

# Package ‘schoenberg’

July 23, 2025

**Type** Package

**Title** Tools for 12-Tone Musical Composition

**Version** 2.0.3

**Date** 2024-01-27

**Author** Jeffrey A. Dahlke <jeff.dahlke.phd@gmail.com>

**Maintainer** Jeffrey A. Dahlke <jeff.dahlke.phd@gmail.com>

**Description** Functions for creating and manipulating 12-tone (i.e., dodecaphonic) musical matrices using Arnold Schoenberg's (1923) serialism technique. This package can generate random 12-tone matrices and can generate matrices using a pre-determined sequence of notes.

**BugReports** <https://github.com/jadahlke/schoenberg/issues>

**License** GPL (>= 3)

**Imports** crayon

**Encoding** UTF-8

**RoxygenNote** 7.2.3

**NeedsCompilation** no

**Repository** CRAN

**Date/Publication** 2024-01-28 11:20:03 UTC

## Contents

print . . . . .	2
rekey . . . . .	2
schoenberg . . . . .	3

<b>Index</b>	<b>6</b>
--------------	----------

---

print	<i>Print methods for <b>schoenberg</b></i>
-------	--

---

### Description

Print methods for **schoenberg** output objects with classes exported from **schoenberg**.

### Arguments

x	Object to be printed (object is used to select a method).
...	Additional arguments.

---

rekey	<i>Re-express a "schoenberg" class object with a different lead tone or different notation of accidentals.</i>
-------	--

---

### Description

Re-express a "schoenberg" class object with a different lead tone or different notation of accidentals.

### Usage

```
rekey(tone_mat, tone0 = NULL, accidentals = NULL)
```

### Arguments

tone_mat	Object of the class "schoenberg" produced by the schoenberg() function.
tone0	<i>Optional:</i> Name of the note to use as the lead tone of the matrix.
accidentals	<i>Optional:</i> Character scalar that determines whether accidentals should be represented as sharps (accidentals = "sharps") or flats (accidentals = "flats"); default value is NULL. accidentals can also be set to "integers" when one wishes to obtain a 12-tone matrix of numeric indices rather than notes. When accidentals is NULL, matrices created from pre-specified vectors of notes will use the original set of accidentals, whereas random matrices and matrices created from vectors of numeric indices will default to sharp notation.

### Value

A 12-tone matrix of the "schoenberg" class with prime series on the rows and inverted series on the columns.

**Examples**

```
# Let's create a vector of notes to use in creating our initial 'tone_mat' matrix based
# on Schoenberg's Walzer from Opus 23
prime01 <- c("C#", "A", "B", "G", "Ab", "F#", "A#", "D", "E", "Eb", "C", "F")
tone_mat <- schoenberg(prime0 = prime01)

# Now, let's change the lead tone to "C":
rekey(tone_mat = tone_mat, tone0 = "C")

# And let's also change the accidentals to flats:
rekey(tone_mat = tone_mat, tone0 = "C", accidentals = "flats")
```

---

schoenberg	<i>Generate a 12-tone matrix using Arnold Schoenberg's serialism technique.</i>
------------	---

---

**Description**

Generate a 12-tone matrix using Arnold Schoenberg's serialism technique.

**Usage**

```
schoenberg(prime0 = NULL, tone0 = NULL, accidentals = NULL, seed = NULL)
```

**Arguments**

prime0	<i>Optional:</i> Vector of notes or numeric note indices to use in forming the matrix. If the vector is numeric, the values must span from 0 - 11, where 0 is the lead tone (unless tone0 is specified, note 0 will be treated as "C"). If supplying note names, use capital letters for the note names, use "#" to indicate sharps, and use "b" to indicate flats.
tone0	<i>Optional:</i> Name of the note to use as the lead tone of the matrix.
accidentals	<i>Optional:</i> Character scalar that determines whether accidentals should be represented as sharps (accidentals = "sharps") or flats (accidentals = "flats"); default value is NULL. accidentals can also be set to "integers" when one wishes to obtain a 12-tone matrix of numeric indices rather than notes. When accidentals is NULL, matrices created from pre-specified vectors of notes will use the original set of accidentals, whereas random matrices and matrices created from vectors of numeric indices will default to sharp notation.
seed	<i>Optional:</i> Seed value to use in generating random matrices. Set this to a numeric value when matrices need to be reproducible.

**Value**

A 12-tone matrix of the "schoenberg" class with prime series on the rows and inverted series on the columns.

## References

Schoenberg, A. (1923). *Fünf klavierstücke [Five piano pieces], Op. 23, Movement 5: Walzer*. Copenhagen, Denmark: Wilhelm Hansen.

## Examples

```
#### Generating Random 12-Tone Matrices ####
# The schoenberg() function can generate completely random 12-tone matrices:
schoenberg()

# Or you can specify a seed value so that your matrices are reproducible:
schoenberg(seed = 42)

#### Generating 12-Tone Matrices From a Specified Vector of Notes ####
# For illustration, let's create two equivalent vectors of note information
# for Schoenberg's first 12-tone serialist work: Walzer from Opus 23.

# First, let's create one vector with note labels:
prime01 <- c("C#", "A", "B", "G", "Ab", "F#", "A#", "D", "E", "Eb", "C", "F")

# Next, let's create an equivalent vector using numeric indices instead of notes:
prime02 <- c(1, 9, 11, 7, 8, 6, 10, 2, 4, 3, 0, 5)

# Now, let's generate a 12-tone matrix from our note-based vector:
schoenberg(prime0 = prime01)

# And let's generate a matrix from our number-based vector:
schoenberg(prime0 = prime02)

# Schoenberg used a mix of sharps and flats in his notation, which lost in translation with the
# numeric-index approach. Let's re-create our note-based matrix using only sharps:
schoenberg(prime0 = prime01, accidentals = "sharps")

# These two approaches produce identical outputs:
all(schoenberg(prime0 = prime01, accidentals = "sharps") == schoenberg(prime0 = prime02))

# Matrices can also be generated with flat notation by setting accidentals to "flats":
schoenberg(prime0 = prime01, accidentals = "flats")
schoenberg(prime0 = prime02, accidentals = "flats")

# As before, these two approaches produce identical outputs:
all(schoenberg(prime0 = prime01, accidentals = "flats") ==
     schoenberg(prime0 = prime02, accidentals = "flats"))

# We can also manipulate the output of the schoenberg() function
# so that the lead tone of the matrix is a particular note.
# This works with either note-based or number-based input vectors:
schoenberg(prime0 = prime01, tone0 = "C", accidentals = "sharps")
```

```
schoenberg(prime0 = prime02, tone0 = "C")  
  
# And, as before, these two approaches produce identical outputs:  
all(schoenberg(prime0 = prime01, tone0 = "C", accidentals = "sharps") ==  
     schoenberg(prime0 = prime02, tone0 = "C"))
```

# Index

print, [2](#)

rekey, [2](#)

schoenberg, [3](#)