

# Package: nfl4th (via r-universe)

July 26, 2024

**Title** Functions to Calculate Optimal Fourth Down Decisions in the National Football League

**Version** 1.0.4.9002

**Description** A set of functions to estimate outcomes of fourth down plays in the National Football League and obtain fourth down plays from <https://www.nfl.com/> and <https://www.espn.com/>.

**License** MIT + file LICENSE

**URL** <https://www.nfl4th.com/>, <https://github.com/nflverse/nfl4th/>,  
<https://github.com/nflverse/nfl4th>

**BugReports** <https://github.com/nflverse/nfl4th/issues>

**Depends** R (>= 3.6)

**Imports** backports (>= 1.1.6), curl, dplyr, glue, httr, janitor, jsonlite, magrittr, mgcv, nflfastR (>= 4.0.0), nflreadr, purrr, rlang, stringr, tibble, tidyr, tidyselect, xgboost

**Suggests** data.table, future, gt, nflplotR, rmarkdown, tictoc, testthat (>= 2.0.0), withr

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**RoxygenNote** 7.2.3

**Config/testthat/edition** 2

**LazyData** true

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

**RemoteUrl** <https://github.com/nflverse/nfl4th>

**RemoteRef** HEAD

**RemoteSha** 1ab58fc7a7d846b1c2baa15d5bb1a1836a03d685

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add_2pt_probs	<i>Get 2pt decision probabilities</i>
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### Description

Get various probabilities associated with each option on PATs (go for it, kick PAT).

### Usage

```
add_2pt_probs(df)
```

### Arguments

`df` A data frame of decisions to be computed for.

### Value

Original data frame Data frame plus the following columns added:

first\_down\_prob, wp\_fail, wp\_succeed, go\_wp, fg\_make\_prob, miss\_fg\_wp, make\_fg\_wp, fg\_wp, punt\_wp

**wp\_0** Win probability when scoring 0 points on PAT.

**wp\_1** Win probability when scoring 1 point on PAT.

**wp\_2** Win probability when scoring 2 points on PAT.

**conv\_1pt** Probability of making PAT kick.

**conv\_2pt** Probability of converting 2-pt attempt.

**wp\_go1** Win probability associated with going for 1.

**wp\_go2** Win probability associated with going for 2.

## Examples

```
play <-
  tibble::tibble(
    # things to help find the right game (use "reg" or "post")
    home_team = "GB",
    away_team = "TB",
    posteam = "GB",
    type = "post",
    season = 2020,

    # information about the situation
    qtr = 4,
    quarter_seconds_remaining = 123,
    score_differential = -2,

    home_opening_kickoff = 0,
    posteam_timeouts_remaining = 3,
    defteam_timeouts_remaining = 3
  )

probs <- nfl14th::add_2pt_probs(play)

dplyr::glimpse(probs)
```

---

add\_4th\_probs

*Get 4th down decision probabilities*

---

## Description

Get various probabilities associated with each option on 4th downs (go for it, kick field goal, punt).

## Usage

```
add_4th_probs(df)
```

## Arguments

**df** A data frame of decisions to be computed for.

## Value

Original data frame Data frame plus the following columns added:

**go\_boost** Gain (or loss) in win prob associated with choosing to go for it (percentage points).

**first\_down\_prob** Probability of earning a first down if going for it on 4th down.

**wp\_fail** Win probability in the event of a failed 4th down attempt.

**wp\_succeed** Win probability in the event of a successful 4th down attempt.

**go\_wp** Average win probability when going for it on 4th down.  
**fg\_make\_prob** Probability of making field goal.  
**miss\_fg\_wp** Win probability in the event of a missed field goal.  
**make\_fg\_wp** Win probability in the event of a made field goal.  
**fg\_wp** Average win probability when attempting field goal.  
**punt\_wp** Average win probability when punting.

### Examples

```
play <-
  tibble::tibble(
    # things to help find the right game (use "reg" or "post")
    home_team = "GB",
    away_team = "TB",
    posteam = "GB",
    type = "post",
    season = 2020,

    # information about the situation
    qtr = 4,
    quarter_seconds_remaining = 129,
    ydstogo = 8,
    yardline_100 = 8,
    score_differential = -8,

    home_opening_kickoff = 0,
    posteam_timeouts_remaining = 3,
    defteam_timeouts_remaining = 3
  )

probs <- nfl4th::add_4th_probs(play)

dplyr::glimpse(probs)
```

---

get\_4th\_plays

*Get 4th down plays from a game*

---

### Description

Get 4th down plays from a game.

### Usage

```
get_4th_plays(gid)
```

### Arguments

**gid** A game to get 4th down decisions of.

**Details**

Obtains a data frame that can be used with `add_4th_probs()`. The following columns must be present:

- `game_id` : game ID in nflfastR format (eg '2020\_20\_TB\_GB')

**Value**

Original data frame Data frame plus the following columns added:

**desc** Play description from ESPN.

**type\_text** Play type text from ESPN.

**index** Index number of play from a given game. Useful for tracking plays (e.g. for 4th down bot).

**The rest** All the columns needed for `add_4th_probs()`.

**Examples**

```
plays <- nfl4th::get_4th_plays('2020_20_TB_GB')
dplyr::glimpse(plays)
```

---

load\_4th\_pbp

*Load calculated 4th down probabilities from nflfastR data*

---

**Description**

Load calculated 4th down probabilities from nflfastR data.

**Usage**

```
load_4th_pbp(seasons, fast = FALSE)
```

**Arguments**

`seasons` Seasons to load. Must be 2014 and later.  
`fast` Defaults to FALSE. If TRUE, loads pre-computed decisions from repository

**Value**

nflfastR data on 4th downs with the `add_4th_probs()` columns added and also the following:

**go** 100 if a team went for it on 4th down, 0 otherwise. It's 100 and 0 as a convenience for obtaining percent of times going for it.

## Examples

```
try({# Wrap in try to avoid CRAN test problems
probs <- load_4th_pbp(2019:2020)
dplyr::glimpse(probs)
})
```

---

make\_2pt\_table\_data    *Get 2pt decision probabilities*

---

## Description

Get a table with the probabilities associated with a 2-pt decision.

## Usage

```
make_2pt_table_data(probs)
```

## Arguments

probs                    A data frame consisting of one play that has had `add_2pt_probs()` already run on it.

## Value

A table showing the probabilities associated with each possible choice.

## Examples

```
play <-
  tibble::tibble(
    # things to help find the right game (use "reg" or "post")
    home_team = "GB",
    away_team = "TB",
    posteam = "GB",
    type = "post",
    season = 2020,

    # information about the situation
    qtr = 4,
    quarter_seconds_remaining = 123,
    score_differential = -2,

    home_opening_kickoff = 0,
    posteam_timeouts_remaining = 3,
    defteam_timeouts_remaining = 3
  )
```

```
probs <- nfl14th::add_2pt_probs(play)
nfl14th::make_2pt_table_data(probs)
```

---

make\_table\_data

*Get 4th down decision probabilities*

---

## Description

Get a table with the probabilities on 4th down.

## Usage

```
make_table_data(probs)
```

## Arguments

probs                    A data frame consisting of one play that has had `add_4th_probs()` already run on it.

## Value

A table showing the probabilities associated with each possible choice.

## Examples

```
play <-
  tibble::tibble(
    # things to help find the right game (use "reg" or "post")
    home_team = "GB",
    away_team = "TB",
    posteam = "GB",
    type = "post",
    season = 2020,

    # information about the situation
    qtr = 4,
    quarter_seconds_remaining = 129,
    ydstogo = 8,
    yardline_100 = 8,
    score_differential = -8,

    home_opening_kickoff = 0,
    posteam_timeouts_remaining = 3,
    defteam_timeouts_remaining = 3
  )

probs <- nfl14th::add_4th_probs(play)
nfl14th::make_table_data(probs)
```

---

nfl4th\_clear\_cache     *Reset nfl4th Package Cache*

---

**Description**

Reset nfl4th Package Cache

**Usage**

```
nfl4th_clear_cache(type = c("games", "fd_model", "wp_model", "all"))
```

**Arguments**

`type`            One of "games" (the default), "fd\_model", or "all". "games" will remove an internally used games file. "fd\_model" will remove the nfl4th 4th down model (only necessary in the unlikely case of a model update). "wp\_model" will remove the nfl4th win probability model (only necessary in the unlikely case of a model update). "all" will remove all of the above.

**Value**

Returns TRUE invisibly if cache has been cleared.

**Examples**

```
nfl4th_clear_cache()
```



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