

# Package ‘abwm’

November 4, 2025

**Title** Ansari-Bradley Test with Arbitrarily Missing Data

**Version** 0.1.0

**Description** Performs the two-sample Ansari–Bradley test (Ansari & Bradley, 1960  
[<https://www.jstor.org/stable/2237814>](https://www.jstor.org/stable/2237814)) for univariate, distinct data in the presence of missing values, as described in Zeng et al. (2025) [<doi:10.48550/arXiv.2509.20332>](https://doi.org/10.48550/arXiv.2509.20332). This method does not make any assumptions about the missingness mechanisms and controls the Type I error regardless of the missing values by taking all possible missing values into account.

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**Encoding** UTF-8

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**Suggests** gtools, testthat (>= 3.0.0)

**Config/testthat.edition** 3

**Imports** stats

**NeedsCompilation** no

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## Contents

abwm.test . . . . .	2
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<b>Index</b>	4
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abwm.test*Ansari-Bradley Test with Arbitrarily Missing Data*

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## Description

Performs the two-sample Ansari-Bradley test for univariate, distinct data in the presence of missing values with controlled Type I error.

## Usage

```
abwm.test(X, Y, alternative = c("two.sided", "less", "greater"))
```

## Arguments

X, Y	numeric vectors of data values with potential missing data. Inf and -Inf values will be omitted.
alternative	a character string specifying the alternative hypothesis, must be one of "two.sided" (default), "greater" or "less". You can specify just the initial letter.

## Details

abwm.test() performs the Ansari-Bradley scale testing method (Ansari & Bradley, 1960) in the presence of missing data, as described in Zeng et al. (2025). Suppose  $X = \{x_1, \dots, x_n\}$  and  $Y = \{y_1, \dots, y_m\}$ , the Ansari-Bradley test statistic in Zeng et al. (2025) is defined as

$$\sum_{i=1}^n \left| R(x_i, X \cup Y) - \frac{n+m+1}{2} \right|,$$

where  $R(x_i, X \cup Y)$  denotes the rank of  $x_i$  in the set  $X \cup Y$ . The function abwm.test() returns the tight bounds of the Ansari-Bradley test statistic and its p-value obtained using the normal approximation. The p-value of the test method proposed in Zeng et al. (2025) is then returned as the maximum possible p-value of the Ansari-Bradley test. This method (Zeng et al., 2025) does not make any missing data assumptions, and controls the Type I error regardless of the values of missing data.

## Value

p.value	the p-value for the test.
bounds.statistic	bounds of the value of the Ansari-Bradley test statistic.
bounds.pvalue	bounds of the p-value of the Ansari-Bradley test.
alternative	a character string describing the alternative hypothesis.
data.name	a character string giving the names of the data.

## References

- Y. Zeng, N. M. Adams, D. A. Bodenham. Scale two-sample testing with arbitrarily missing data. arXiv preprint arXiv:2509.20332. 2025.
- A. R. Ansari, R. A. Bradley. Rank-Sum Tests for Dispersions. *The Annals of Mathematical Statistics*, pages 1174–1189, 1960.

## See Also

`stats:::ansari.test()` when data are completely observed.

## Examples

```
#### Assume all values are distinct.  
X <- c(6.2, 3.5, NA, 7.6, 9.2)  
Y <- c(0.2, 1.3, -0.5, -1.7)  
  
## Perform the two-sided Ansari-Bradley testing with missing data.  
abwm.test(X, Y, alternative = 'two.sided')  
  
## Consider one-sided testing.  
abwm.test(X, Y, alternative = 'less')
```

# Index

`abwm.test`, [2](#)

`stats:::ansari.test()`, [3](#)