Contents

1 Define an Input

First you must define an input for our vote method. This input must be a list with each element of the list containing the ranked choices for an individual:

```
#let input = (
    ("Alice", "Charlie"),
    ("Bob", "Charlie", "Alice"),
    ("Charlie", "Alice", "Bob"),
    ("Alice", "Charlie", "Bob"),
    ("Bob", "Alice", "Charlie"),
    ("Tim",)
)
```

In our example the first person prefered Alice over Charlie and the last person only voted for Tim. Please note that an Element that contains only one element must end with a comma, as shown in `("Tim",)`.

2 Retrieve raw results (#vote)

To retrieve the raw results simply call

```
#vote(input)
```

The results is JSON and is shown here:


```
(
  (
    run: 1,
    candidate: "Alice",
    id: 0,
    votes: 2,
    total_votes: 6,
```

```
    percentage: 33.33333333333333,
    is_winner: true,
    is_winner_candidate: true,
    is_eliminated: false,
    is_elimination_candidate: false,
  ),
  (
    run: 1,
    candidate: "Bob",
    id: 1,
    votes: 2,
    total_votes: 6,
    percentage: 33.33333333333333,
    is_winner: true,
    is_winner_candidate: true,
    is_eliminated: false,
    is_elimination_candidate: false,
  ),
  (
    run: 1,
    candidate: "Charlie",
    id: 2,
    votes: 1,
    total_votes: 6,
    percentage: 16.666666666666664,
    is_winner: false,
    is_winner_candidate: false,
    is_eliminated: false,
    is_elimination_candidate: false,
  ),
  (
    run: 1,
    candidate: "Tim",
    id: 3,
    votes: 1,
    total_votes: 6,
    percentage: 16.666666666666664,
    is_winner: false,
    is_winner_candidate: false,
    is_eliminated: false,
    is_elimination_candidate: false,
  ),
)
```

By default vote operates on Plurality (See Section 4.1) vote mode and for ties all candidates are retained (and/or eliminated). For other methods of solving votes see Section 4 and for other tie breaker modes see Section 5.

3 Retrieve a detailed result report (`#vote-report`)

To retrieve a report of the raw results simply call

```
#vote-report(input)
```

This method takes in the same parameters as `#vote`. For reference see Section 2.

The results are shown in the examples (see Section 6 and Section 7).

4 Methods

4.1 Plurality

Each ballot selects one candidate. The candidate with the highest number of votes wins. The candidate with the fewest votes is eliminated.

4.2 STV

Single Transferable Vote is used when multiple seats are to be filled. A quota of votes is calculated. Candidates who reach the quota are elected, and any surplus votes they receive are transferred to remaining candidates according to voter preferences. If no one meets the quota, the candidate with the fewest votes is eliminated and their ballots transferred. The process repeats until all seats are filled.

With only one seat to fill, STV works like Instant-Runoff Voting: voters rank candidates, the least-voted candidate is eliminated each round, and their ballots are transferred to the next preference, until one candidate remains and wins (> 50% of votes).

5 Tie Breakers

5.1 All

If multiple candidates tie for winning or elimination, all tied candidates share the outcome (all win or all are eliminated).

5.2 Random

If multiple candidates tie, a random selection among the tied candidates determines who wins or is eliminated.

5.3 Count

If multiple candidates tie, the total number of ballots that contain this candidate is summed up. This sum is used to break the tie.

6 Example Reports for Plurality-Voting

6.1 Tie Method: All

```
//Call:
#vote-report(input)
```

Report

Method

We performed a **Plurality** vote with **All** tie-breaking.

Results

The vote finished after **1** rounds.

The winner(s) is/are:

- **Alice**
- **Bob**

Details

6.1.0.1.2.1.1 Round 1

We performed the **1st** round of the vote:

Run	Candidate	ID	Votes	Total Votes	Percentage	Winner	Winner Candidate	Eliminated	Elem. Candidate
1	Alice	0	2	6	33.3	`true`	`true`	`false`	`false`
1	Bob	1	2	6	33.3	`true`	`true`	`false`	`false`
1	Charlie	2	1	6	16.7	`false`	`false`	`false`	`false`
1	Tim	3	1	6	16.7	`false`	`false`	`false`	`false`

We have multiple winner candidates: **Alice**, **Bob**

We need to break the tie. The tie-breaking method is **All**. The final winner(s) is/are: **Alice**, **Bob**

We have no elimination candidates in this round.

6.2 Tie Method: Random

```
//Call:
#vote-report(input, tie-method: "Random")
```

Report

Method

We performed a **Plurality** vote with **Random** tie-breaking.

Results

The vote finished after **1** rounds.

The winner(s) is/are:

- **Alice**

Details

6.2.0.1.2.1.1 Round 1

We performed the **1st** round of the vote:

Run	Candidate	ID	Votes	Total Votes	Percentage	Winner	Winner Candidate	Eliminated	Elem. Candidate
1	Alice	0	2	6	33.3	true	true	false	false
1	Bob	1	2	6	33.3	false	true	false	false
1	Charlie	2	1	6	16.7	false	false	false	false
1	Tim	3	1	6	16.7	false	false	false	false

We have multiple winner candidates: **Alice**, **Bob**

We need to break the tie. The tie-breaking method is **Random**. The final winner(s) is/are: **Alice**

We have no elimination candidates in this round.

6.3 Tie Method: Count

```
//Call:
#vote-report(input, tie-method: "Count")
```

Report

Method

We performed a **Plurality** vote with **Count** tie-breaking.

Results

The vote finished after **1** rounds.

The winner(s) is/are:

- **Alice**

Details

6.3.0.1.2.1.1 Round 1

We performed the **1st** round of the vote:

Run	Candidate	ID	Votes	Total Votes	Percentage	Winner	Winner Candidate	Eliminated	Elem. Candidate
1	Alice	0	2	6	33.3	true	true	false	false
1	Bob	1	2	6	33.3	false	true	false	false
1	Charlie	2	1	6	16.7	false	false	false	false
1	Tim	3	1	6	16.7	false	false	false	false

We have multiple winner candidates: **Alice**, **Bob**

We need to break the tie. The tie-breaking method is **Count**. The final winner(s) is/are: **Alice**

We have no elimination candidates in this round.

7 Examples Reports for STV-Voting

7.1 Tie Method: All

```
//Call:
#vote-report(input, method: "STV", tie-method: "All")
```

Report

Method

We performed a **STV** vote with **All** tie-breaking.

Results

The vote finished after **2** rounds.

The winner(s) is/are:

- **Alice**

Details

7.1.0.1.2.1.1 Round 1

We performed the **1st** round of the vote:

Run	Candidate	ID	Votes	Total Votes	Percentage	Winner	Winner Candidate	Eliminated	Elem. Candidate
1	Alice	0	2	6	33.3	false	false	false	false
1	Bob	1	2	6	33.3	false	false	false	false
1	Charlie	2	1	6	16.7	false	false	true	true
1	Tim	3	1	6	16.7	false	false	true	true

We have no winner candidates in this round.

We have multiple elimination candidates: **Charlie**, **Tim**

We need to break the tie. The tie-breaking method is **All**. The final eliminated candidate(s) is/are: **Charlie**, **Tim**

7.1.0.1.2.1.2 Round 2

We performed the **2nd** round of the vote:

Run	Candidate	ID	Votes	Total Votes	Percentage	Winner	Winner Candidate	Eliminated	Elem. Candidate
2	Alice	0	3	5	60	true	true	false	false
2	Bob	1	2	5	40	false	false	false	false

We have found a winner: **Alice**.

We have no elimination candidates in this round.

7.2 Tie Method: Random

```
//Call:
#vote-report(input, method: "STV", tie-method: "Random")
```

Report

Method

We performed a **STV** vote with **Random** tie-breaking.

Results

The vote finished after **3** rounds.

The winner(s) is/are:

- **Alice**

Details

7.2.0.1.2.1.1 Round 1

We performed the **1st** round of the vote:

Run	Candidate	ID	Votes	Total Votes	Percentage	Winner	Winner Candidate	Eliminated	Elem. Candidate
1	Alice	0	2	6	33.3	false	false	false	false
1	Bob	1	2	6	33.3	false	false	false	false
1	Charlie	2	1	6	16.7	false	false	false	true
1	Tim	3	1	6	16.7	false	false	true	true

We have no winner candidates in this round.

We have multiple elimination candidates: **Charlie**, **Tim**

We need to break the tie. The tie-breaking method is **Random**. The final eliminated candidate(s) is/are: **Tim**

7.2.0.1.2.1.2 Round 2

We performed the **2nd** round of the vote:

Run	Candidate	ID	Votes	Total Votes	Percentage	Winner	Winner Candidate	Eliminated	Elem. Candidate
2	Alice	0	2	5	40	false	false	false	false
2	Bob	1	2	5	40	false	false	false	false
2	Charlie	2	1	5	20	false	false	true	true

We have no winner candidates in this round.

We have found an elimination candidate: **Charlie**.

7.2.0.1.2.1.3 Round 3

We performed the **3rd** round of the vote:

Run	Candidate	ID	Votes	Total Votes	Percentage	Winner	Winner Candidate	Eliminated	Elem. Candidate
3	Alice	0	3	5	60	`true`	`true`	`false`	`false`
3	Bob	1	2	5	40	`false`	`false`	`false`	`false`

We have found a winner: **Alice**.

We have no elimination candidates in this round.

7.3 Tie Method: Count

```
//Call:
#vote-report(input, method: "STV", tie-method: "Count")
```

Report

Method

We performed a **STV** vote with **Count** tie-breaking.

Results

The vote finished after **3** rounds.

The winner(s) is/are:

- **Alice**

Details

7.3.0.1.2.1.1 Round 1

We performed the **1st** round of the vote:

Run	Candidate	ID	Votes	Total Votes	Percentage	Winner	Winner Candidate	Eliminated	Elem. Candidate
1	Alice	0	2	6	33.3	false	false	false	false
1	Bob	1	2	6	33.3	false	false	false	false
1	Charlie	2	1	6	16.7	false	false	false	true
1	Tim	3	1	6	16.7	false	false	true	true

We have no winner candidates in this round.

We have multiple elimination candidates: **Charlie**, **Tim**

We need to break the tie. The tie-breaking method is **Count**. The final eliminated candidate(s) is/are: **Tim**

7.3.0.1.2.1.2 Round 2

We performed the **2nd** round of the vote:

Run	Candidate	ID	Votes	Total Votes	Percentage	Winner	Winner Candidate	Eliminated	Elem. Candidate
2	Alice	0	2	5	40	false	false	false	false
2	Bob	1	2	5	40	false	false	false	false
2	Charlie	2	1	5	20	false	false	true	true

We have no winner candidates in this round.

We have found an elimination candidate: **Charlie**.

7.3.0.1.2.1.3 Round 3

We performed the **3rd** round of the vote:

Run	Candidate	ID	Votes	Total Votes	Percentage	Winner	Winner Candidate	Eliminated	Elem. Candidate
3	Alice	0	3	5	60	true	true	false	false
3	Bob	1	2	5	40	false	false	false	false

We have found a winner: **Alice**.

We have no elimination candidates in this round.

7.4 Change Header Level

Changes the top header of the report to level 3:

```
//Call:
#vote-report(input, method: "STV", tie-method: "All", level-start: 3)
```

7.4.1 Report

Method

We performed a **STV** vote with **All** tie-breaking.

Results

The vote finished after **2** rounds.

The winner(s) is/are:

- **Alice**

Details

Round 1

We performed the **1st** round of the vote:

Run	Candidate	ID	Votes	Total Votes	Percentage	Winner	Winner Candidate	Eliminated	Elem. Candidate
1	Alice	0	2	6	33.3	false	false	false	false
1	Bob	1	2	6	33.3	false	false	false	false
1	Charlie	2	1	6	16.7	false	false	true	true
1	Tim	3	1	6	16.7	false	false	true	true

We have no winner candidates in this round.

We have multiple elimination candidates: **Charlie**, **Tim**

We need to break the tie. The tie-breaking method is **All**. The final eliminated candidate(s) is/are: **Charlie**, **Tim**

Round 2

We performed the **2nd** round of the vote:

Run	Candidate	ID	Votes	Total Votes	Percentage	Winner	Winner Candidate	Eliminated	Elem. Candidate

2	Alice	0	3	5	60	`true`	`true`	`false`	`false`
2	Bob	1	2	5	40	`false`	`false`	`false`	`false`

We have found a winner: **Alice**.

We have no elimination candidates in this round.