

# Package: WBI (via r-universe)

May 11, 2026

**Type** Package

**Title** Wasserstein Bipolarization Index

**Version** 0.1.0

**Description** Computation of the Wasserstein Bipolarization Index as described in Lee and Sobel (Forthcoming)  [<doi:10.48550/arXiv.2408.03331 >](https://doi.org/10.48550/arXiv.2408.03331). Provides both asymptotic (Sommerfeld, 2017  [<https://ediss.uni-goettingen.de/bitstream/handle/11858/00-1735-0000-0023-3FA1-C/DissertationSommerfeldRev.pdf?sequence=1 >](https://ediss.uni-goettingen.de/bitstream/handle/11858/00-1735-0000-0023-3FA1-C/DissertationSommerfeldRev.pdf?sequence=1)) and bootstrap methods (Efron and Narasimhan, 2020  [<doi:10.1080/10618600.2020.1714633 >](https://doi.org/10.1080/10618600.2020.1714633)) for calculating confidence intervals.

**License** MIT + file LICENSE

**Encoding** UTF-8

**LazyData** true

**Imports** transport, dplyr, bcaboot

**RoxygenNote** 7.3.3

**Suggests** spelling

**Language** en-US

**Repository** <https://hanelee.r-universe.dev>

**Date/Publication** 2026-03-09 20:28:26 UTC

**RemoteUrl** <https://github.com/hanelee/wbi>

**RemoteRef** HEAD

**RemoteSha** a42d161e6ec2d5d36ca8a571b5718584b017bd5c

## Contents

|                    |   |
|--------------------|---|
| WBI . . . . .      | 2 |
| WBI_boot . . . . . | 3 |

|              |          |
|--------------|----------|
| <b>Index</b> | <b>4</b> |
|--------------|----------|

---

**WBI***Wasserstein Bipolarization Index*

---

**Description**

This function takes a vector of observed responses and computes the Wasserstein Bipolarization Index and its asymptotic confidence interval with the maximum polarization distribution (with 0.5 masses each on min and max) as the maximally separated measure.

**Usage**

```
WBI(obs, wp, min, max, alpha, wt = rep(c(1/length(obs)), length(obs)))
```

**Arguments**

|                    |  |
|--------------------|--|
| <code>obs</code>   | A vector of observed responses.  |
| <code>wp</code>    | The order ( $p$ ) of the $p$ -Wasserstein distance. Use $p=1$ to only account for spread, $p>1$ to account for spread and bi-clustering. |
| <code>min</code>   | The minimum of the response scale.   |
| <code>max</code>   | The maximum of the response scale.   |
| <code>alpha</code> | Significance level of the confidence interval.   |
| <code>wt</code>    | Weight of each observation, with default set to uniform.   |

**Value**

A vector of length three containing the CI lower bound, point estimate, and CI upper bound.

**Examples**

```
# We want to measure WBI of an opinion item measured on [0,100].
# We choose W2 distance and 95% asymptotic confidence intervals.
data <- c(20, 100, 50, 50, 0,
          90, 85, 10, 25, 10,
          30, 90, 80, 0, 100,
          20, 30, 0, 65, 95)
results <- WBI(data, 2, 0, 100, 0.05)
```

---

|          |   |
|----------|---|
| WBI_boot | <i>Wasserstein Bipolarization Index with Bootstrap Confidence Intervals</i> |
|----------|---|

---

**Description**

This function takes a vector of observed responses and computes the Wasserstein Bipolarization Index and its bootstrap confidence interval with the maximum polarization distribution (with 0.5 masses each on min and max) as the maximally separated measure. We use the package `bcaboot` for bootstrap.

**Usage**

```
WBI_boot(obs, wp, min, max, alpha, r = 5000)
```

**Arguments**

|                    |  |
|--------------------|--|
| <code>obs</code>   | A vector of observed responses.  |
| <code>wp</code>    | The order ( $p$ ) of the $p$ -Wasserstein distance. Use $p=1$ to only account for spread, $p>1$ to account for spread and bi-clustering. |
| <code>min</code>   | The minimum of the response scale.   |
| <code>max</code>   | The maximum of the response scale.   |
| <code>alpha</code> | Significance level of the confidence interval.   |
| <code>r</code>     | Number of Bootstrap replications   |

**Value**

A vector of length three containing the CI lower bound, point estimate, and CI upper bound.

**Examples**

```
# We want to measure WBI of an opinion item measured on [0,100].
# We choose W2 distance and 95% bootstrap confidence intervals.
# r=1 for automatic testing (runs quickly)
data <- c(20, 100, 50, 50, 0,
          90, 85, 10, 25, 10,
          30, 90, 80, 0, 100,
          20, 30, 0, 65, 95)
results <- WBI_boot(data, 2, 0, 100, 0.05, r=1)
```

# Index

WBI, [2](#)

WBI\_boot, [3](#)