

# The Unsinkable Titanic Data

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# Timeline of the Titanic Disaster

- July 1908: Design approved
- March 1909: Construction began
- April 10, 1912: Maiden voyage started in Southampton, England
- April 14, 1912, 11:40pm: Iceberg struck Titanic on starboard (right) side
- April 15, 1912, 2:05am: Last lifeboat left Titanic with over 1,500 people left on the ship
- April 15, 1912, 2:20am: After breaking apart, last major part (the stern) of Titanic sinks
- About 1,500 out of about 2,200 passengers and crew killed

<https://www.historyonthenet.com/titanic-timeline-3/>

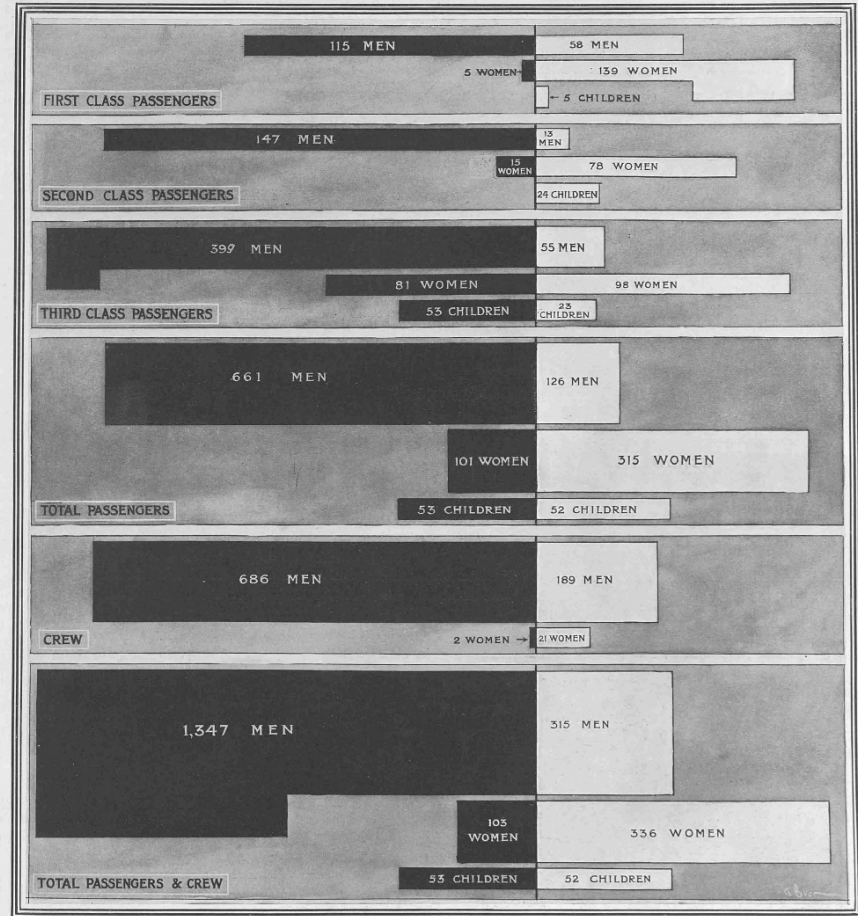
# Timeline of the Titanic Disaster (2)

- May 2, 1912: British Board of Trade Formal Investigation Report into "Loss of the S.S. 'Titanic'" released
- May 4, 1912: First Titanic graph by G. Bron published in British newspaper *The Sphere*

## THE LOSS of the "TITANIC."

The Results Analysed and Shown in a Special "Sphere" Diagram

Drawn from the Official Figures Given in the House of Commons



The Black Indicates Passengers and Crew NOT SAVED, the White Indicates the SAVED

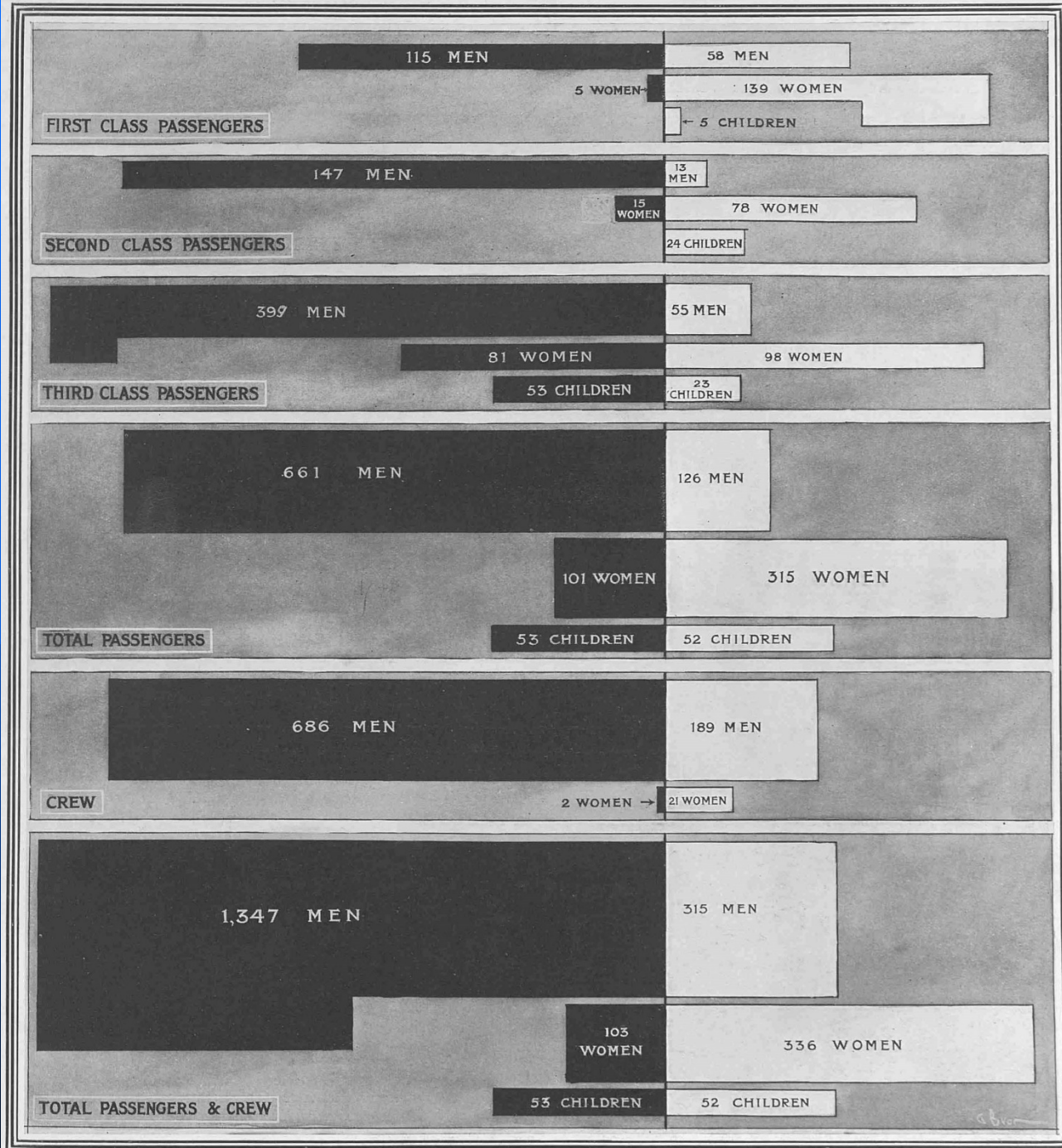
SPECIALY DRAWN FOR "THE SPHERE" BY G. BRON

The official figures given last week show that the first figures (as given in "The Sphere" of last week) were in excess of the real numbers on board by about 132. The actual figures are as above. The actual numbers of the saved and lost are given above; the percentage is shown below

NUMBERS OF SAVED	FIRST CLASS			SECOND CLASS			THIRD CLASS			THE CREW			PASSENGERS AND CREW		
	Per cent.	Carried	Saved	Per cent.	Carried	Saved	Per cent.	Carried	Saved	Per cent.	Carried	Saved	Per cent.	Carried	Saved
First class	63	173	106	34	160	113	8	214	98	45	875	189	22	1,662	315
Second class	42	144	139	97	21	78	84	179	98	55	23	21	91	439	316
Third class	25	5	3	100	24	24	100	76	23	30	23	21	91	105	52
Crew	23	322	202	63	277	115	42	709	176	25	898	210	23	2,206	703

# 1912 Graph

- Area based
- Back-to-back saved/not saved
- Conditional on men/women/children
- Conditional on class (1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>)
- Cumulative
- “Surprisingly modern” appearance



The Black Indicates Passengers and Crew NOT SAVED, the White Indicates the SAVED

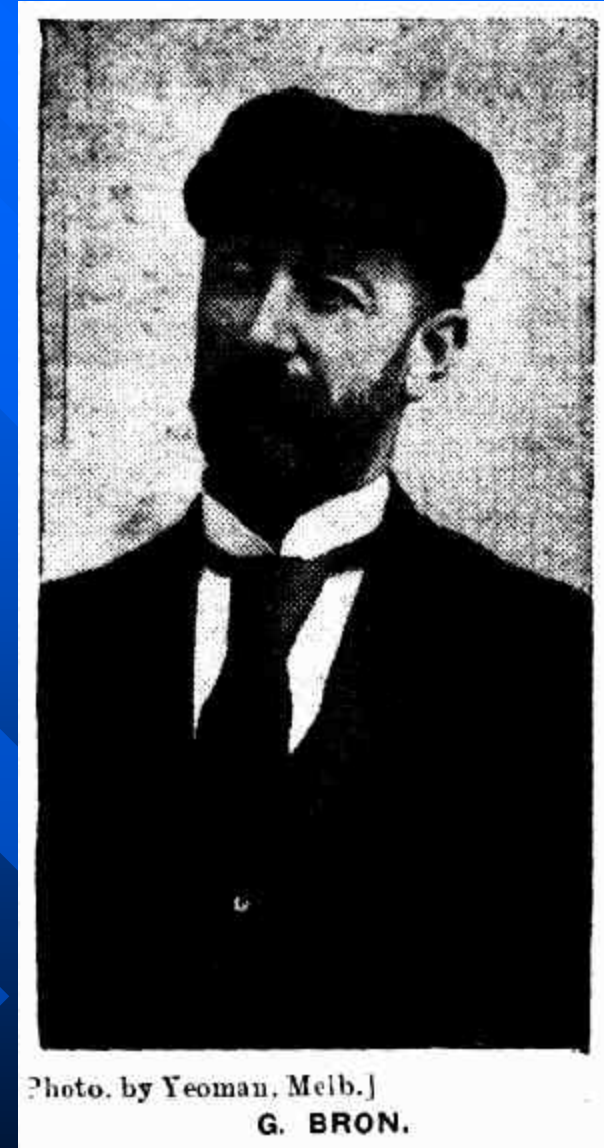
SPECIALLY DRAWN FOR "THE SPHERE" BY G. BRON

# The Sphere

- Illustrated weekly newspaper
  - Publisher: Illustrated London News Group, London, England
  - First issue: January 27, 1900
  - Last issue: June 27, 1964
  - Dedicated to world-wide reporting
- 
- <https://www.britishnewspaperarchive.co.uk/titles/the-sphere>
  - <https://www.britishnewspaperarchive.co.uk/search/results/1900-01-01/1964-12-31?newspapertitle=The%20Sphere>

# G. Bron

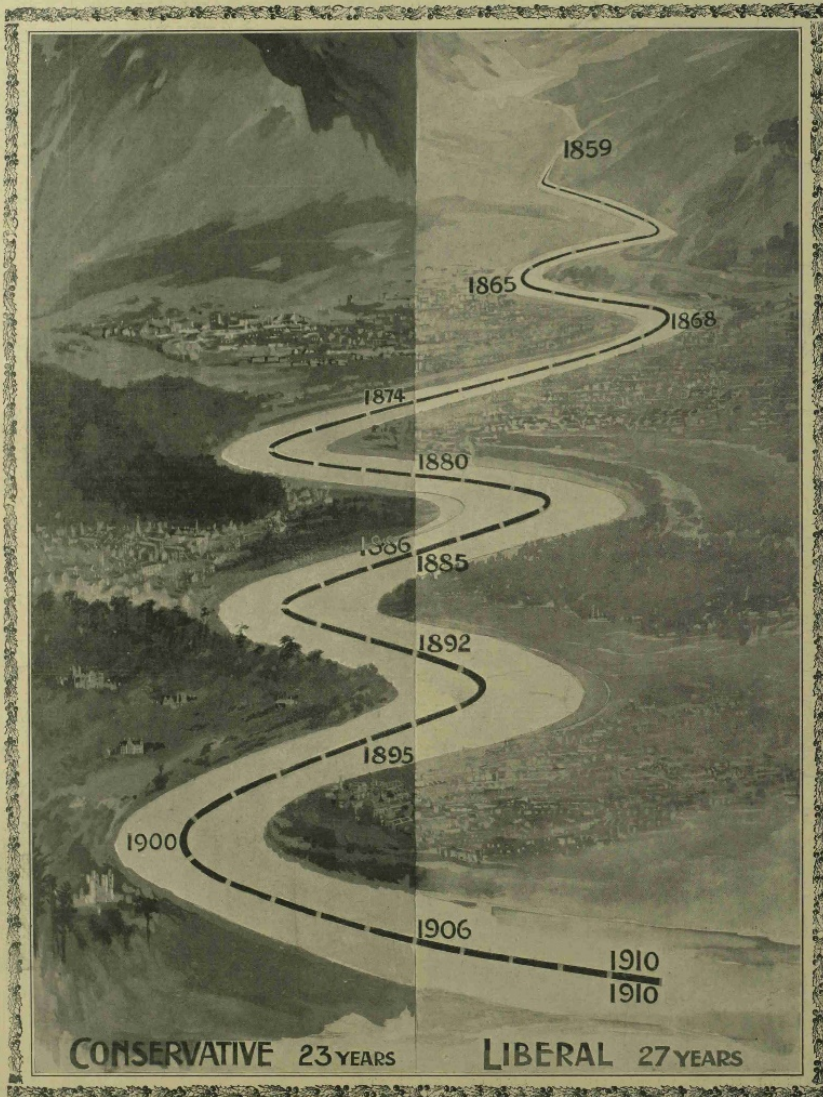
- G. Bron: pseudonym for George Treeby / William Brown Treeby
- Artist, illustrator, and cartoonist
- Graphic designer for *The Sphere* & other newspapers
- Born in London, brought to Australia as a young child
- Returned to England late in his life
- “InfoVis” pioneer



Trove, January 14, 1909

THE FLOWING TIDE: THE WINDING WAYS OF THE PARTIES' STREAM.

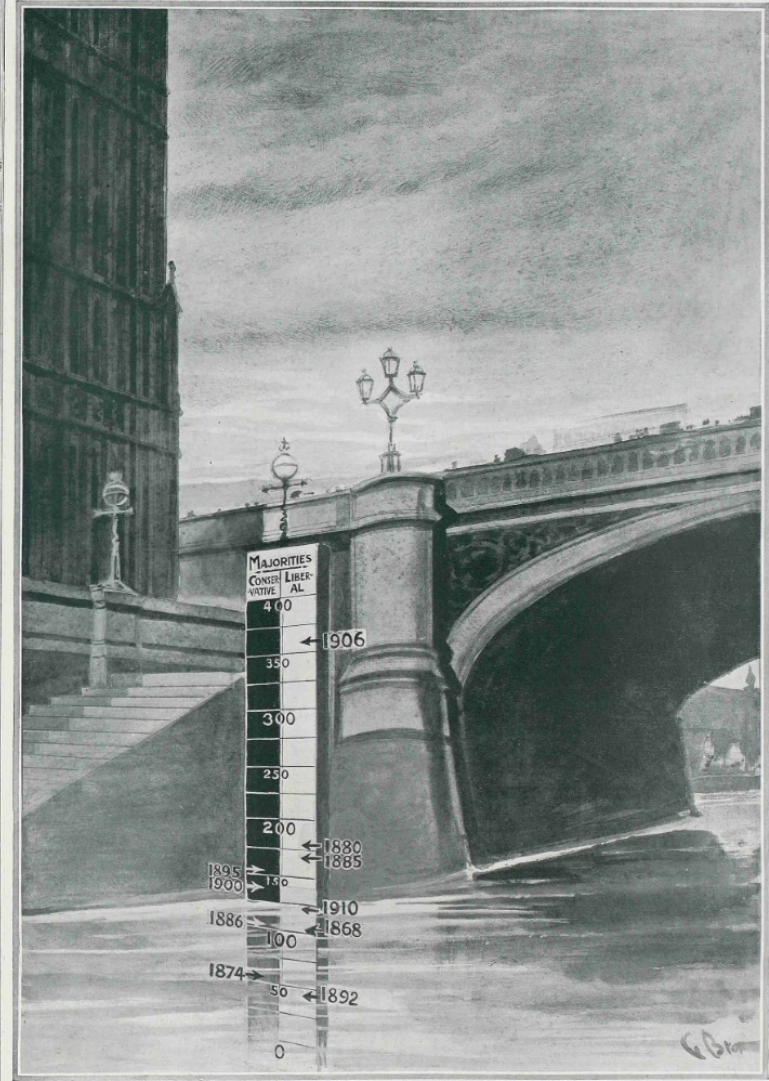
DRAWN BY G. BRON.



THE MEANDERINGS OF MAJORITIES: THE MOVEMENTS OF THE "WAVES" OF POLITICAL POWER OVER THE LANDS OF CONSERVATISM AND LIBERALISM.

At the moment, it is of particular interest to note the meanderings of the stream of political power in this country during the last half-century: hence the presentation of this drawing.

The Ebb and Flow of the Electoral Tide.



AN ELECTION GAUGE AT WESTMINSTER—A SYMBOLICAL VIEW

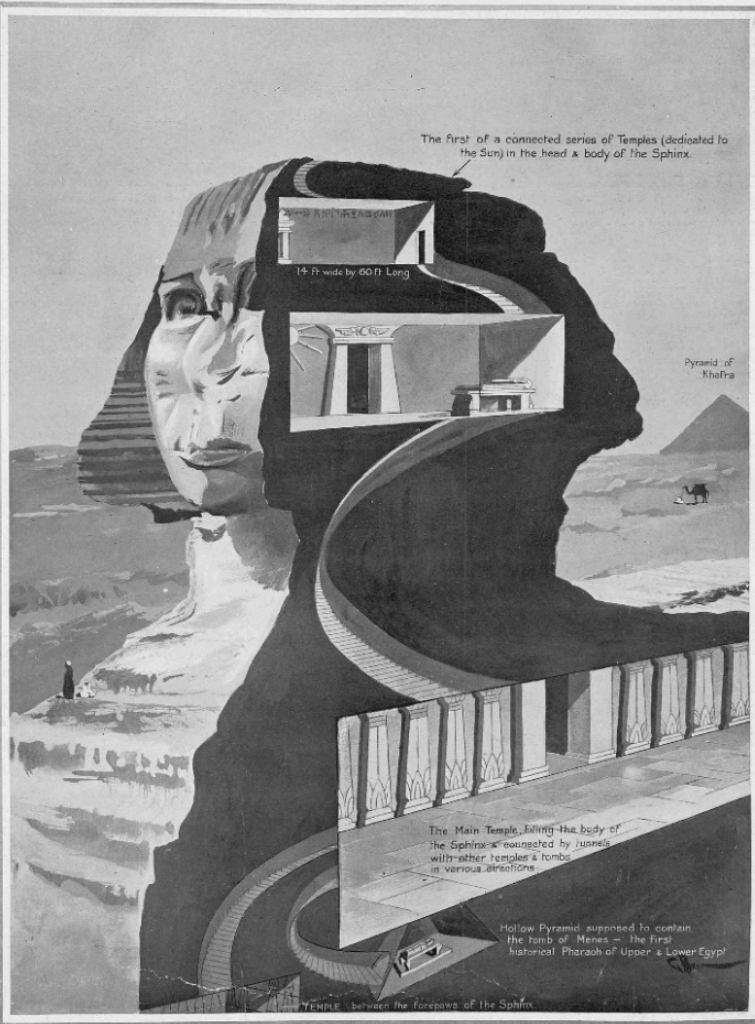
DRAWN FOR "THE SPHERE" BY G. BRON

Showing how the tide of Conservative and Liberal majorities have risen and fallen since 1868. The Conservative figures are on the left hand and the Liberal on the right. The Conservative majorities since 1874 have been as follows: 1874-80 (six years) 52; 1880-82 (two years) 101; 1885-1890 (five years) 132; 1890-92 (two years) 146. The Liberal majorities since 1868 have been as follows: 1868-74 (six years) 100; 1880-85 (five years) 176; 1885-86 (one year) 173; 1890-95 (five years) 40; 1900-06 (four years) 190; February, 1905, to November, 1905 (ten months) 124.



# Remarkable Discoveries Within the Sphinx.

The Temple Within its Hollow Head : Professor G. A. Reisner's Interesting Discoveries



DIAGRAMMATIC VIEW OF THE DISCOVERIES RECENTLY MADE OF HIDDEN TEMPLES WITHIN THE SPHINX

*Referred reports are coming to this country from Egypt of the extreme interest which is being evoked by the remarkable discoveries now being made by Professor G. A. Reisner, Egyptologist, of Harvard University. He is unveiling a series of hidden temples within the natural rock of which the Sphinx is formed. The drawings given above are only approximate in its details as the measured drawings now being made by the explorer are not yet available. The temples and stairways are, however, shown in their relative positions. Not only in the head of the Sphinx occupied by two small chambers, one superimposed above the other, but the actual body of the Sphinx is also occupied by a larger pillar-lined temple with passages leading off in several directions. The actual tomb of Menes, the great but mysterious founder of remote Egypt, is also supposed to be within the Sphinx. The most remarkable discoveries may be looked for at any time. See notes on opposite page.*

## IN PLACE OF WHEAT : Special "Sphere" Table of Optional Cereals, Compiled by R. P. Hearne and G. Bron.

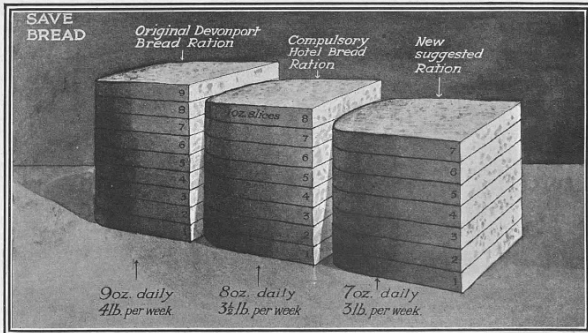
	PROTEIN per cent.	FATS per cent.	CARBO-HYDRATES per cent.	CALORIES per lb.	
WHEAT FLOUR	11.4	1	70	1600	Use as little as possible
OATMEAL	16	1	65	1780	Excellent food as porridge, eaten cakes & Highest value in protein & fat.
MAIZE FLOUR	9	1	76	1630	Useful in many forms - puddings, cakes &c
RICE FLOUR	7.5	1	79	1635	Excellent for puddings, cakes &c Note high-carbo-hydrate values
RYE FLOUR	10	1	74	1660	Can be used for bread but not very palatable at first.
BARLEY FLOUR	12	1	71	1580	Makes excellent puddings & gruel, barley water &c. Deserves to be more popular.
SAGO	2	1	82	1560	Useful for puddings &c. Delicant in protein & fat.
SEMOLINA	9.4	1	76	1590	Makes excellent puddings &c

SEVEN OPTIONAL CEREALS TO REPLACE LESSENED CONSUMPTION OF WHEAT FLOUR

The food values of seven cereals are given here in tabular form. This chart forms a companion one to that published in "The Sphere" of April 21. The heat values have in this case been added. Oatmeal is the richest in fat and protein (body forming) constituents, but its carbo-hydrates are less than sago (a product of East Indian palms). Semolina is a by-product of the grinding of wheat flour. The reader either knows or will find by experiment which suits him or her taste best.

### USEFUL CEREALS

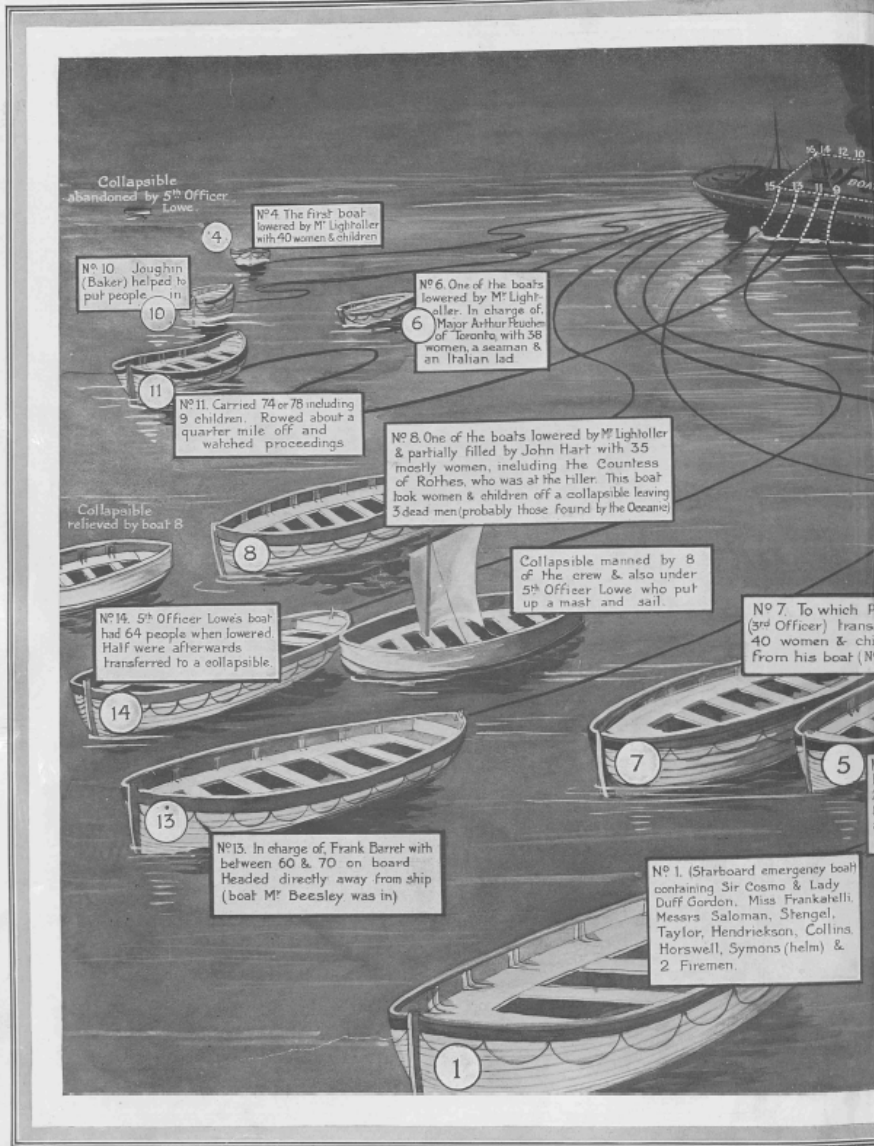
The above cereals, though inferior to wheat in various respects, could be very extensively used if cooks and housekeepers exercised greater originality. Oatmeal is particularly useful, as it provides porridge for the morning meal, and enables bread to be almost dispensed with at breakfast. Oat cakes are delicious and healthy products. They are excellent bread alternatives for afternoon tea. By the use of rice, rye, maize, sago, and semolina a great variety of wheat-saving dishes can be prepared, and barley in the shape of crushed-barley kernels is particularly recommended. It is advisable not to confine the dietary to any one cereal, as various digestive troubles may result. The widest possible dietary should be planned, and cereals require to be supplemented by fresh vegetables and fruits. In a future issue we shall deal with the food value of the chief fruits and vegetables.



What We Have to Do to Reach the 7-oz. Ration

The original Devonport ration allowed, in round figures, 9 oz. of bread per head per day. The compulsory hotel ration takes a 1-oz. slice off this. It is now suggested that if every person reduced the daily bread consumption to 7 oz. we need have little fear of acute shortage.

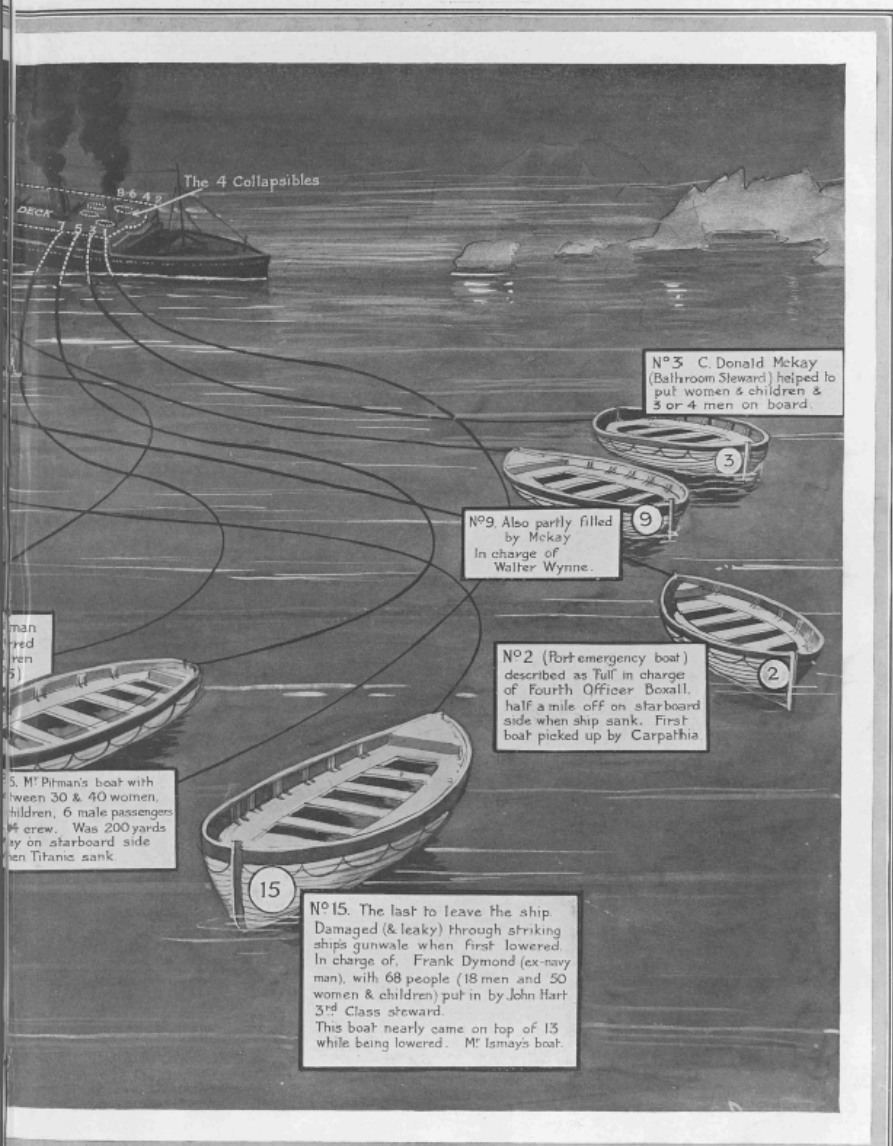
# WHAT BECAME of the "TITANIC'S" BOATS—and an



The above drawing has been made with the idea of showing what happened to each individual boat of the "Titanic" as far as can be traced out from the published evidence and also as illustrating the important question of control. The position of the boats is, of course, quite arbitrary. They appear to have pulled off from the sinking ship for short distances. Fourteen of the boats are more or less accounted for. In addition to the seven boats there were four collapsibles. One of these was abandoned by Fifth Officer Lowe and another was relieved by boat

**THE FLOTILLA OF BOATS: WHO SHOULD COMMAND**  
8 as indicated on the drawing. We understood that the third was never launched, and of the fourth we have no information. Among the more famous boats are No. 1, which included Sir Cosmo and Lady Duff-Gordon; No. 8, which included the Countess of Rothes; No. 13, which included Mr. Bower, the manager who wrote the best-remembered account of the disaster; No. 6, which included Mayor Arthur Haecher, a distinguished citizen of Toronto; and No. 15, which included Mr. Ismay, who gave his evidence on Tuesday and Wednesday of last week. The number

# IMPORTANT QUESTION WHICH HANGS THEREON.



## IT?—A VITAL QUESTION FOR THE FUTURE

all passengers in the boats range from a dozen in No. 1 to the seventy-four or seventy-eight in No. 11. The drawing will help to bring before the reader vividly the important question of the control of such a flotilla as here shown. The existing idea appears to be that the captain and his chief officer should remain upon the bridge of a sinking ship, and there is no clear idea at present existent concerning the control of a boat flotilla in the case of the sudden wrecking of a great liner. It is not desirable that the idea of the captain remaining on the bridge to the last moment should be

ground too far. In fact, in some circumstances it is evident that it's doing so may take upon itself an Eastern character of self-obliteration which is not in line with the Western ideal of a man facing any music which lies before him. Is there a moment at which the supreme control of the captain should pass to the surviving flotilla? Only one officer appears to have succeeded in converting the unorganized boats which lay around him into a little fleet under one command. As the evidence before the "Titanic" commission proceeds this question of boat control grows in importance.

DRAWN FOR "THE SPHERE" BY G. BRON

# Titanic Data Sets

# Data Background

“More detailed research into the *Titanic* disaster revealed some differences of opinion on the number lost. For instance, the *Encyclopaedia Americana* (1994) gives the death toll as "variously estimated as 1,490, 1,502, and 1,517." A book edited in 1912 under the pseudonym Marshall Everett gives the figure variously as 1635 and 1595 (Everett 1912); the first of these figures agrees with that found in Logan Marshall's book (Marshall 1912). However, the *British Board of Trade Inquiry Report* (1990), written originally in 1912, claims a death toll of 1490. Modern sources seem to agree that the true numbers are in the neighborhood of 1,500, but the exact numbers may never be known.”

Dawson, R.J.M. (1995) The "Unusual Episode" Data Revisited, *Journal of Statistics Education* 3(3), <http://ww2.amstat.org/publications/jse/v3n3/datasets.dawson.html>

# Titanic Data Sets (in R)

## Help pages:

<a href="#">carData::TitanicSurvival</a>	Survival of Passengers on the Titanic
<a href="#">COUNT::titanic</a>	titanic
<a href="#">COUNT::titanicgrp</a>	titanicgrp
<a href="#">DALEX::titanic</a>	Passengers and Crew on the RMS Titanic
<a href="#">datasets::Titanic</a>	Survival of passengers on the Titanic
<a href="#">earth::etitanic</a>	Titanic data with incomplete cases removed
<a href="#">msme::titanic</a>	Titanic passenger survival data
<a href="#">ReporteRs::textNormal</a>	shortcuts for formatting properties
<a href="#">rpart.plot::ptitanic</a>	Titanic data with passenger names and other details removed.
<a href="#">stablelearner::titanic</a>	Passengers and Crew on the RMS Titanic
<a href="#">Stat2Data::Titanic</a>	Passengers on the Titanic
<a href="#">titanic::titanic</a>	titanic: Titanic Passenger Survival Data Set
<a href="#">titanic::titanic_gender_class_model</a>	Titanic gender class model data.
<a href="#">titanic::titanic_gender_model</a>	Titanic gender model data.
<a href="#">titanic::titanic_test</a>	Titanic test data.
<a href="#">titanic::titanic_train</a>	Titanic train data.
<a href="#">vcd::Lifeboats</a>	Lifeboats on the Titanic

# Titanic Data Sets: baseR datasets

Titanic {datasets}

R Documentation `> Titanic`, , Age = Child, Survived = No

## Survival of passengers on the Titanic

### Description

This data set provides information on the fate of passengers on the fatal maiden voyage of the ocean liner 'Titanic', summarized according to economic status (class), sex, age and survival.

### Usage

Titanic

### Format

A 4-dimensional array resulting from cross-tabulating 2201 observations on 4 variables. The variables and their levels are as follows:

No Name	Levels
1 Class	1st, 2nd, 3rd, Crew
2 Sex	Male, Female
3 Age	Child, Adult
4 Survived	No, Yes

Class	Sex	
	Male	Female
1st	0	0
2nd	0	0
3rd	35	17
Crew	0	0

, , Age = Adult, Survived = No

Class	Sex	
	Male	Female
1st	118	4
2nd	154	13
3rd	387	89
Crew	670	3

, , Age = Child, Survived = Yes

Class	Sex	
	Male	Female
1st	5	1
2nd	11	13
3rd	13	14
Crew	0	0

, , Age = Adult, Survived = Yes

Class	Sex	
	Male	Female
1st	57	140
2nd	14	80
3rd	75	76
Crew	192	20

# Titanic Data Sets: carData Package

TitanicSurvival {carData}

R Documentation

## Survival of Passengers on the Titanic

### Description

Information on the survival status, sex, age, and passenger class of 1309 passengers in the Titanic disaster of 1912.

### Usage

```
TitanicSurvival
```

### Format

A data frame with 1309 observations on the following 4 variables.

survived		survived	sex	age	passengerClass
	Allen, Miss. Elisabeth Walton	yes	female	29.0000	1st
no or yes.	Allison, Master. Hudson Trevor	yes	male	0.9167	1st
	Allison, Miss. Helen Loraine	no	female	2.0000	1st
sex	Allison, Mr. Hudson Joshua Crei	no	male	30.0000	1st
	Allison, Mrs. Hudson J C (Bessi	no	female	25.0000	1st
female or male	Anderson, Mr. Harry	yes	male	48.0000	1st
age					

in years (and for some children, fractions of a year); age is missing for 263 of the passengers.

```
passengerClass
```

1st, 2nd, or 3rd class.

### Details

This is part of a larger data set compiled by Thomas Cason. Many additional details are given in the sources cited below.

### Source

Data set `titanic3` from <http://biostat.mc.vanderbilt.edu/wiki/bin/view/Main/DataSets>.

# Titanic Data Sets: vcd Package

Lifeboats {vcd}

R Documentation

## Lifeboats on the Titanic

### Description

Data from Mersey (1912) about the 18 (out of 20) lifeboats launched before the sinking of the S. S. Titanic.

### Usage

```
data("Lifeboats")
```

### Format

A data frame with 18 observations and 8 variables.

launch

launch time in "[POSIXt](#)" format.

side

factor. Side of the boat.

boat

factor indicating the boat.

crew

number of male crew members on board.

men

number of men on board.

women

number of women (including female crew) on board.

total

total number of passengers.

cap

capacity of the boat.

	launch	side	boat	crew	men	women	total	cap
1	1912-04-15 00:45:00	Port	7	3	4	20	27	65
2	1912-04-15 00:55:00	Port	5	5	6	30	41	65
3	1912-04-15 01:00:00	Port	3	15	10	25	50	65
4	1912-04-15 01:10:00	Port	1	7	3	2	12	40
5	1912-04-15 01:20:00	Port	9	8	6	42	56	65
6	1912-04-15 01:25:00	Port	11	9	1	60	70	65



# Titanic Data Sets: titanic Package

titanic\_train {titanic}

R Documentation

## Titanic train data.

### Description

Titanic train data.

### Usage

titanic\_train

### Format

Data frame with columns

PassengerId

Passenger ID

Survived

Passenger Survival Indicator

Pclass

Passenger Class

Name

Name

Sex

Sex

PassengerId Survived Pclass

1	1	0	3
2	2	1	1
3	3	1	3
4	4	1	1
5	5	0	3
6	6	0	3

Name

Braund, Mr. Owen Harris
Cumings, Mrs. John Bradley (Florence Briggs Thayer)
Heikkinen, Miss. Laina
Futrelle, Mrs. Jacques Heath (Lily May Peel)
Allen, Mr. William Henry
Moran, Mr. James

	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
1	male	22	1	0	A/5 21171	7.2500		S
2	female	38	1	0	PC 17599	71.2833	c85	C
3	female	26	0	0	STON/O2. 3101282	7.9250		S
4	female	35	1	0	113803	53.1000	c123	S
5	male	35	0	0	373450	8.0500		S
6	male	NA	0	0	330877	8.4583		Q

Number of Siblings/Spouses Aboard

Parch

Number of Parents/Children Aboard

Ticket

Ticket Number

Fare

Passenger Fare

Cabin

Cabin

Embarked

Port of Embarkation

# Titanic Data Sets: titanic Package

titanic\_test {titanic}

R Documentation

## Titanic test data.

	PassengerId	Pclass	Name
1	892	3	Kelly, Mr. James
2	893	3	Wilkes, Mrs. James (Ellen Needs)
3	894	2	Myles, Mr. Thomas Francis
4	895	3	Wirz, Mr. Albert
5	896	3	Hirvonen, Mrs. Alexander (Helga E Lindqvist)
6	897	3	Svensson, Mr. Johan Cervin

## Description

Titanic test data.

	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
1	male	34.5	0	0	330911	7.8292		Q
2	female	47.0	1	0	363272	7.0000		S
3	male	62.0	0	0	240276	9.6875		Q
4	male	27.0	0	0	315154	8.6625		S
5	female	22.0	1	1	3101298	12.2875		S
6	male	14.0	0	0	7538	9.2250		S

## Usage

titanic\_test

## Format

Number of Siblings/Spouses Aboard

Data frame with columns

Parch

Number of Parents/Children Aboard

PassengerId

Ticket

Passenger ID

Ticket Number

Pclass

Fare

Passenger Class

Passenger Fare

Name

Cabin

Name

Cabin

Sex

Embarked

Sex

Port of Embarkation

# Titanic Data Sets: Encyclopedia Titanica

Titanic First Class Passen... X

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RMS Titanic facts, history and passenger and crew biography Join ET!

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## Titanic People Explorer

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Choose a list to begin






### Who were the First Class Passengers on the Titanic?

The first class passengers were the well-off upper and middle classes (and their servants), they included American millionaires such as Benjamin Guggenheim, John Jacob Astor and railway magnate Charles M. Hays as well as the cream of British society including the Countess of Rothes, the eminent journalist W.T. Stead and noted couturière 'Lucile', Lady Duff Gordon.

This page contains a comprehensive list of RMS Titanic first class passengers, with full biographies.

Show/Hide Columns How to use

Search:

Name	Age	Class/Dept	Ticket	Joined	Job	Survived?	Boat (Body)	URL	Photo
<b>ALLEN, Miss Elisabeth Walton</b>	29	1st Class Passenger	24160 £211 60s 9d	Southampton		SAVED	2	<a href="https://www.encyclopedia-titanica.org/titanic-survivor/elisabeth-walton-allen.html">https://www.encyclopedia-titanica.org/titanic-survivor/elisabeth-walton-allen.html</a>	
<b>ALLISON, Master Hudson Trevor</b>	11m	1st Class Passenger	113781 £151 16s	Southampton		SAVED	11	<a href="https://www.encyclopedia-titanica.org/titanic-survivor/trevor-allison.html">https://www.encyclopedia-titanica.org/titanic-survivor/trevor-allison.html</a>	
<b>ALLISON, Miss Helen Loraine</b>	2	1st Class Passenger	113781 £151 16s	Southampton		LOST		<a href="https://www.encyclopedia-titanica.org/titanic-victim/loraine-allison.html">https://www.encyclopedia-titanica.org/titanic-victim/loraine-allison.html</a>	
<b>ALLISON, Mr Hudson Joshua Creighton</b>	30	1st Class Passenger	113781 £151 16s	Southampton	Businessman	LOST	[135]	<a href="https://www.encyclopedia-titanica.org/titanic-victim/hudson-joshua-creighton.html">https://www.encyclopedia-titanica.org/titanic-victim/hudson-joshua-creighton.html</a>	
<b>ALLISON, Mrs Bessie Waldo</b>	25	1st Class Passenger	113781 £151 16s	Southampton		LOST		<a href="https://www.encyclopedia-titanica.org/titanic-victim/bessie-waldo-allison.html">https://www.encyclopedia-titanica.org/titanic-victim/bessie-waldo-allison.html</a>	

2:00 PM 8/27/2018

# Titanic Data Sets: icyousee.org



Breakdown of Passengers by Nationality

Nationality	FIRST CLASS				SECOND CLASS				THIRD CLASS				Total			
	Total	Survived	Died	Percent Survived	Total	Survived	Died	Percent Survived	Total	Survived	Died	Percent Survived	Total	Survived	Died	Percent Survived
American	212	141	71	67%	51	24	27	47%	43	12	21	28%	306	177	119	58%
Australian	0				1	0	1	0%	1	1	0	100%	2	1	1	50%
Austro Hungarian	1	0	1	0%	4	1	3	25%	44	7	37	16%	49	8	41	16%
Belgian	1	1	0	100%	1	0	1	0%	22	5	17	23%	24	6	18	25%
British	45	20	25	44%	164	68	96	41%	118	18	100	15%	327	104	223	32%
Bulgarian	0				0				33	0	33	0%	33	0	33	0%
Canadian	27	13	14	48%	2	1	1	50%	5	0	5	0%	34	14	20	41%
Chinese	0				0				8	6	2	75%	8	6	2	75%
Danish	0				3	0	3	0%	7	1	6	14%	10	1	9	10%
Dutch	1	0	1	0%	0				0				1	0	1	0%
Finn	0				4	2	2	50%	55	17	38	31%	59	19	40	32%
French	12	11	1	92%	14	7	7	50%	5	0	5	0%	31	18	13	58%
German	3	3	0	100%	3	0	3	0%	4	1	3	25%	10	4	6	40%
Greek	0				0				4	0	4	0%	4	0	4	0%
Italian	2	1	1	50%	4	2	2	50%	4	1	3	25%	10	4	6	40%
Irish	3	0	3	0%	4	1	3	25%	113	41	72	36%	120	42	78	35%
Japanese	0				1	1	0	100%	0				1	1	0	100%
Mexican	1	0	1	0%	0				0				1	0	1	0%
Norwegian	0				1	0	1	0%	25	8	17	32%	26	8	18	31%
Portugese	0				1	0	1	0%	3	0	3	0%	4	0	4	0%
Russian	0				9	3	6	33%	18	6	12	33%	27	9	18	33%
South African	0				4	2	2	50%	1	0	1	0%	5	2	3	40%
Spanish	3	2	1	67%	4	4	0	100%	0				7	6	1	86%
Swede	3	2	1	67%	6	2	4	33%	104	23	81	22%	113	27	86	24%
Swiss	6	6	0	100%	1	1	0	100%	4	0	4	0%	11	7	4	64%
Syrian	0				2	1	1	50%	79	31	48	39%	81	32	49	40%
Turk	1	1	0	100%	0				8	2	6	25%	9	3	6	33%
Uruguayan	3	0	3	0%	0				0				3	0	3	0%
	FIRST CLASS				SECOND CLASS				THIRD CLASS				Total			
	Total	Survived	Died	Percent Survived	Total	Survived	Died	Percent Survived	Total	Survived	Died	Percent Survived	Total	Survived	Died	Percent Survived
Grand Total	324	201	123	62%	283	120	163	42%	708	180	518	25%	1315	501	804	38%

The nationality numbers were adapted from lists and raw data compiled by [Hermann Söldner](#). Note: the numbers on this chart do not match the totals on the two tables above. Although I can account for some of the discrepancies (for example, I think he included the musicians among the British Second Class passengers, but I did not), I do not have enough information about his sources to be able to square his numbers with my own.

# Primary Uses of the Titanic Data

**Nothing for the next ~70 years  
(from 1912 to the 1980ies) !!!**

# Use by Discipline

- **Statistics:** Introduction of new graphical methods and their advantages & overview of existing graphical methods, using a well-known data set
- **Computer Science & Social Sciences:** Modeling/prediction of survival and visualization of results
- **Info Vis:** Telling the entire story, including some data visualizations

# Survey of Graphical Methods using the Titanic Data



# Dot Plots

Harrell, F. E., Jr. (2001) *Regression Modeling Strategies: With Applications to Linear Models, Logistic Regression, and Survival Analysis*, Springer, New York, NY.

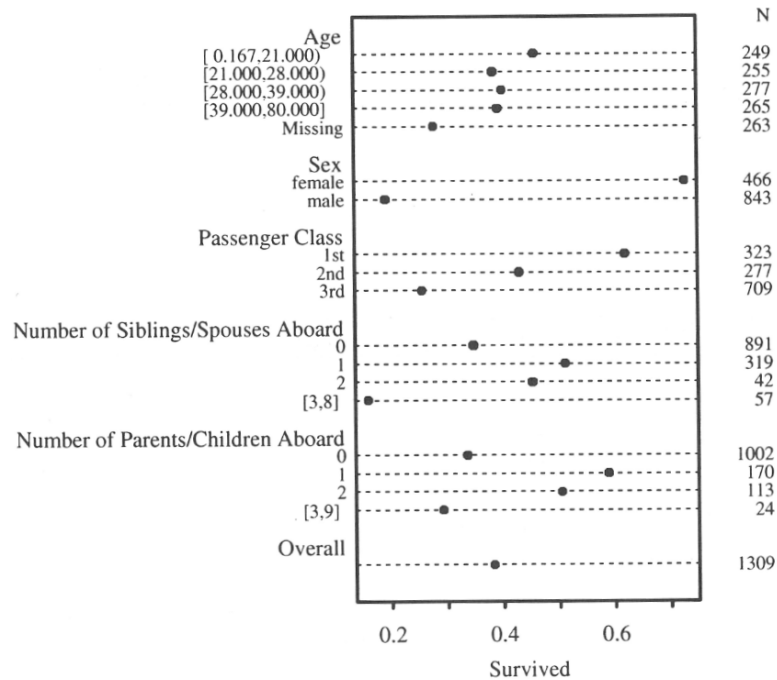


FIGURE 12.1: Univariable summaries of Titanic survival.

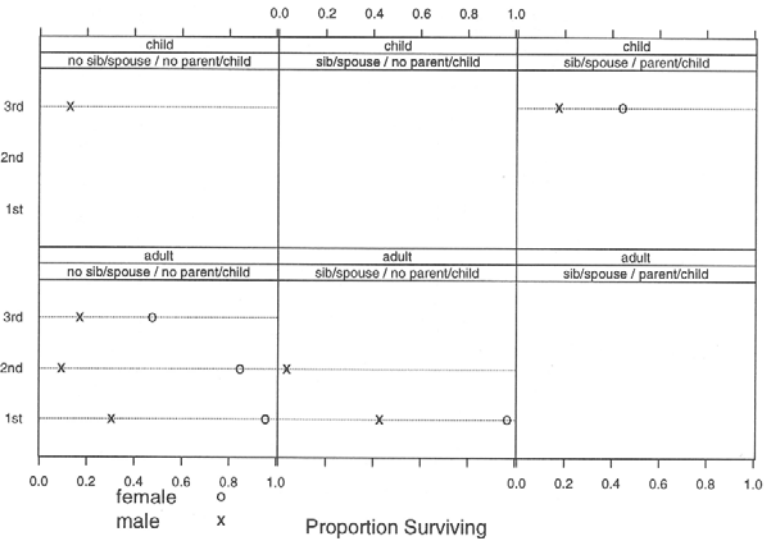


FIGURE 12.2: Multiway summary of Titanic survival.

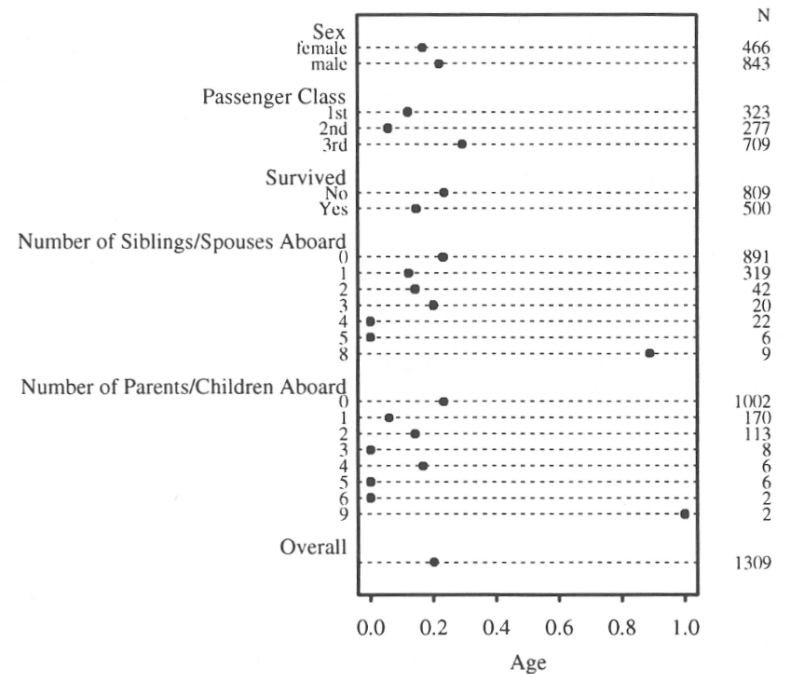
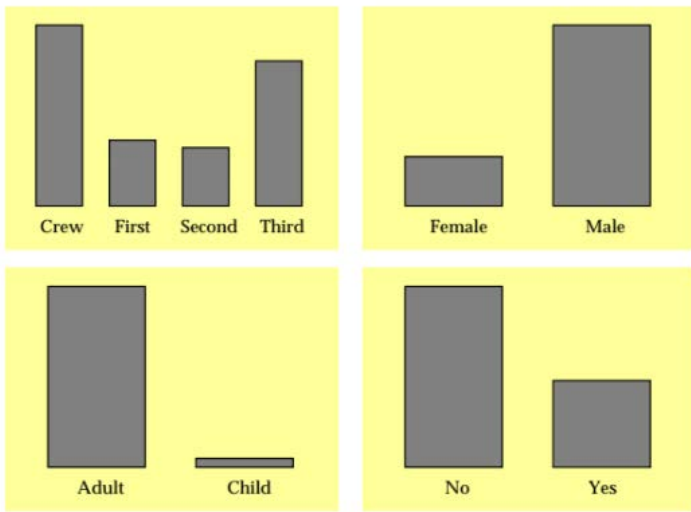


FIGURE 12.9: Univariable descriptions of proportion of passengers with missing age.

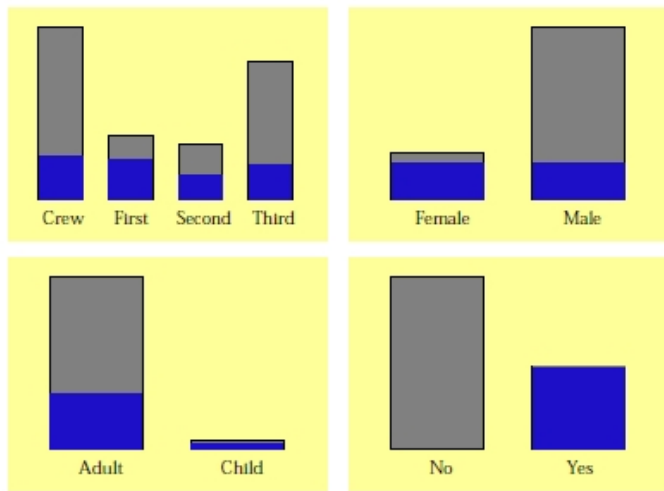
# Bar Charts

Hofmann, H. (1998) Simpson on Board the Titanic? Interactive Methods for Dealing with Multivariate Categorical Data, *Statistical Computing & Graphics Newsletter* 9(2): 16-19.

Gärtner, J. (2017) *Programming and Evaluation of Shiny Applications for Lectures*, MS Thesis, Humboldt-Universität zu Berlin, Germany.



**Figure 1.** Four bar charts showing the marginal distributions according to class, age, sex and, of course, survival of those on board the Titanic.



**Figure 2.** Four bar charts with marginal distribution of the properties. Highlighted (dark) are survivors.

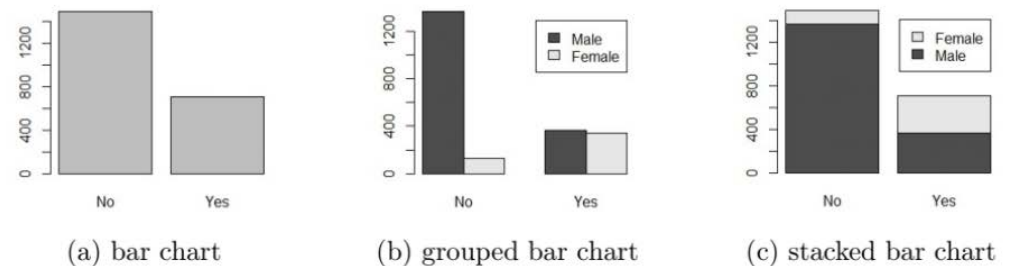
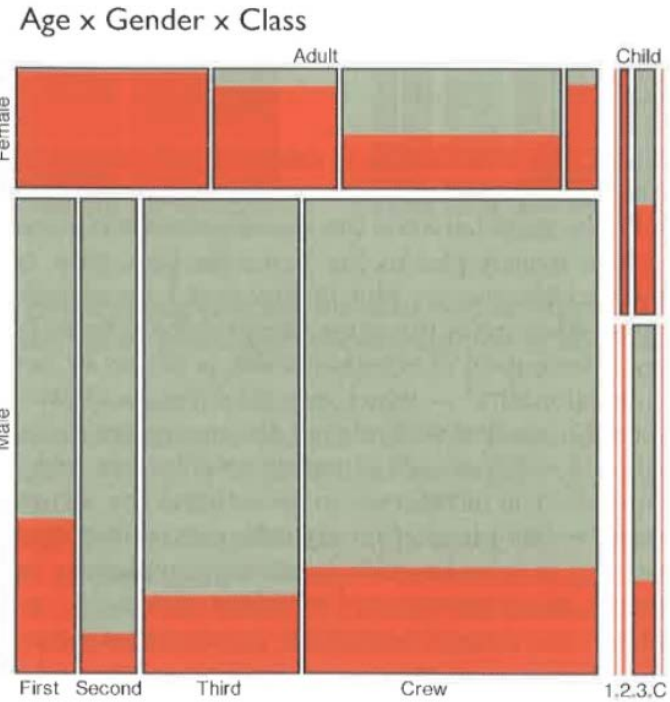
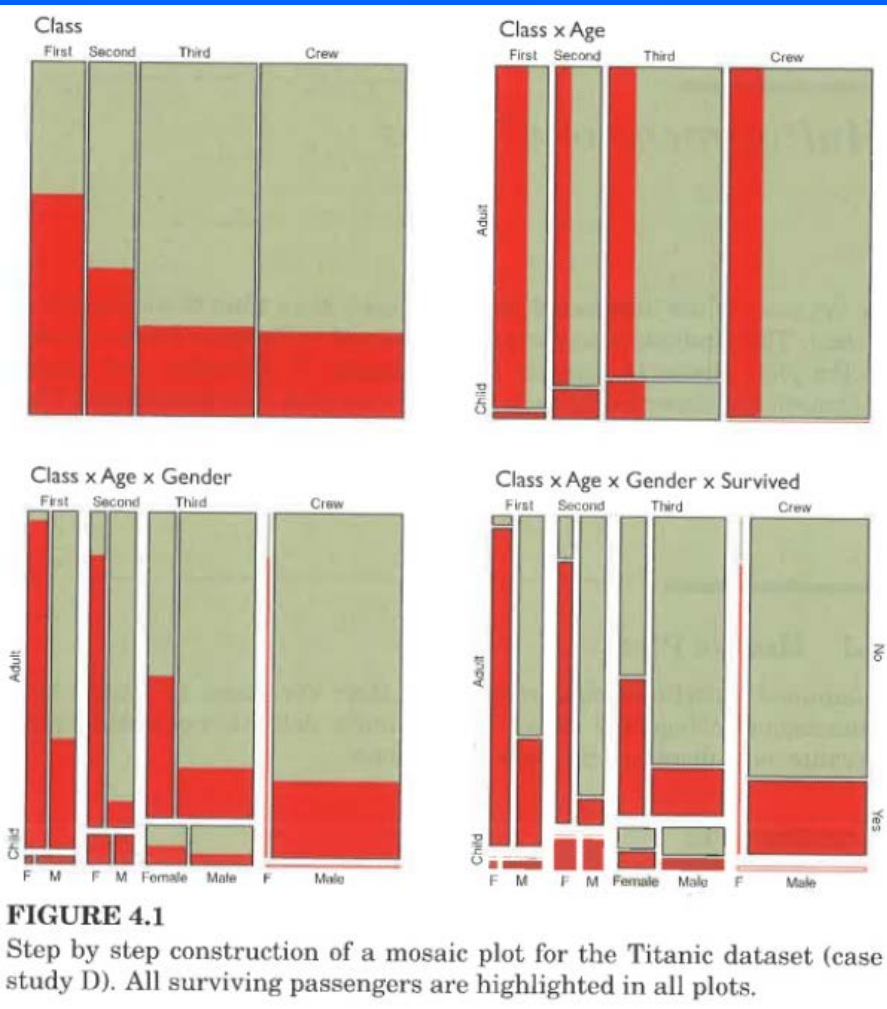


Figure 6: Bar charts of Titanic survival data

# Mosaic Plots

Theus, M., Urbanek, S. (2009) *Interactive Graphics for Data Analysis – Principles and Examples*, CRC Press/Taylor & Francis, Boca Raton, FL.



# Double-Decker Plots

Meyer, D. Zeileis, A., Hornik, K. (2006) The Strucplot Framework: Visualizing Multi-way Contingency Tables with vcd, *Journal of Statistical Software* 17(3).

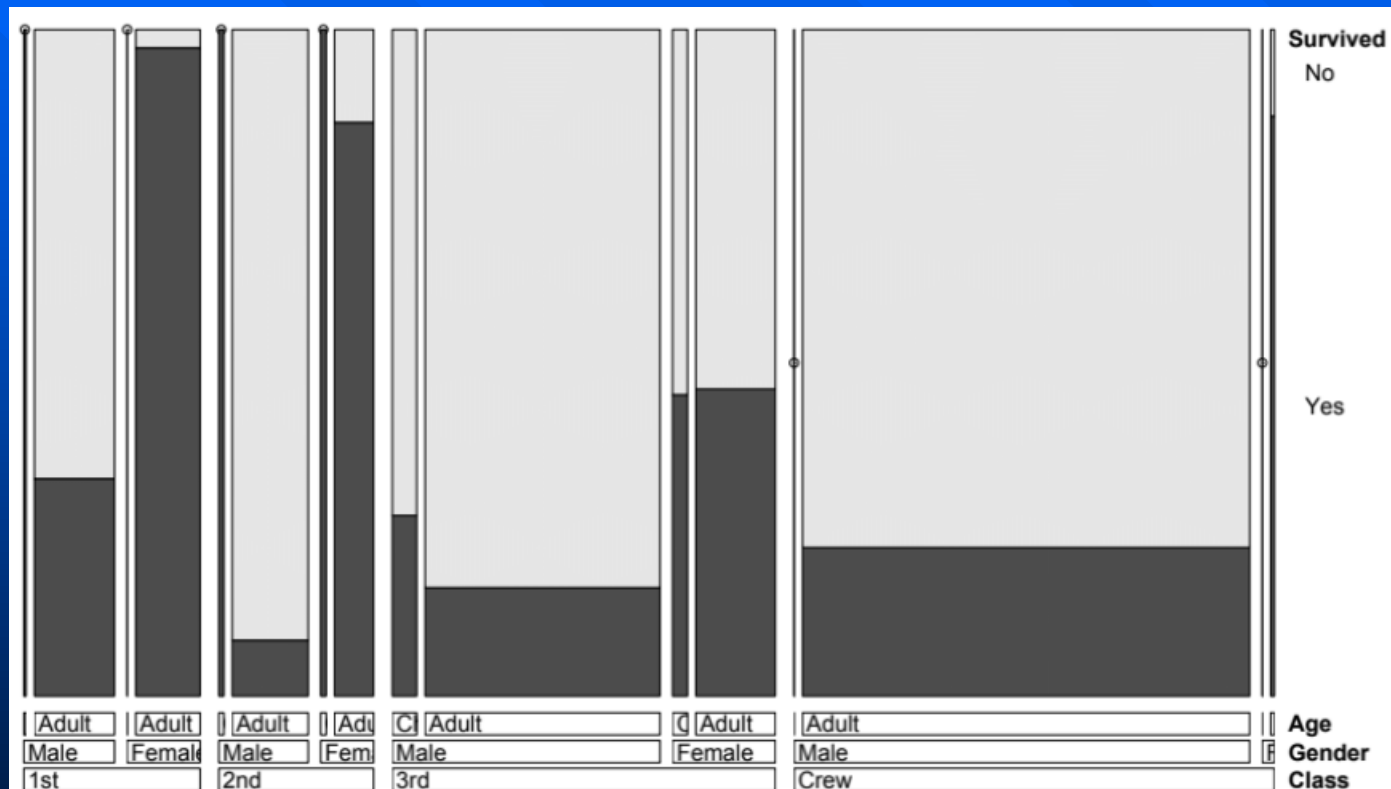


Figure 4: Double-decker plot for the Titanic data.

# Hammock, Parallel Sets & Common Angle

## Plots

Hofmann, H., Vendettuoli, M. (2013) Common Angle Plots as Perception-True Visualizations of Categorical Associations, *IEEE Transactions on Visualization and Computer Graphics* 19(2): 2297-2305.

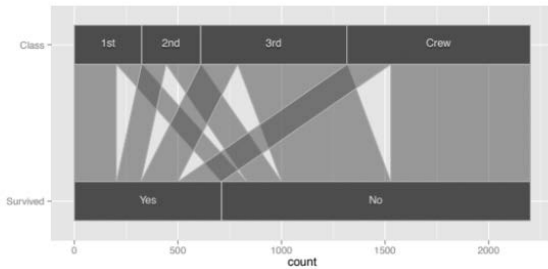


Fig. 2. Parallel sets plot showing the relationship between survival of the sinking of the HMS Titanic and class membership. Class membership and survival are clearly related, but which class had the largest number of survivors?

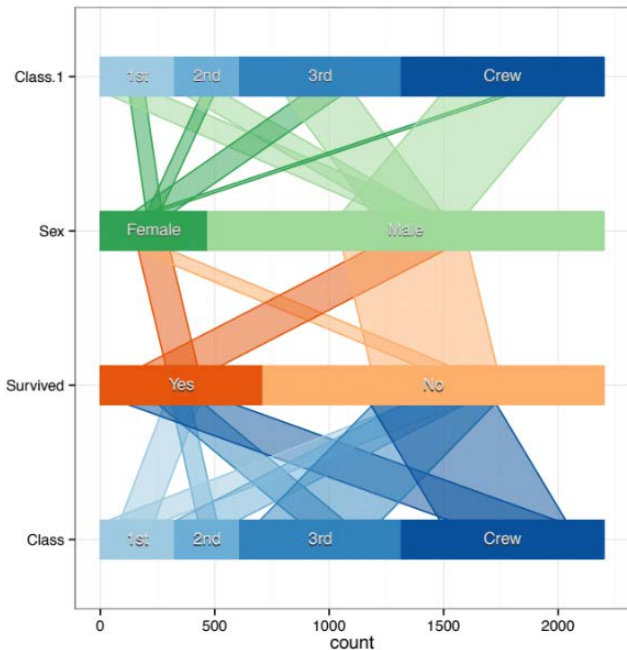


Fig. 7. Hammock plot of the relationship between Class and Survival on the Titanic.

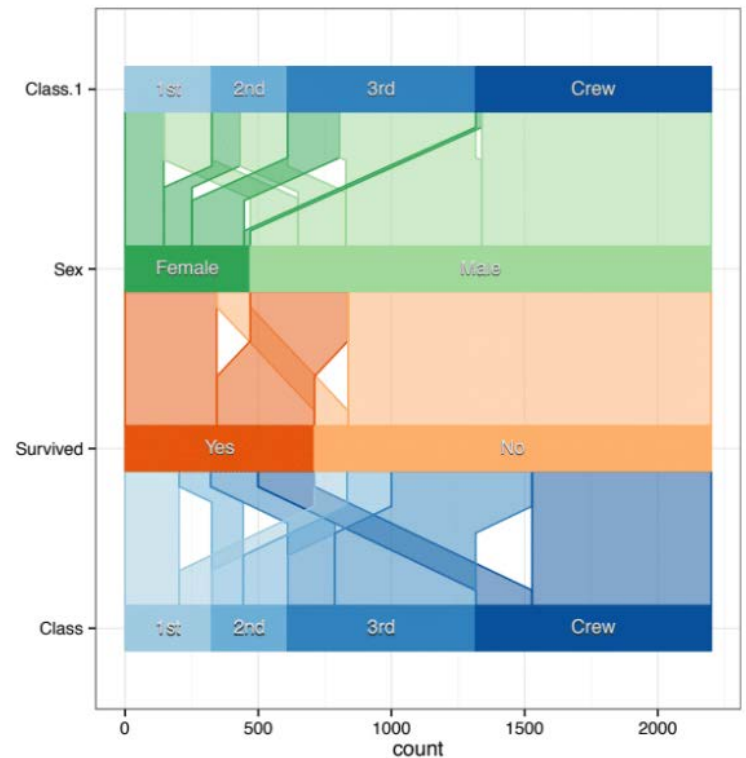
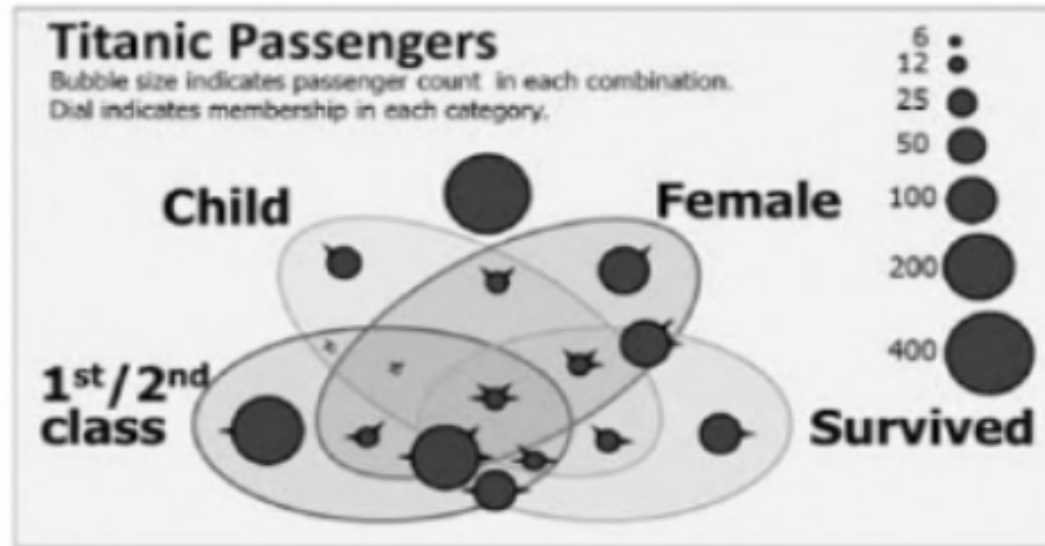


Fig. 10. Common angle plot of the Titanic data.

# Venn Diagrams

Brath, R.  
(2014) *The Multiple Visual Attributes of Shape*, In: Banissi, E., Marchese, F.T., Forsell, C. (Eds.) *Information Visualization: Techniques, Usability and Evaluation*, Cambridge Scholars Publishing, pp. 43-66.



**Fig. 3.30.** A Venn diagram of **Titanic** survivor data, with a bubble per segment sized to indicate the number of corresponding passengers; and with spikes per bubble to indicate set membership by pointing towards the corresponding set labels around the perimeter. For example, the large bubble near the centre bottom has three spikes, indicating that its members belong to three sets. The orientation of these spikes correspond to the location of the labels around the perimeter; therefore, based on the spikes it can be determined, this large bubble corresponds to a large number of 1<sup>st</sup>/2<sup>nd</sup> class, female passengers that survived the **Titanic** disaster.

# Balloon Plots

Jain, N., Warnes, G.R. (2006) Balloon Plot -- Graphical Tool for Displaying Tabular Data, *R News* 6(2): 35-38.

BalloonPlot : Passenger Class by Survival, Age and Sex  
Circle area is proportional to number of passengers

Survived	Age	Sex	Class				
			1st	2nd	3rd	Crew	
No	Child	Male	0	0	35	0	35
		Female	0	0	17	0	17
	Adult	Male	148	154	387	670	1329
		Female	4	13	89	3	109
Yes	Child	Male	5	11	13	0	29
		Female	1	13	14	0	28
	Adult	Male	57	14	75	192	338
		Female	140	80	76	20	316
			325	285	706	885	2201

BalloonPlot : Passenger Class by Survival, Age and Sex  
Circle area is proportional to number of passengers

Survived	Age	Sex	Class				
			1st	2nd	3rd	Crew	
No	Child	Male	0	0	35	0	35
		Female	0	0	17	0	17
	Adult	Male	148	154	387	670	1329
		Female	4	13	89	3	109
Yes	Child	Male	5	11	13	0	29
		Female	1	13	14	0	28
	Adult	Male	57	14	75	192	338
		Female	140	80	76	20	316
			325	285	706	885	2201

Figure 3: Balloon plot of Titanic passengers by gender, age and class. Green circles represent passengers who survived and magenta circles represent the passengers who did not survive.

BalloonPlot : Surviving passengers  
Circle area is proportional to number of passengers

Age	Sex	Class				
		1st	2nd	3rd	Crew	
Child	Male	5	11	13	0	29
	Female	1	13	14	0	28
Adult	Male	57	14	75	192	338
	Female	140	80	76	20	316
		203	118	178	212	711

Figure 2: Balloon plot of surviving individuals by class, gender and age

Figure 4: Balloon plot of all the passengers of Titanic, stratified by survival, age, sex and class

# Nomograms

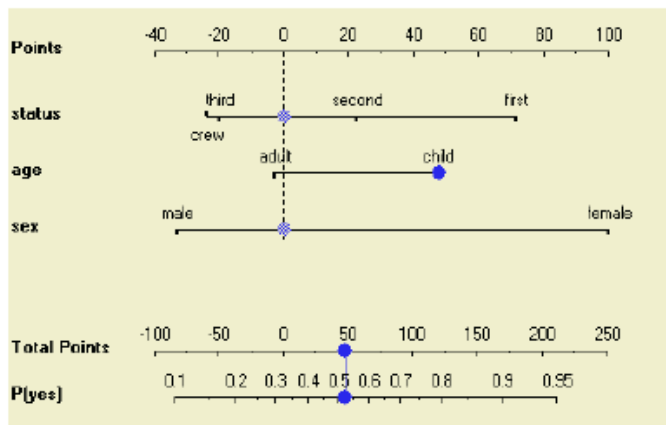


Fig. 1. A nomogram for prediction of survival probability of a passenger on HMS Titanic.

Mozina, M., Demsar, J., Kattan, M., Zupan, B. (2004) Nomograms for Visualization of Naive Bayesian Classifier, In: Boulicaut, J.-F. et al. (Eds.) *Knowledge Discovery in Databases: PKDD 2004*, Springer, Berlin, pp. 337-348.

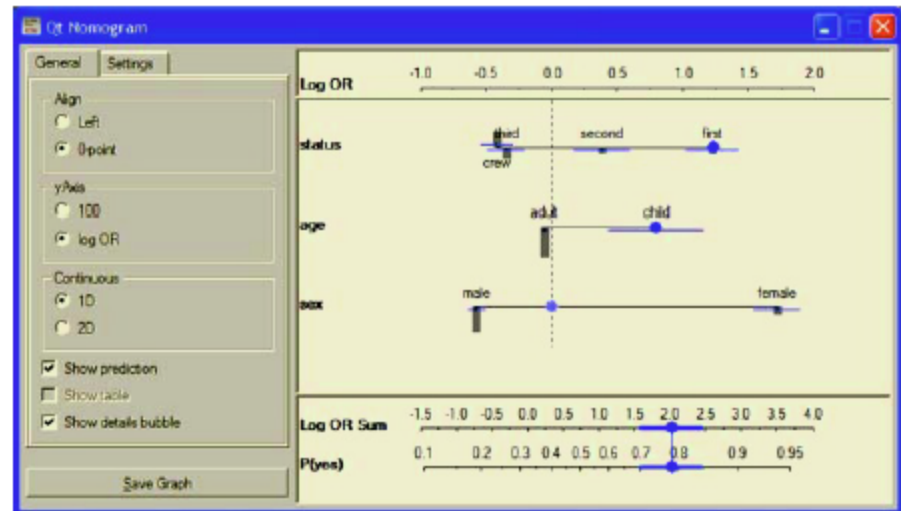


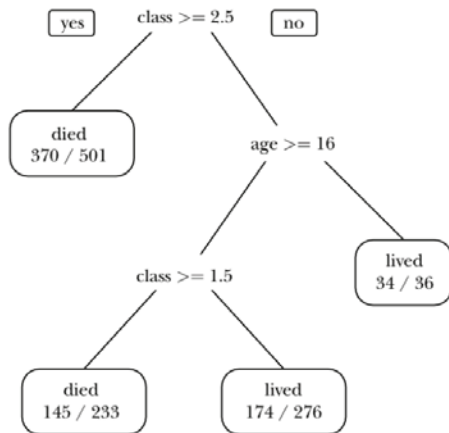
Fig. 4. Orange widget with the Titanic nomogram that includes confidence intervals for contributions of attribute values and class probabilities. For a woman travelling in the first class, the probability of survival is with 95% confidence between 0.87 and 0.92.



# Tree Diagrams

Figure 1

A Classification Tree for Survivors of the *Titanic*

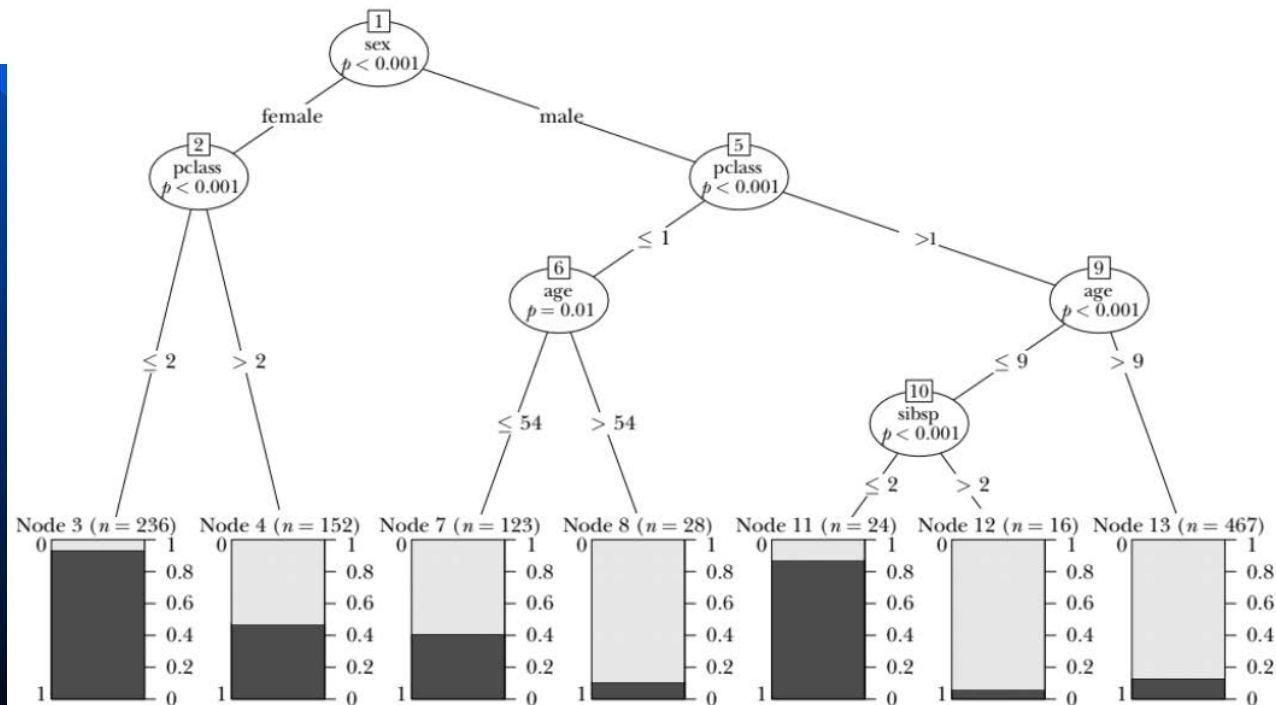


Varian, H.R. (2014) *Big Data: New Tricks for Econometrics*, *Journal of Economic Perspectives* 28(2): 3-28.

Figure 4

A tree for Survivors of the *Titanic*

(black bars indicate fraction of the group that survived)



# Stem-and-Leaf Plots

Sage	THOMAS WILLIAM ADA CONSTANCE DOLLY Annie John George FREDERICK Douglas Stella
Goodwin	HAROLD WILLIAM JESSIE LILLIAN CHARLES SIDNEY Charles Augusta
Andersson	ELLIS INGEBORG SIGRID Anders Alfrida SIGVARD EBBA
Asplund	Selma CARL CLARENCE EDVIN FILIP LILLIAN Carl
Panula	JUHA EINO Maria JAAKO ERNESTI URHO
Rice	ALBERT Margaret GEORGE EUGENE ERIC ARTHUR
Skoog	HARALD KARL MABEL MARGIT Anna Wilhelm
Ford	Daisy Edward WILLIAM RUBY Margaret
Kink	Vincenz Maria Luise Anton LUISE
Lefebre	IDA MATHILDE Frances HENRY JEANNIE
Palsson	PAUL STINA TORBORG Alma GOSTA
Thomas	John Charles ASSAD THELMA TANNOUS
Bacini	Latifa MARIE HELENE EUGENIE
Boulos	HANNA NOURELAIN AKAR Sultana
Cacic	Jego Marija Luka Manda
Dean	Eva Bertram MILLVINA BERTRAM
Elias	Dibo JOSEPH TANNOUS Joseph
Hansen	Henry Henrik Claus Jennie
Johnston	Lily* Andrew WILLIE CARRIE
Olsen	ARTUR Henry Karl Ole
Vander Planke	Augusta Julius LEO Emelia

Figure 9. *Titanic* third class families. Stem indicates surname, leaf for given name, bold indicates death, italics for women, allcaps for children.

Ethel Mabel Mary Alice	Fortune	Mark Charles
Emily Suzette Emily	Ryerson	JOHN Arthur
<b>Bessie HELEN*</b>	Allison	<b>Hudson HUDSON</b>
Lucile LUCILE	Carter	William WILLIAM
Sara Mary	Compton	<b>Alexander</b>
Harriet Catherine	Crosby	<b>Edward</b>
Ruth	Dodge	WASHINGTON Washington
Mahala Mary	Douglas	<b>Walter</b>
Clara	Frauenthal	Henry Isaac
Margaretha Hedwig	Frolicher	Maxmillian
Margaret Edith	Graham	<b>George</b>
Margaret Clara	Hays	<b>Charles</b>
Jane	Hoyt	<b>William Frederick</b>
Lillian Daisy	Minahan	<b>William</b>
Madeleine Marjorie	Newell	<b>Arthur</b>
Margaretta	Spedden	Frederic ROBERT
Tillie Ruth	Taussig	<b>Emil</b>
Marian	Thayer	JOHN John
Ella	White	<b>Richard Percival</b>
Mary Mary	Wick	<b>George</b>
Eleanor	Widener	<b>Harry George</b>

Figure 10. *Titanic* first class families, women left, men right.

Brath, R., Banissi, E. (2017) Stem & Leaf Plots Extended for Text Visualizations, *14<sup>th</sup> International Conference on Computer Graphics*, IEEE.

# Typographic Mosaic Plots

## Who Survived on the Titanic? by class, men vs. women & children

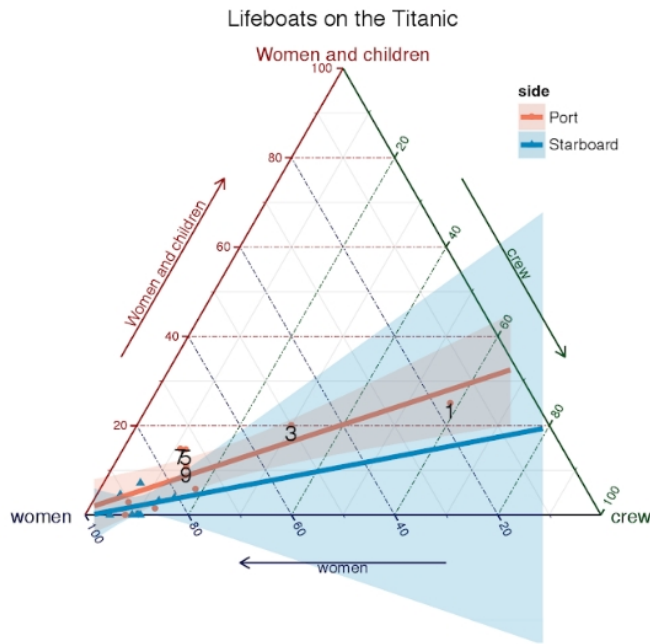


Data source: Dept of Biostatistics, Vanderbilt University & Encycloedia-titanica.org

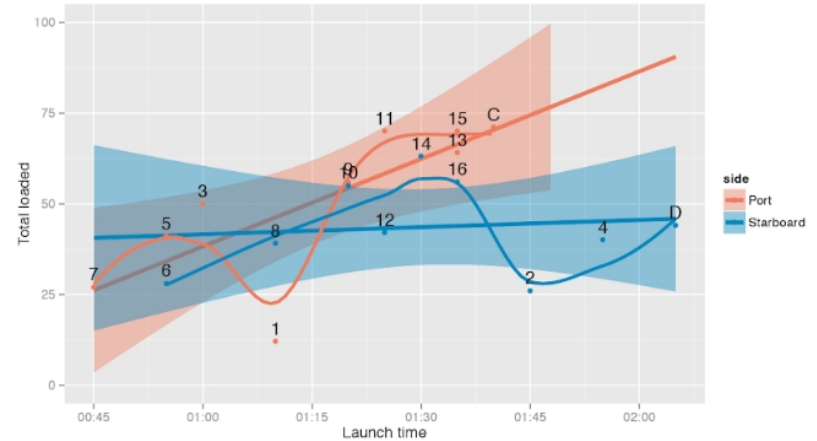
Figure 151. 1308 passengers on the Titanic, organized by class (vertically), survivorship (horizontally), serif/sans serif, red/green and gender (plain/italic). Image created by author.

Brath, R. (2018) *Text in Visualisation: Extending the Visualization Design Space*, Thesis, London South Bank University.

# Visualizations of Lifeboat Data



**Figure 4.22:** Lifeboats on the *Titanic*, showing the composition of each boat. Boats with more than 10% male passengers are labeled.



**Figure 4.23:** Number of people loaded on lifeboats on the *Titanic* vs. time of launch, by side of boat. The plot annotations show the linear regression and loess smooth.

Friendly, M., Meyer, D. (2016) *Discrete Data Analysis with R: Visualization and Modeling Techniques for Categorical and Count Data*, CRC Press/Taylor & Francis, Boca Raton, FL.

# Info Vis (1)

**MIXER**

DOCUMENTÁRIOS

## Titanic em detalhes

**POR DENTRO DO TITANIC** | DIA 19, DOMINGO, 21H, DISCOVERY CHANNEL, 51

**CEM ANOS DE TITANIC** | DIA 8, DOMINGO, 20H30 > **TITANIC: O LEGADO!** DIA 8, DOMINGO, 22H10 > **TITANIC: A VERDADEIRA HISTÓRIA?** | DIA 8, DOMINGO, 23H > **TITANIC: A SÉRIE** | DIAS 17 A 20, TERÇA A SEXTA, 23H15, NATGEO, 33

por Juliana Malacarne e Marina Jankauskas | infográfico Gerson Mora e Anna Luiza Aragão/Maná e.d.i.

Toda lenda tem um início, algo real por trás de tudo o que é fascinante e emblemático. O começo da história do navio que se tornaria o mais famoso de todos os tempos é, na verdade, o início de uma tragédia.

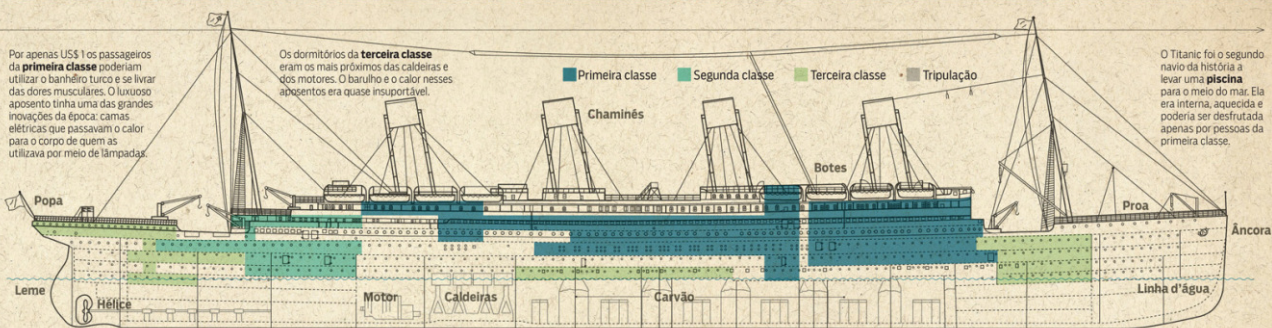
No dia 14 de abril de 1912, às 23h40, o Titanic colidiu com um iceberg. As 2.224 pessoas a bordo não podiam acreditar que um simples pedaço de gelo havia conseguido derrubar a embarcação, considerada "inafundável".

Mergulhamos a fundo nos números do navio e sua trágica história, que vêm marcando gerações por um século.



Por apenas US\$ 1 os passageiros da **primeira classe** poderiam utilizar o banheiro turco e se livrar das dores musculares. O luxuoso aposento tinha uma das grandes inovações da época: camas elétricas que passavam o calor para o corpo de quem as utilizava por meio de lâmpadas.

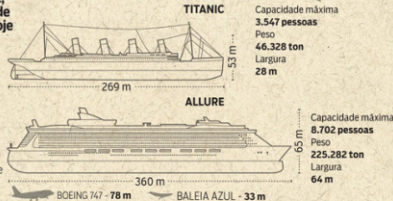
Os dormitórios da **terceira classe** eram os mais próximos das caldeiras e dos motores. O barulho e o calor nesses aposentos era quase insuportável.



O Titanic foi o segundo navio da história a levar uma **placina** para o meio do mar. Ela era interna, aquecida e poderia ser desfrutada apenas por pessoas da primeira classe.

### Titanic x Allure, o maior navio de passageiros hoje

Em sua época, o Titanic era o estado da arte em engenharia naval, mas hoje o Allure of the Seas ocupa a posição de "rei dos mares". Se o antigo navio já era grande para os padrões, o atual campeão pode ser chamado de monstro marinho.



### Os valores titânicos do projeto

US\$ **400.000.000\***  
É o valor estimado da construção do Titanic.

US\$ **1.200.000.000**  
Foram gastos na construção do Allure of the Seas.

### Os valores titânicos das passagens

US\$ **729\*** → **62.157\***  
Eram os valores da passagem mais barata à passagem mais cara no Titanic.

US\$ **749** → **1.599**  
São os valores da passagem mais barata à passagem mais cara em uma viagem da Florida ao Caribe no Allure of the Seas.

### Um grave erro de avaliação

Havia 14 botes, capazes de carregar 65 pessoas cada; **dois barcos de emergência**, capazes de carregar 35 pessoas cada; e **quatro botes infláveis**, capazes de carregar 49 pessoas cada.

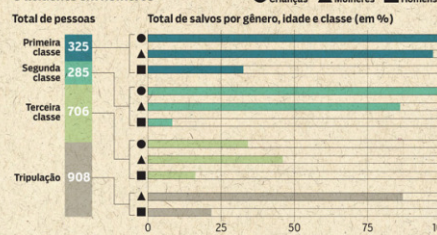


Cada bote poderia carregar **65 pessoas**. Com todos os 64, seriam resgatadas **4.160 pessoas**.

Nível do mar

10,2 m

### O acidente em números



### Mortos por classe

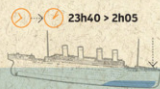


O Titanic está a 3.965 metros de profundidade, o que significa uma pressão de 408,4 quilos por centímetro quadrado.

### Viagem ao fundo do mar

#### "Iceberg à frente!"

O alerta foi dado, mas as manobras evasivas não foram executadas a tempo e o Titanic colidiu 30 segundos depois. Descubra o que aconteceu com sua estrutura até ele afundar por completo.



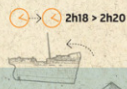
A água começa a encher os compartimentos inferiores do navio. Seis deles ficam cheios em 10 minutos, sendo que o máximo que o Titanic poderia suportar eram quatro. O navio inclina, ficando a proa (frente) submersa e a popa (traseira) ligeiramente levantada.



O número de locais alagados aumenta drasticamente e o navio dá uma guinada para baixo. A chaminé número 1 cai para a frente e o alojamento dos oficiais, que ficava na proa, desmorona sob a pressão.



O casco racha entre as chaminés 3 e 4 e o navio é separado em duas partes. A proa, onde estavam todos os compartimentos alagados, é a primeira a afundar totalmente.



Por causa da separação e do deslocamento de água, a parte de trás do Titanic flutua por um curto período de tempo e depois começa a afundar lentamente.



Destruições do fundo do oceano.

#### 15 - 45 minutos

Tempo médio que as vítimas do Titanic, em contato com a água, conseguiram resistir à hipotermia (doença causada pela exposição intensa ao frio que provoca parada respiratória e cardíaca). A temperatura do mar era de aproximadamente -2°C.

#### 60 minutos

Foi o tempo que demorou para o primeiro bote ser lançado ao mar.

# Info Vis (2)

## FIRST CLASS PASSENGERS BY AGE

"Never have I heard such awful cries. People came tumbling down like so many oranges." — Major Arthur Peuchen, president of Standard Chemical Company and rear commodore of the Royal Canadian Yacht Club. He paid £30 10s for his ticket.



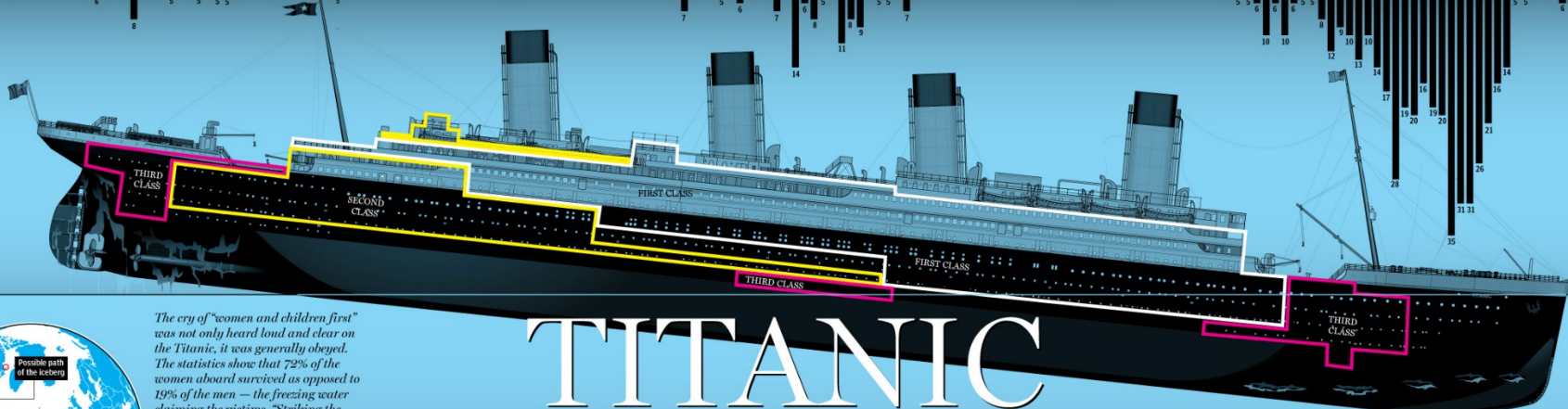
## SECOND CLASS PASSENGERS BY AGE

"If a ship is torpedoed, that's war. If it strikes a rock in a storm, that's nature. But just to die because there weren't enough lifeboats, that's ridiculous." — Eva Hart, who was seven when her parents boarded the Titanic on their way to Winnipeg as Second Class passengers. Their ticket cost £26 5s.

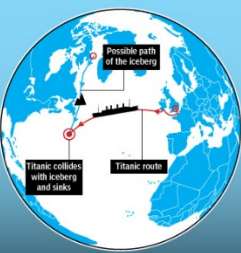


## THIRD CLASS PASSENGERS BY AGE

"With fright we heard an incredible crash and it was as if a scream from 1,000 voices came from the lit giant ship, when it broke in two and both parts rose into the sky and sank.... What was even worse than the screams were the deadly silence that came after.... It was frightful." — Carla Andersen-Jensen, 19, on her way to the U.S. She was on a £7 17s ticket.



# TITANIC



The cry of "women and children first" was not only heard loud and clear on the Titanic, it was generally obeyed. The statistics show that 72% of the women aboard survived as opposed to 19% of the men — the freezing water claiming the victims. "Striking the water was like a thousand knives being driven into one's body," said Second Officer Charles Lightoller. "The temperature was 28f, four degrees below freezing." But class, too, played its part in the disaster. Of the First Class passengers 62% survived, a number that dropped to 39% for Second Class passengers. Of the 700 Third Class passengers, only 24% survived.

What caused the "unsinkable" Titanic, built with the latest 20th century technology, including 16 watertight compartments, to actually go down?

2:15 a.m.

After the collision with the iceberg, water floods over the bulkheads weighing the bow of the ship and pulling it down. The funnels begin to fall off.

2:20 a.m.

With the stern lifted out of the water massive stress is placed on the hull and keel.

2:20 a.m.

Part of the hull breaks away causing the Titanic to split along an expansion joint.

2:20 a.m.

The stern floats free, spilling debris, as the bow sinks. The stern floats almost vertically, rotating briefly before it too sinks.

## DEATH RATE BY GENDER & CLASS

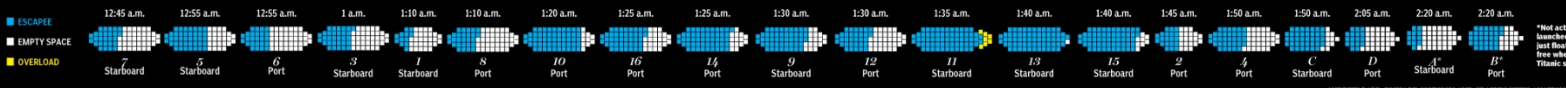
NUMBER ON BOARD	PERCENTAGE KILLED
1st class women: 141	3%
2nd class women: 92	14%
3rd class women: 179	51%
1st class men: 171	66%
2nd class men: 152	91%
3rd class men: 440	87%
1st class children: 7	14%
3rd class children: 80	69%

## DEATH RATE BY NATIONALITY

NUMBER ON BOARD	PERCENTAGE KILLED
British: 127	68%
Americans: 306	42%
Irish: 129	65%
Swedish: 113	76%
Syrian: 81	66%
Finnish: 59	68%
Austro-Hungarian: 49	84%
Canadian: 34	59%

## THE LIFEBOAT LAUNCHES

The Titanic carried 20 lifeboats, enough for 1,178 people. But even though there weren't enough boats for people, many of them were still launched with empty seats. Some officers feared overfilling the lifeboats would cause them to sink.



\*Not actually launched, just floated free when Titanic sank

# Info Vis (3)



Arranz, A. (2012) Sinking the 'Unsinkable', <https://www.behance.net/gallery/3975285/Titanic>

# kaggle Competition

3/6/2018

Titanic: Machine Learning from Disaster | Kaggle

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Getting Started Prediction Competition

## Titanic: Machine Learning from Disaster

Start here! Predict survival on the Titanic and get familiar with ML basics



Kaggle · 10,232 teams · 2 years to go

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Evaluation

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### Learning with Kaggle Kernels

Kaggle Kernels is an in-browser computational environment that is fully integrated with most competition datasets. Kernels is preloaded with most data science packages and libraries. It supports scripts and Jupyter Notebooks in R and Python, as well as RMarkdown reports. You can create submission files with Kernels and also use it to explore the competition data.

To get started with Kernels you can either:

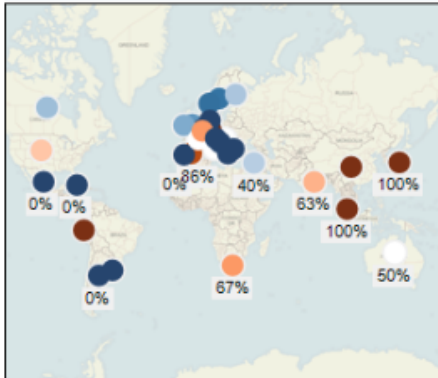
1. Create a new script or notebook on the [Kernels](#) tab or
2. "Fork" any kernel to create an editable copy for you to experiment with

<https://www.kaggle.com/c/titanic>

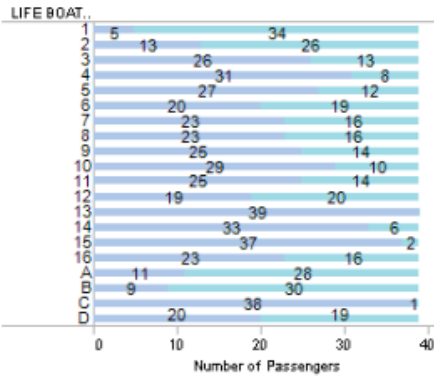


# Business Intelligence “Olympiad”

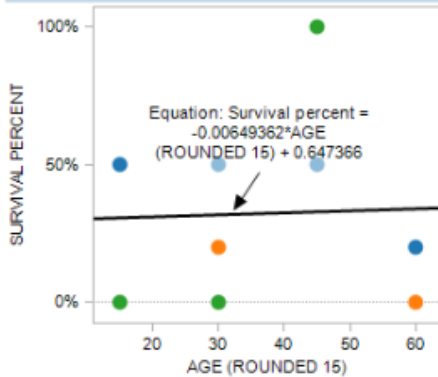
**SURVIVAL PERCENTAGE BY COUNTRY OF ORIGIN**



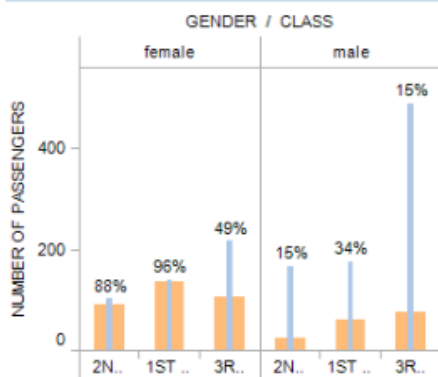
**AVAILABLE AND OCCUPIED LIFEBOAT SEATS**



**CORRELATION BETWEEN SURVIVAL RATE AND AGE**



**TOTAL AND SURVIVED VS GENDER AND CLASS**



## Titanic Survivors

**Titanic Survivors vs. Non-Survivors**



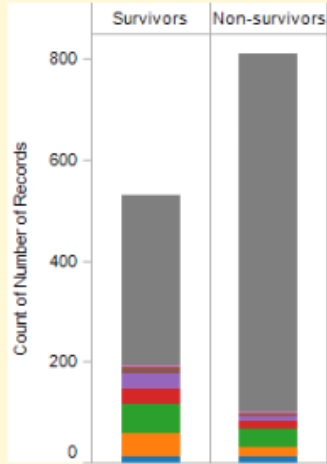
531 of Titanic's 1340 passengers survived (40%).

**Survivors by Gender and Class**

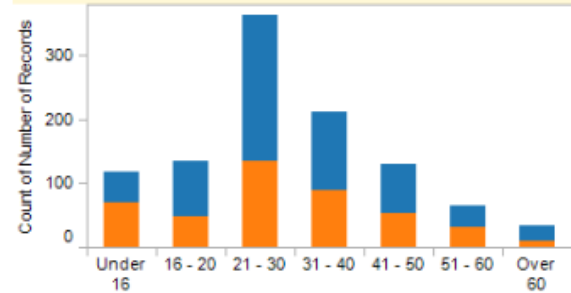
GENDE..	CLASS	Survivors	Non-survivo..
Female	1st	96.71%	3.29%
Female	2nd	89.29%	10.71%
Female	3rd	49.07%	50.93%
Male	1st	38.86%	61.14%
Male	2nd	15.61%	84.39%
Male	3rd	15.21%	84.79%

Survivors were most likely to be female 1st class passengers.

**Cabin**



**Age**



Excluding records with unknown ages, the data

**SURVIVED**

Non-survivors  
Survivors

# Conclusions

- 40+ articles & books that contain graphs based on the Titanic data
- Numerous competitions, infographics, and single web pages that make use of the Titanic data
- Extremely popular data set that likely will see continued use in the future

# Further Reading

- Friendly, M., Symanzik, J., Onder, O. (2019) Visualizing the Titanic Disaster, *Significance* 16(1): 14-19, <https://rss.onlinelibrary.wiley.com/doi/10.1111/j.1740-9713.2019.01229.x>.
- Accompanying Web Site: <http://datavis.ca/papers/titanic/>
- Photo from title page: Read more about

```
> data(Titanic, package = "Stat2Data")
> Titanic[grep("Molly", Titanic$Name), ]
```

	Name	PClass	Age	Sex	Survived	SexCode
37	Brown, Mrs James Joseph (Margaret Molly" Tobin)"	1st	44	female	1	1

```
> |
```

at <https://www.encyclopedia-titanica.org/titanic-survivor/molly-brown.html>

*Questions ???*

*or*

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