included in Meta-Analytic Reviews, and Empirical Guidelines for Interpreting the Magnitude of Correlation Coefficients

Distribution of correlation coefficients	Assessment review[a]	Treatment review[b]	Combined reviews[c]	Empirical guidelines[d]
Lower third	.02 to .21	−.08 to .17	−.08 to .17	< .20
Middle third	.21 to .33	.17 to .28	.18 to .29	20 to .30
Upper third	.35 to .78	.29 to .60	.30 to .78	> .30

[a]78 meta-analytic studies concerning psychological assessment reviewed by Meyer et al. (2001).
[b]302 meta-analytic studies concerning psychological treatment reviewed by Lipsey and Wilson (1993).
[c]A total of 380 meta-analytic studies.
[d]Guidelines are based on all 380 meta-analytic studies.

(Hemphill, 2003, p. 78)

1992). Cohen's guidelines tend to overestimate effect sizes, especially medium and large effect sizes in social psychology. Based on an empirically derived effect size distribution, it is recommended that the correlation coefficients of 0.12, 0.24, and 0.41 and Cohen's *d*s of 0.15, 0.36, and 0.65 should be interpreted as small, medium, and large effects for studies in social psychology. The differences do not

(Lovakov & Agadullina, 2021, p. 514)References

5 References

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