Exercise session 2

Design based on the two-trials rule

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Two functions:

- `powerSignificance()` and `sampleSizeSignificance()`

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Main arguments (`default`):

- `zo`
- `c` (1)
- `power`
- `designPrior` (`"conditional"`)
- `shrinkage` (0)
- `level` (0.025)
- `alternative` (`"one.sided"`)

Example from Pyc and Rawson (2010)

No shrinkage

- p-value $p_o = 0.011$
- relative sample size $c = 9.2$

```
# power calculation
powerSignificance(zo = p2z(0.011, alternative = "one.sided"),
                  c = 9.2,
                  designPrior = "conditional")
```

```
## [1] 0.9999997
```

Example from Pyc and Rawson (2010)

With 50% shrinkage

- p-value $p_o = 0.011$
- relative sample size $c = 9.2$

```
# power calculation
powerSignificance(zo = p2z(0.011, alternative = "one.sided"),
                  c = 9.2,
                  shrinkage = 0.5,
                  designPrior = "conditional")
```

```
## [1] 0.9349301
```

Exercises

(Solutions: https://gitlab.uzh.ch/charlotte.micheloud/replicationstudies)

Exercise 2.1

We have five original studies that we want to replicate. The one-sided p-values are 0.0001, 0.001, 0.005, 0.01, and 0.025, respectively. We decide to use the same sample size as in the original study ($c = 1$).

- Compute and plot the conditional and predictive power of the five replication studies. Use the function `powerSignificance()`
- Shrink the original effect estimate by a factor of 25% and use a conditional design prior. How does the power compare to the conditional power without shrinkage?

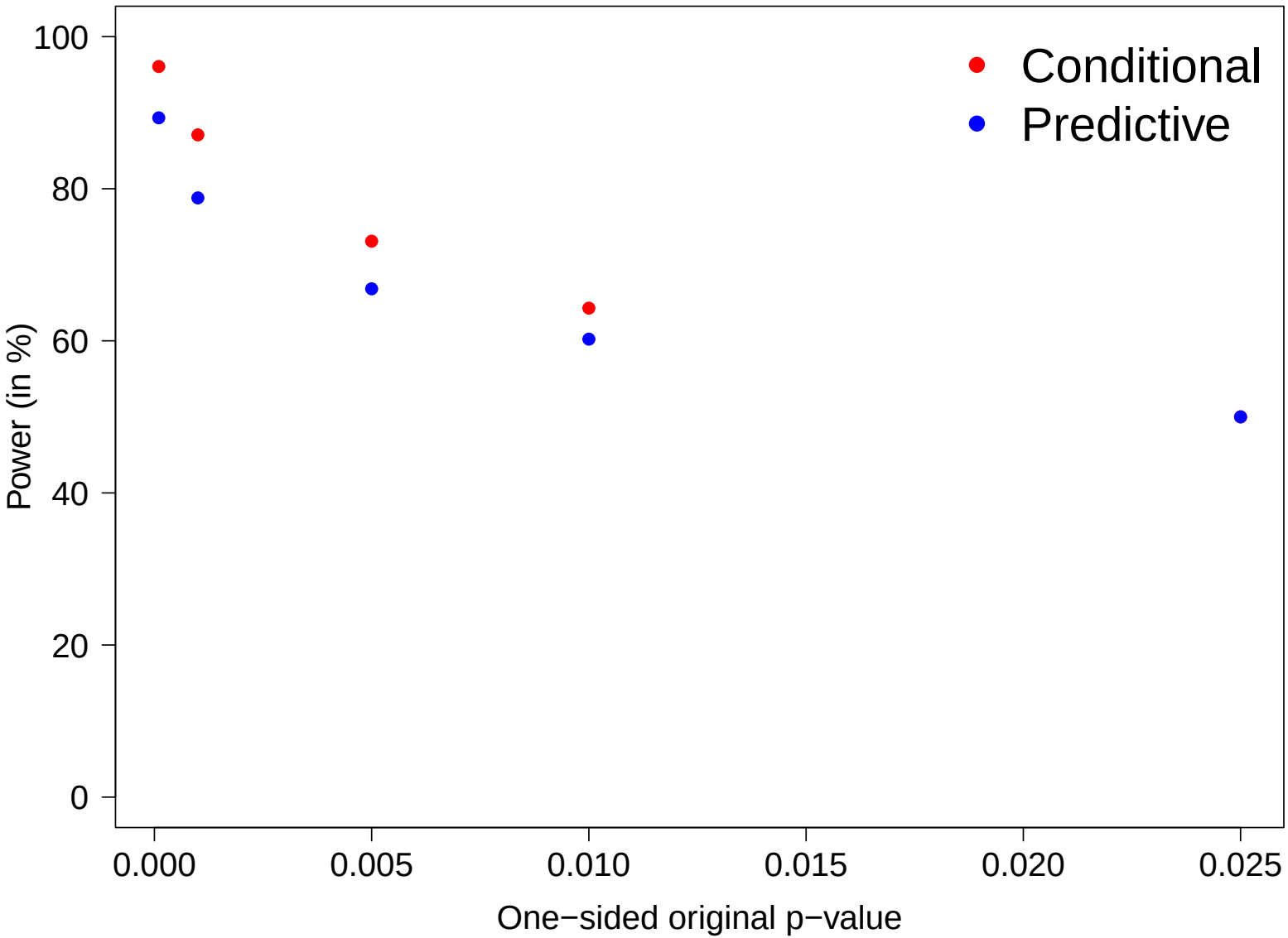
Exercises

(Solutions: https://gitlab.uzh.ch/charlotte.micheloud/replicationstudies)

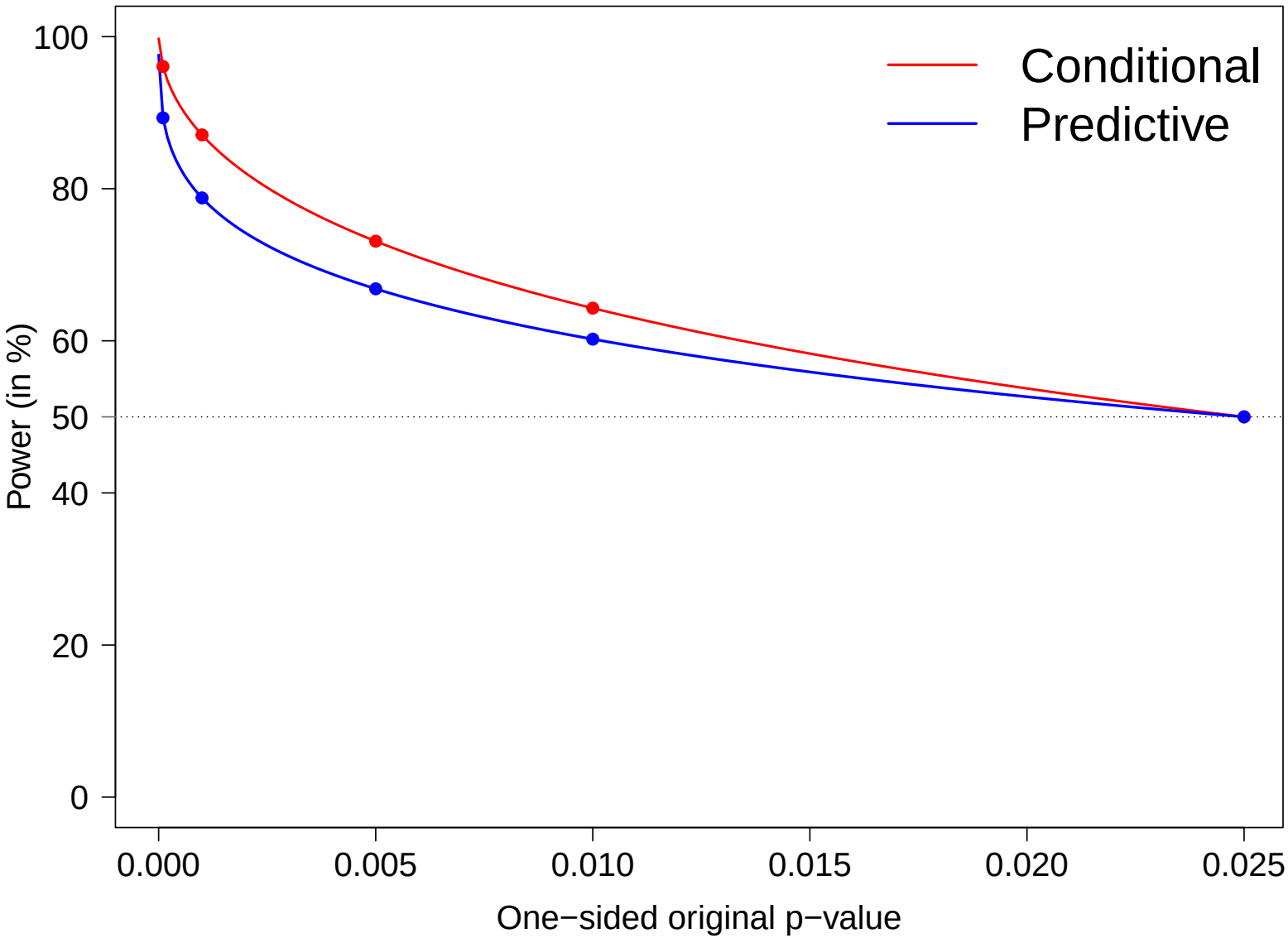
Exercise 2.2

- Compute and plot the relative sample sizes of the five studies to achieve a power of 80% with the conditional and the predictive design prior. Use the function `sampleSizeSignificance()`.
- Shrink the original effect estimate by a factor of 25% and use a conditional design prior. How does the required relative sample size change compared to not shrinking the estimate?

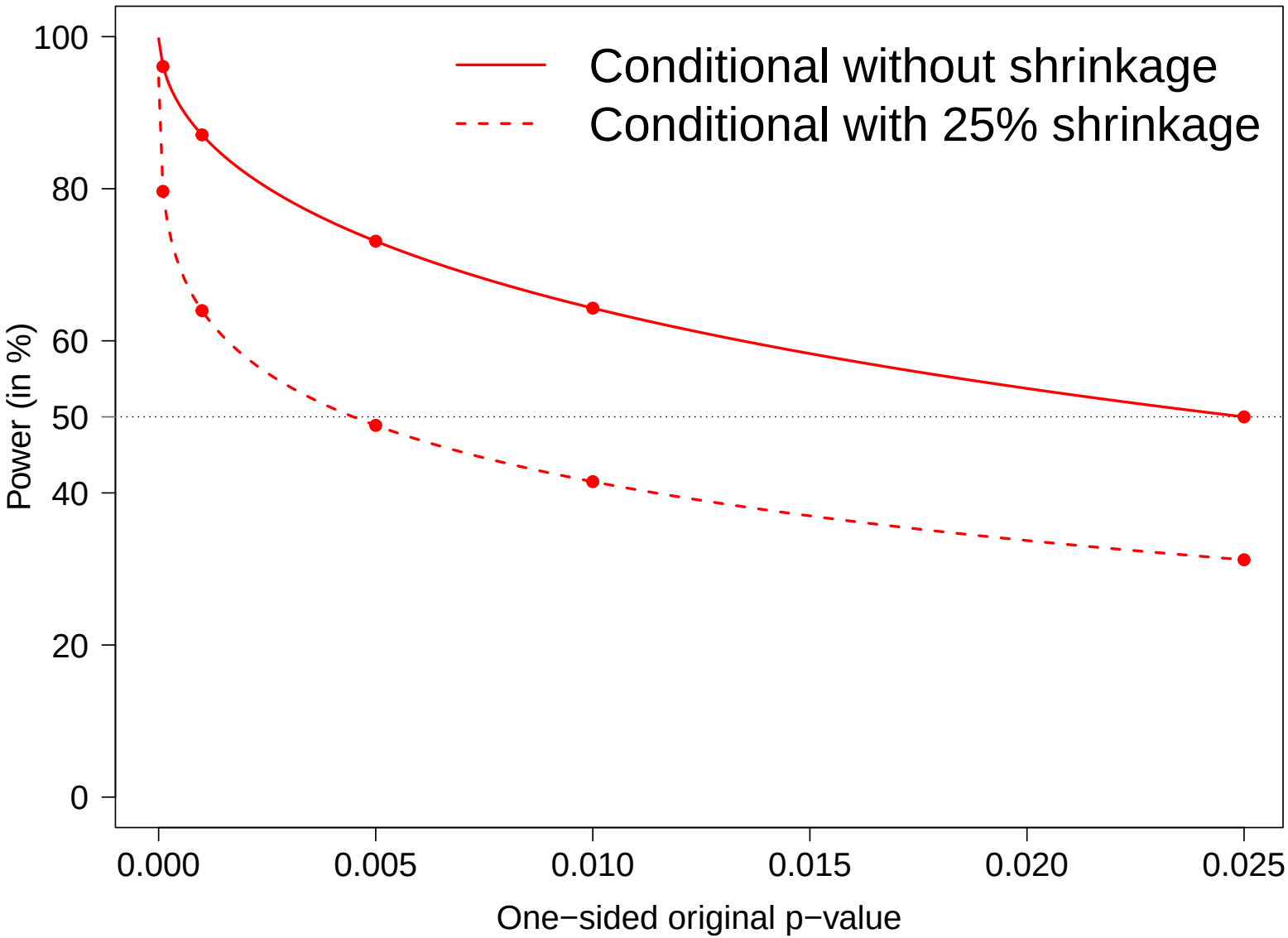
Solution: Exercise 2.1



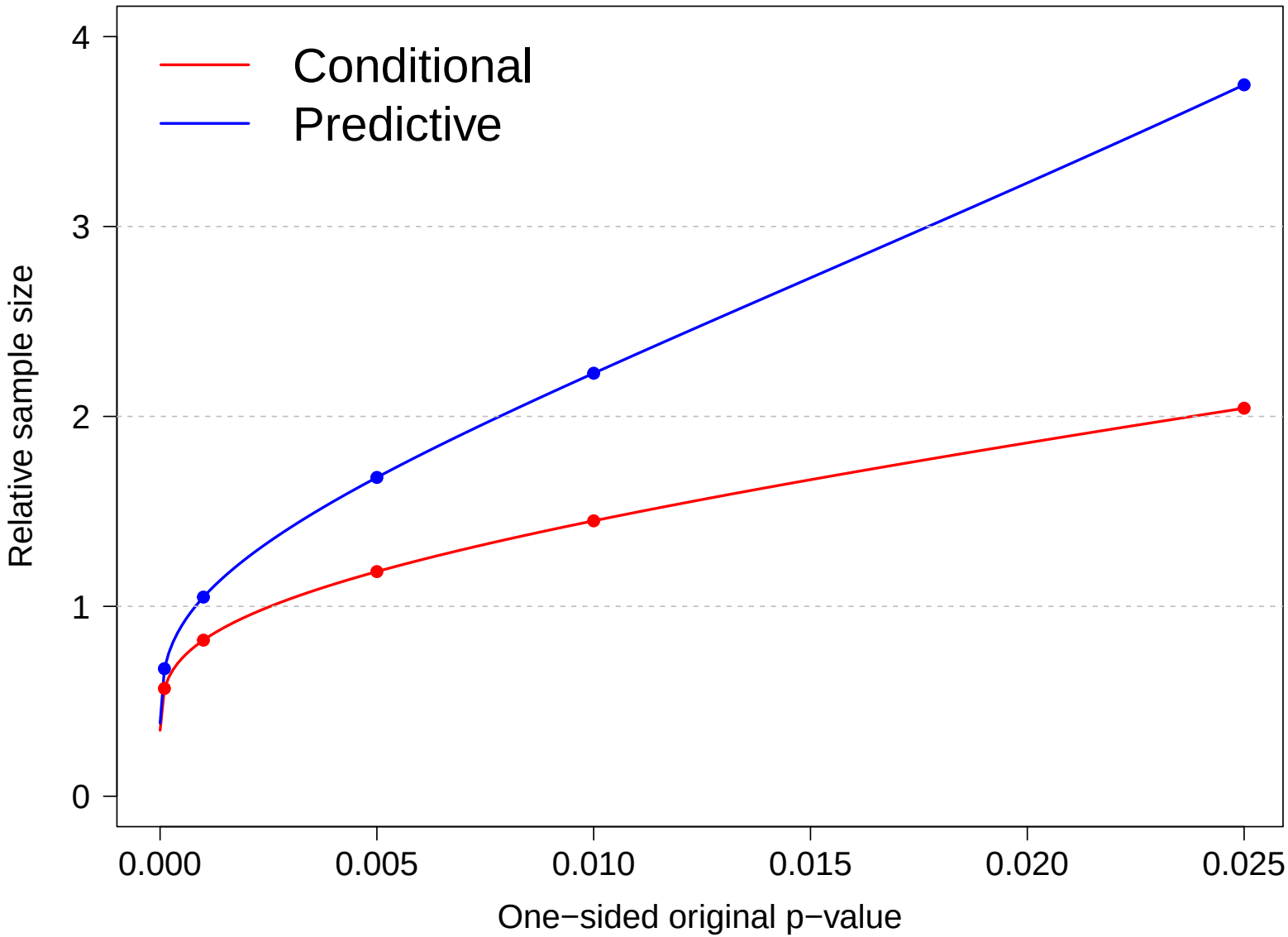
Solution: Exercise 2.1



Solution: Exercise 2.1



Solution: Exercise 2.2



Solution: Exercise 2.2