Package ‘EngrExpt’

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**Description**

Time ordered measurements of oil absorption from silica samples produced during one manufacturing shift.

**Format**

A data frame with 102 observations on the following variable.

absorb: a numeric vector

**Details**

As stated in Nelson, Coffin and Copeland (2003, p. 424), "One key quality parameter in the making of silica is the amount of oil that it can absorb since silica is often mixed with rubber and oil in various applications (battery separators, tires, shoe soles, etc.)"

**References**

Examples

str(absorb)
summary(absorb$absorb)
densityplot(~ absorb, absorb,
          xlab = "Average oil absorption of silica samples")
qqmath(~ absorb, absorb,
       ylab = "Average oil absorption of silica samples",
       xlab = "Standard normal quantiles", aspect = 1)

| adhesion | Adhesive qualities of a lens coating |

Description

These data are from two experiments to examine the effect of formulation changes on the adhesive properties of an eye glass lens coating. If the coating would not adhere to the lens surface then the formulation would not be marketable. The first experiment (adhesion) considered only pH (i.e., one factor). In this experiment three formulations were made (one at each of three pH levels) and ten samples from each formulation were tested. The test procedure for measuring adhesion is known to contain a large amount of test error. In the second experiment (adhesion2) the effect of pH (3 levels) and a catalyst (2 levels) were tested. The data consists of five samples were taken from and tested from each of the six formulations.

Format

adhesion is a data frame with 30 observations on the following 2 variables.

adhesion a numeric vector
pH a numeric vector at three distinct levels

adhesion2 is a data frame with 30 observations on the following 3 variables.

cat a factor with levels A and B
pH a numeric vector
adhesion a numeric vector

References

Examples

```r
str(adhesion)
xtabs(~ pH, adhesion)
xyplot(adhesion ~ pH, adhesion,
       ylab = "Adhesion of a lens coating", xlab = "pH",
       type = c("g", "p", "a"))
dotplot(as.factor(pH) ~ adhesion, adhesion, ylab = "pH",
        type = c("p","a"), xlab = "Adhesion of a lens coating")
str(adhesion2)
xtabs(~ cat + pH, adhesion2)
dotplot(as.factor(pH) ~ adhesion, adhesion2, groups = cat,
        type = c("p","a"), ylab = "pH",
        auto.key = list(space = "right", lines = TRUE,
                         title = "Catalyst"))
```

**alnum**

*Aluminum impurity amounts*

### Description

As described in Nelson, Coffin and Copeland (2003), “Over a 2-hour period, twenty-five 200 gm samples were drawn at random from a process that recycles plastic, and the amount of aluminum impurities in the sample in ppm was determined for each sample.”

### Format

A data frame with 25 observations on the following variable.

- **ppm**: amount of aluminum impurities (ppm)

### References


### Examples

```r
str(alum)
qqmath(~ ppm, alum, xlab = "Standard normal quantiles",
       aspect = 1, ylab = "Amount of aluminum impurities (ppm)",
       type = c("g","p"))
qqmath(~ log(ppm), alum, xlab = "Standard normal quantiles",
       aspect = 1, type = c("g","p"),
       ylab = "Natural log of amount of aluminum impurities (log(ppm))")
```
Description

As described in Nelson, Coffin and Copeland (2003), “The application of powder coating (a type of paint used on appliances and, in limited settings, cars) is done by spraying the material through a ‘gun’ that has an electrical charge on it. There are three factors to consider in setting up the application booth: the gun distance from the target item, the charge and the pressure (flow rate) of the material through the gun. This data set contains data from 18 runs.” Note that there is no data for the high flow rate, high charges, and low distance as these combinations were infeasible from an operations standpoint (they were such that too much paint would be applied to the target).

Format

A data frame with 18 observations on the following 4 variables.

distance  distance of the gun from the target (inches) - an ordered factor with levels 11 < 13 < 15
charge  charge used (kvolts) - an ordered factor with levels 35 < 45 < 55
flowrate  flow rate in gm/min. - an ordered factor with levels 94 < 124
gloss  a measure of the resulting gloss

References


Examples

```r
str(applicat)
dotplot(distance ~ gloss|flowrate, applicat, groups = charge,
    type = c("p","a"), layout = c(1,2),
    ylab = "Gun distance from target (in.)",
    strip = FALSE, strip.left = TRUE,
    auto.key = list(columns = 3, lines = TRUE), xlab =
    "Gloss for two flow rates (gm/min) and three charges (kvolts)"
)
dotplot(charge ~ gloss|flowrate, applicat, groups = distance,
    type = c("p","a"), layout = c(1,2),
    ylab = "Charge (kvolts)",
    strip = FALSE, strip.left = TRUE,
    auto.key = list(columns = 3, lines = TRUE), xlab =
    "Gloss for two flow rates (gm/min) and three distances from target (in)"
)
```
assay

Yield from two processes

Description
A resin is one component in paint formulations. A chemist was working on a process for producing a resin needed in a paint formulation. Two competing processes were tested for the amount of resin the could produce.

Format
A data frame with 9 observations on the following 2 variables.

<table>
<thead>
<tr>
<th>process</th>
<th>yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td></td>
</tr>
</tbody>
</table>

References

Examples
str(assay)
summary(assay)
dotplot(process ~ yield, assay)

bacteria

Bacteria count in water samples

Description
As described in Nelson, Coffin and Copeland (2003), “Purified water is used in one step in the production of a medical device. The water is tested daily for bacteria. These data are the results from 50 days of testing. They are the counts of a particular strain of bacteria in a 100 ml. sample of water.”

Format
A data frame with 50 observations on the following variable.

<table>
<thead>
<tr>
<th>level</th>
<th>bacteria count</th>
</tr>
</thead>
</table>

References
Examples

str(bacteria)

\begin{verbatim}
qqmath(~ level, bacteria, aspect = 1,
  xlab = "Standard normal quantiles",
  ylab = "Bacteria count")
\end{verbatim}

bath

Electrical resistance after water bath

Description

In a production process a rubber material is extruded in a continuous ribbon (about 2 feet in width). In one step of the process the product passes through a water bath. In this experiment the time spent in the bath and the temperature of the bath were varied to determine their effect on the electrical resistance of the final product.

Format

A data frame with 4 observations on the following 3 variables.

- **time**: time in the bath (coded as levels -1 and 1)
- **temp**: temperature in the bath (coded as levels -1 and 1)
- **er**: electrical resistance of the final produce (ohm/m\(^2\))

References


Examples

str(bath)

dotplot(ordered(time) ~ er, bath, groups = temp, type = c("p","a"),
  xlab = expression("Electrical resistance (ohm/m \times m^2 \times ")),
  ylab = "Time in bath (coded)",
  auto.key = list(columns = 2, lines = TRUE))

summary(fm1 <- lm(er ~ time * temp, bath))
summary(fm2 <- lm(er ~ time + temp, bath))
summary(fm3 <- lm(er ~ temp, bath))
battery

Battery lifetime in laptop computers

Description

Data from a study on the effect of different processors on the battery lifetime in laptop computers.

Format

A data frame with 30 observations on the following 2 variables.

- type  processor type - a factor with levels A, B and C
- lifetime a numeric vector

References


Examples

```r
str(battery)
densityplot(~ lifetime, battery, groups = type,
  xlab = "Battery lifetime (hours)",
  auto.key = list(columns = 3, lines = TRUE))
densityplot(~ lifetime, battery, groups = type,
  scales = list(x = list(log = 2)),
  xlab = "Battery lifetime (hours) - logarithmic scale",
  auto.key = list(columns = 3, lines = TRUE))
dotplot(reorder(as.factor(type), lifetime) ~ lifetime, battery,
  jitter.y = TRUE,
  xlab = "Battery lifetime (hours)",
  ylab = "Type", type = c("p", "a"))
dotplot(reorder(as.factor(type), lifetime) ~ lifetime, battery,
  jitter.y = TRUE, scales = list(x = list(log = 2)),
  xlab = "Battery lifetime (hours) - logarithmic scale",
  ylab = "Type", type = c("p", "a"))
```

bright

Brightness of de-inked newspaper

Description

One step of recycling newsprint is to "de-ink" the newsprint, that is to remove the ink. The brightness of the paper pulp after a de-inking process is a measure of how well the process to remove the ink worked. A half-fraction of a $2^5$ factorial experiment was run to test various factors on the ability to de-ink newsprint.
Usage

data(bright)

Format

A data frame with 16 observations on the following 6 variables.

type  type of alkali - an ordered factor with levels A < B
percent  percentage of alkali (25% or 75%)
time  time pulp is soaked (30 or 40 minutes)
hardness  water hardness (150 or 250)
speed  agitation rate - an ordered factor with levels S < F
bright  Brightness of pulp

References


Examples

str(bright)
options(contrasts = c("contr.treatment", "contr.helmert"))
summary(fm1 <- lm(bright ~ (type + percent + time + hardness + speed)^2,  
  bright))
qqmath(coef(fm1)[-1], aspect = 1,
  panel = function(...)  
  {
    panel.grid(h = -1, v = -1)
    panel.qqmath(...)
    panel.qqmathline(..., alpha = 0.5, lty = 2)
  },
  xlab = "Standard normal quantiles",
  ylab = "First- and second-order effects")
summary(fm2 <- lm(bright ~ (type + hardness)^2, bright))
dotplot(type ~ bright, bright, groups = hardness,
  type = c("p", "a"), jitter.y = TRUE,
  xlab = "Brightness of pulp (lines and point styles are levels of water hardness)",
  ylab = "Alkali type", aspect = 0.4,
  auto.key = list(lines = TRUE, columns = 2))
calcium

Calcium levels before and after taking vitamin

Description

The serum calcium levels in 11 test subjects before taking a multi-vitamin containing calcium and three hours after taking the vitamin.

Format

A data frame with 11 observations on the following 2 variables.

hrs0  serum calcium level (mg/dl) at time zero
hrs3  serum calcium level (mg/dl) three hours after taking the multi-vitamin containing calcium

Details

This was a small pilot study to test the effectiveness of the multi-vitamin with respect to calcium absorption.

References


Examples

```r
str(calcium)
show(p11 <-
    xyplot(hrs3 ~ hrs0, calcium, type = c("g","p"), aspect = "iso",
    xlab = "Calcium level (mg/dl) before taking multi-vitamin",
    ylab = "Calcium level (mg/dl) 3 hours after taking multi-vitamin")
tmd(p11))
```

caliper

Diameters of rods measured by two calipers

Description

Diameters of 14 metal rods measured once each with each of two calipers.
Format

A data frame with 14 observations on the following 3 variables.

- **part**: indicator of which part is measured - a factor
- **calipera**: measurement with caliper type A
- **caliperb**: measurement with caliper type B

Details

This is an experiment to study the relationship between the measurements taken by the two calipers on various parts. The diameter of each part is not of interest.

References


Examples

```r
str(caliper)
show(pl1 <-
  xyplot(caliperb ~ calipera, caliper,
         type = c("g","p"), aspect = "iso",
         xlab = "Measurement with caliper A",
         ylab = "Measurement with caliper B"))
tmd(pl1)
```

---

ccthickn

**Clear coat thickness**

Description

Measurements of film build from 40 test panels sprayed in a pilot plant spray booth to study paint equipment set-up. Target film build was 65 microns.

Format

A data frame with 40 observations on the following variable.

- **thickness**: clear coat thickness (microns)

Details

Cars are coated (i.e., painted) in layers. The “film build” (i.e., thickness) of each layer of the coating has an effect on the properties of the paint (performance and appearance) so it is important to maintain the correct film builds. The final layer of paint on a car is called the clear coat; the film build of this layer was to be 65 microns.
cement

References


Examples

```r
str(ccthickn)
densityplot(~ thickness, ccthickn, xlab = "Clear coat thickness (microns)")
qqmath(~ thickness, ccthickn, aspect = 1,
  ylab = "Clear coat thickness (microns)",
  xlab = "Standard normal quantiles",
  type = c("g","p"),
  panel=function(...)
  {
    panel.qqmathline(..., alpha = 0.5, lty = 2)
    panel.qqmath(...)
  })
```

description

Drying times of different concrete mixes used in a sidewalk. Mix ‘A’ is the conventional mix. Mixes ‘B’ and ‘C’ are experimental, and more expensive, mixes.

Format

A data frame with 19 observations on the following 2 variables.

- **type**: concrete mix - a factor with levels A, B and C
- **time**: time (hr) until concrete is dry enough to walk on

References


Examples

```r
str(cement)
dotplot(reorder(type, time) ~ time, cement, type = c("p","a"),
  jitter.y = TRUE, ylab = "Mix type",
  xlab = "Time until concrete is dry enough to walk on (hours)")
qqmath(~ time, cement, groups = type, aspect = 'xy',
  xlab = "Standard normal quantiles",
  type = c("g","p"),
  panel=function(...)
  {
    panel.qqmathline(..., alpha = 0.5, lty = 2)
    panel.qqmath(...)
  })
```
Description

A manufacturer of cheese supplies a major pizza chain from three different manufacturing locations. Samples from 6 different batches at each of three different plants were assayed for the percentage fat content.

Format

A data frame with 90 observations on the following 3 variables.

plant  the plant where the cheese was manufactured - a factor with levels A, B and C
batch  the batch of cheese - a factor with levels a to f. Note that batch a from plant A is not related to batch a from plants B or C
fat  fat content of the cheese (%) 

References


Examples

```r
str(cheese)
bwplot(batch ~ fat|plant, cheese, layout = c(1,3), strip = FALSE, strip.left = TRUE,
       xlab = "Percentage fat content of batches from three plants")
dotplot(reorder(reorder(plant:batch, fat), as.numeric(plant)) ~ fat |
        reorder(plant, fat), cheese, strip = FALSE, strip.left = TRUE,
        layout = c(1, 3), scales = list(y = list(relation = "free")),
        aspect = 0.2, type = c("p", "a"), xlab =
        "Percentage fat content - lines join mean fat content per batch",
        ylab = "Batch within plant", jitter.y = TRUE)
```
chemreac

Yield of a chemical reaction

Description
The yield of a chemical reaction was determined in a replicated $2^3$ factorial design.

Format
A data frame with 16 observations on the following 4 variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>temp</td>
<td>temperature in degrees C - an ordered factor with levels $120 &lt; 140$</td>
</tr>
<tr>
<td>cat</td>
<td>catalyst - a factor with levels A and B</td>
</tr>
<tr>
<td>time</td>
<td>time reaction was run, in minutes - an ordered factor with levels $10 &lt; 30$</td>
</tr>
<tr>
<td>yield</td>
<td>yield of the reaction</td>
</tr>
</tbody>
</table>

Examples

```r
str(chemreac)
dotplot(temp ~ yield | time, chemreac, groups = cat,
       strip = FALSE, strip.left = TRUE, type = c("p", "a"), layout = c(1,2),
       auto.key = list(space = "right", title = "Catalyst", lines = TRUE))
summary(fm1 <- lm(yield ~ (time + temp + cat)^3, chemreac))
summary(fm2 <- lm(yield ~ time * temp + cat, chemreac))
```

computer

Repair time of computers

Description
Data from a study of the repair time for different brands of computers in different configurations.

Format
A data frame with 36 observations on the following 3 variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>brand</td>
<td>a factor with levels A B C</td>
</tr>
<tr>
<td>type</td>
<td>an ordered factor with levels Inexpensive home &lt; Expensive home &lt; Business</td>
</tr>
<tr>
<td>time</td>
<td>time to repair computer (minutes)</td>
</tr>
</tbody>
</table>

References
Examples

```
str(computer)
dotplot(type ~ time, computer, groups = brand, 
  auto.key = list(columns = 3, lines = TRUE), 
  type = c("p","a"), jitter.y = TRUE,  
  xlab = "Time to repair computer (minutes)"
summary(fm1 <- lm(time ~ brand * type, computer))
summary(fm2 <- lm(time ~ brand + type, computer))
summary(fm3 <- lm(time ~ type, computer))
```

Yield from a chemical curing process

Description

Process engineers wish to determine a “bake window”, the combination of time and temperature in a curing process, that will maximize the yield of the product.

Format

A data frame with 18 observations on the following 3 variables.

- `time` - time - an ordered factor with levels 20 < 40
- `temp` - temperature - an ordered factor with levels Low < Med < High
- `yield` - yield of parts

References


Examples

```
str(cure)
dotplot(temp ~ yield, cure, groups = time, type = c("p","a"), 
  jitter.y = TRUE, xlab = "Yield of parts")
summary(fm1 <- lm(yield ~ time * temp, cure))
```
Description

The current formulation of a coating on transparencies used in ink-jet printers causes them to curl. These data are from experiments conducted on a new formulation of the coating to reduce the amount of curl.

Format

A data frame with 12 observations on the following 3 variables.

catalyst amount of catalyst
compa amount of component a (the second component)
curl a measure of the curl

Details

These data were collected when transparencies were still widely used for presentations. With the proliferation of projectors, transparencies are being used less and less. However, coatings on paper will continue to be an area of research as coatings have to interact with a variety of printers and inks in order to be useful.

References


Examples

```
str(curl)
xtabs(~catalyst + compa, curl)  ## display the experimental design
xyplot(curl ~ compa | ordered(catalyst), curl,
    type = c("g","p","r"), layout = c(3,1),
    xlab = "Amount of component `a' - panels are amount of catalyst",
    ylab = "Amount of curl")
```
defoam

*Height of solution with defoamer*

**Description**

The height of a solution containing a “defoamer” in a 50-ml graduated cylinder after being heated to a particular temperature.

**Format**

A data frame with 27 observations on the following 4 variables.

- **conc**: concentration of defoamer - a factor with levels L < M < H
- **pH**: pH of defoamer - a factor with levels L < M < H
- **temp**: temperature of defoamer - a factor with levels L < M < H
- **height**: height of solution in the graduated cylinder

**Details**

A defoamer is a product that controls the formation of foam in industrial processes such as one might find in the food industry.

**References**


**Examples**

```r
str(defoam)
dotplot(pH ~ height|conc, defoam, groups = temp, aspect = 0.3,
  xlab = "Height of solution", type = c("p","a"),
  auto.key = list(space = "right", lines = TRUE,
    title = "Temperature"),
  strip = FALSE, strip.left = TRUE,
  ylab = "pH within concentration")
summary(fm1 <- lm(height ~ (conc + pH + temp)^2, defoam))
summary(fm2 <- lm(height ~ (pH + temp)^3, defoam))
```
De-inking of newsprint

Description

De-inking of newsprint

Format

A data frame with 27 observations on the following 3 variables.

alkali  amount of alkali in the solution
hardness  hardness of the water - an ordered factor with levels 50 < 150 < 250
bright  a measure of brightness

Details

One step of recycling newsprint is to "de-ink" the newsprint, that is to remove the ink. The brightness of the paper pulp after a de-inking process is a measure of how well the process to remove the ink worked.

References


Examples

```r
str(deink)
xtabs(~ alkali + hardness, deink)
dotplot(hardness ~ bright, deink, groups = alkali,
auto.key = list(columns = 3, lines = TRUE),
type = c("p","a"), aspect = 'xy',
  xlab = "Brightness by amount of alkali",
  ylab = "Hardness of the water")
```

De-inking of newsprint

Description

De-inking of newsprint
Format

A data frame with 15 observations on the following 3 variables.

formula a factor with levels A, B and C
newspaper a factor with levels A, B, C, D and E
bright a numeric vector

Details

One step of recycling newsprint is to "de-ink" the newsprint, that is to remove the ink. The brightness of the paper pulp after a de-inking process is a measure of how well the process to remove the ink worked. In this experiment three formulations were tested on three newspapers (not all newsprint and ink are identical).

References


Examples

str(hdeinkRI)

dhaze  
  Haze of lenses after abrasion

Description

Haze of lenses after 150 test cycles of abrasion

Usage

data(dhaze)

Format

A data frame with 28 observations on the following 2 variables.

treatment a factor with levels A, B, C and D
dhaze a numeric vector

Details

A maker of coatings for eye glass lenses tested three treatments (or coating formulations) for the ability to withstand wear (simulated with an abrasion test) as measured by haze. Low haze is desirable.
References


Examples

```r
str(dhaze)
```

```
diagnostic   Consistency of diagnostic kits

Description

Consistency of diagnostic kits

Format

A data frame with 16 observations on the following 2 variables.

- `kit1`: measurement using kit 1
- `kit2`: measurement using kit 2

Details

Diagnostic kits are used in clinics or laboratories to test samples (e.g., blood) for some condition (i.e., illness). One kit can often test many samples. In this case one kit can test at least 16 samples. This study was to look the consistency between kits used to test the same set of samples. The samples would have been divided such that both kits could be used to test the sample and then the results compared.

References


Examples

```r
str(diagnostic)
show(plt1 <-
  xyplot(kit2 ~ kit1, diagnostic,
        aspect = "iso", type = c("g", "p"),
        xlab = "Measurement using kit 1",
        ylab = "Measurement using kit 2"))
tmd(plt1)
show(plt2 <-
  xyplot(kit2 ~ kit1, diagnostic, aspect = "iso",
         xlab = "Measurement using kit 1 - logarithmic axis",
         ylab = "Measurement using kit 2 - logarithmic axis",
         scales = list(log = 2)))
tmd(plt2)
```
### Diameter of product

**Description**

The diameter of tracking balls for computer mice from two different production lines. The nominal diameter of the ball is 2 cm.

**Format**

A data frame with 20 observations on the following 2 variables.

- **line**: a factor with levels A B
- **diameter**: diameter of the tracking ball (cm.)

**References**


**Examples**

```r
str(diameter)
dotplot(line ~ diameter, diameter, type = c("p","a"),
       jitter.y = TRUE, aspect = 0.2, ylab = "Line",
       xlab = "Diameter of tracking ball (cm.)")
bwplot(line ~ diameter, diameter, type = c("p","a"),
       jitter.y = TRUE, aspect = 0.2, ylab = "Line",
       xlab = "Diameter of tracking ball (cm.)")
```

### Water usage in 2001 and 2002

**Description**

In 2002, Colorado experienced a drought and many towns on the front range (a geographical district close to the Rocky mountains) issued mandatory or voluntary water restrictions on outdoor watering. These data are comparative water usage between 2001 and 2002 for five such towns.

**Format**

A data frame with 5 observations on the following 3 variables.

- **town**: a factor with levels A, B, C, D and E
- **j2001**: water usage (millions of gallons) in 2001
- **j2002**: water usage (millions of gallons) in 2001
**drums**

References


Examples

```r
str(drums)
```

```
drums          Weights of drums before and after filling
```

Description

Weights of drums before and after being filled with a chemical product.

Format

A data frame with 30 observations on the following 3 variables.

- **number**: a numeric vector
- **empty**: a numeric vector
- **full**: a numeric vector

Details

These data were collected to study a filling process that filled drums of material based on an assumed weight of the empty drum.

References


Examples

```r
str(drums)
```
**Description**

Moisture content after drying

**Format**

A data frame with 16 observations on the following 3 variables.

- **rate**: a factor with levels SLOW and FAST
- **type**: type of dryer - a factor with levels BATCH and TUNNEL
- **response**: Moisture content of final product (%)

**Details**

A production process used two types of dryers. The product could pass through the tunnel dryer as a web of material or the product could be coiled on larger rollers and then placed into a dryer. The question was how to best set each dryer to obtain a moisture content of 63(%).

**Examples**

```r
str(dry)
```

---

**Description**

Effect of epoxy level on appearance

**Format**

A data frame with 10 observations on the following 2 variables.

- **epoxy**: level of epoxy in formulation
- **1w**: longwave measure of appearance

**Details**

Long wave is a measurement used to characterize a surface, such as the paint on an auto. In this instance higher LW was desired and the amount epoxy was one component of the paint that was known to impact the LW properties of the final product.
exposure

References


Examples

```r
str(epoxy)
```

<table>
<thead>
<tr>
<th>exposure</th>
<th>Appearance of panels after exposure to weather</th>
</tr>
</thead>
</table>

Description

Appearance of panels after exposure to weather

Format

A data frame with 36 observations on the following 2 variables.

- `form` formulation of paint - a factor with levels A, B and C
- `rating` appearance rating

Details

One way to test the durability of a new auto paint formulation is to hang coated test panels outside and expose them to the elements. After some time has passed the appearance of the panels are rated. If their appearance is poor then that formulation is not desirable.

References


Examples

```r
str(exposure)
```
### fbuild

**Appearance for film builds**

**Description**

Appearance for film builds

**Format**

A data frame with 9 observations on the following 2 variables.

- build a numeric vector
- gloss a numeric vector

**Details**

Film build is the thickness of a coating, such as an automotive paint. Gloss is an appearance measure with higher gloss generally being preferred.

**References**


**Examples**

```r
str(fbuild)
```

### fill

**Fill amount in tamped cylinders**

**Description**

Fill amount in tamped cylinders

**Format**

A data frame with 18 observations on the following 3 variables.

- distance a numeric vector
- tamps a numeric vector
- fill a numeric vector

**References**

**fillweight**

**Examples**

```r
str(fill)
```

---

**Description**

Fill weight by batch

**Format**

A data frame with 20 observations on the following 3 variables.

- run  a factor with levels A, B, C and D
- tube  a factor with levels A, B, C, D and E
- weight  a numeric vector

**References**


**Examples**

```r
str(fillweight)
```

---

**fish**

**Toxin concentrations in fish by site**

**Description**

Toxin concentrations in fish by site

**Format**

*fish* is a data frame with 16 observations on the following 2 variables.

- site  a factor with levels A, B, C and D
- toxin  a numeric vector

*fish2* is a data frame with 16 observations on the following 2 variables.

- site  a factor with levels E, F, G and H
- toxin  a numeric vector
Details

Prior to beginning mining operations a new precious metals mine had to run an extensive environmental study of the surrounding area, particularly downstream from their construction site. Thus, a baseline of data was collected over many years so that any environmental impact of the facility could be quantified. One step in the study was to collect fish along a stream and measure the amount of various toxins found in the fish.

References


Examples

```r
str(fish)
dotplot(reorder(site, toxin) ~ toxin, fish, jitter.y = TRUE,
    aspect = 0.3, xlab = "Amount of toxin (mg/kg wet weight)")
str(fish2)
dotplot(reorder(site, toxin) ~ toxin, fish2, jitter.y = TRUE,
    aspect = 0.3, xlab = "Amount of toxin (mg/kg wet weight)")
```

---

<table>
<thead>
<tr>
<th>fluoride</th>
<th>Fluoride levels from water sources</th>
</tr>
</thead>
</table>

Description

Fluoride levels from water sources

Format

A data frame with 58 observations on the following 2 variables.

- `source` a factor with levels A B C
- `fluoride` a numeric vector

References


Examples

```r
str(fluoride)
```
gloss

Gloss of paint on cars

Description
Gloss of paint on cars

Format
A data frame with 40 observations on the following 2 variables.

- color: a factor with levels Black, Green, Silver and White
- gloss: a numeric vector

Details
The final coat of paint on a car is typically a clear coat. This layer is applied on top of the layer with the color and formulations must be compatible with many base colors. This data was used to investigate the performance of a formulation on the appearance of the coating when used with various base colors.

References

Examples
str(gloss)

labcomp

Inter-lab study

Description
Inter-lab study

Format
A data frame with 28 observations on the following 3 variables.

- lab: a factor with levels A, B, C and D
- pt1: a numeric vector
- pt5: a numeric vector
Details

This study was an "inter-lab" study to investigate measurements taken on a product at various facilities. In particular, this company has a research lab, a pilot line lab, and multiple labs at plants. When characterizing products and especially in trouble shooting performance issues samples may be tested at multiple facilities and it is important to know if there is an impact of location on the resulting measurements. For this study material was sent to each lab and tested 7 times by two testing methods, a 1-point method at all labs and a 5-point method at two of the labs.

References


Examples

```r
str(labcomp)
```

```r
lw     Automotive paint formulation
```

Description

Automotive paint formulation

Format

A data frame with 24 observations on the following 3 variables.

lw a numeric vector
comp1 a factor with levels A, B, C and D
comp2 a factor with levels A, B and C

Details

LW (longwave) is a surface appearance measure. This data was from an experiment to choose the best combination of two components in an automotive paint formulation. The goal is to maximize the LW measure.

References


Examples

```r
str(lw)
```
Appearance measures of automotive paints

Description
Appearance measures of automotive paints

Format
A data frame with 13 observations on the following 2 variables.

lw a numeric vector
sw a numeric vector

Details
Longwave (LW) and shortwave (SW) are two surface quality measurements. Both are important in the development of coating formulations. This data was gathered to examine the relationship between the two measures.

References

Examples
str(lwsw)

Moisture content of a silica product

Description
Moisture content of a silica product

Format
A data frame with 8 observations on the following 5 variables.

temp temperature in degrees Fahrenheit - an ordered factor with levels 200 < 300
speed process speed - an ordered factor with levels A and B
solids percent solids - an ordered factor with levels 10 < 15
pH pH of the process - an ordered factor with levels 6.5 < 7
moisture moisture content of the product
Details

These data were collected from an experiment run in a pilot plant to try to increase the moisture content of a product through production changes.

References


Examples

```r
str(moisture)
```

---

**Description**

Appearance measure of paint

**Format**

A data frame with 32 observations on the following 6 variables.

- `a` a factor with levels H L
- `b` a factor with levels H L
- `c` a factor with levels H L
- `d` a factor with levels H L
- `e` a factor with levels H L
- `mw` a numeric vector

Details

These data are from a designed experiment to study the impact of 5 process factors on the molecular weight of a paint. The Mw is the response of interest as it in turn impacts quality characteristics of the paint. This study was run to better understand the influence of processing variables on the resulting Mw of the formulations.

References


Examples

```r
str(mw)
```
**odor**

| odor | *Odor, yellowing and hardness of optical coating* |

**Description**

Odor, yellowing and hardness of optical coating

**Format**

A data frame with 35 observations on the following 3 variables.

- odor  a numeric vector
- yellowing  a numeric vector
- hardness  a numeric vector

**Details**

These data are quality data gathered from 35 random samples of a raw material used in a lens coating. It is beneficial to understand the relationships between desired quality characteristics of a product as one must often compromise one characteristic for another.

**References**


**Examples**

```r
str(odor)
```

---

**oven**

| oven | *Drying of silica* |

**Description**

Drying of silica

**Format**

A data frame with 30 observations on the following 3 variables.

- brand  a factor with levels A B C
- type  a factor with levels A B
- moisture  a numeric vector
References


Examples

```r
str(oven)
```

---

<table>
<thead>
<tr>
<th>ph</th>
<th>pH measurements in a chemical process</th>
</tr>
</thead>
</table>

**Description**

pH measurements in a chemical process

**Format**

A data frame with 35 observations on the following 2 variables.

- `batch` a factor with levels A, B and C
- `ph` a numeric vector

**Details**

For each of three batches of material numerous pH readings were taken over the course of the production process. For this material the pH should be consistent throughout production.

**References**


**Examples**

```r
str(ph)
summary(ph)
dotplot(batch ~ ph, ph, pch = 21, jitter.y = TRUE)
ph$obs <- as.integer(gl(12, 1, len = 35))
xyplot(ph ~ obs|batch, ph, type = c("g","b"), layout = c(1,3),
       strip = FALSE, strip.left = TRUE, xlab = NULL)
```
Comparison of instruments to measure pH

Description
Comparison of instruments to measure pH

Format
A data frame with 11 observations on the following 2 variables.

- `phold` a numeric vector
- `phnew` a numeric vector

Details
These data were collected to compare an old instrument to a new instrument. Eleven samples were tested with both instruments.

References

Examples
```r
str(phmeas)
```

Yellowing of paint for different pigments

Description
Yellowing of paint for different pigments

Format
A data frame with 9 observations on the following 3 variables.

- `batch` a factor with levels A, B and C
- `pigment` a factor with levels A, B and C
- `deltab` a numeric vector
Details
This experiment was to study the impact of pigments on the quality of a white paint. The measure of interest was delta b (smaller is better). Three batches of paint were used to test each of the three pigments (so there were three measurements for each pigment, one from each batch).

References

Examples
str(pigment)

---

protein

Assay of protein in blood

Description
Assay of protein in blood

Format
A data frame with 54 observations on the following 5 variables.

- gender: a factor with levels F and M
- age: a numeric vector
- duration: a numeric vector
- levela: a numeric vector
- protein: a numeric vector

Details
The response of interest in this data set is the protein level from a new diagnostic test.

References

Examples
str(protein)
purity

| purity | Purity of product from a filtration process |

Description

Purity of product from a filtration process

Format

A data frame with 12 observations on the following 4 variables.

- **tech**: indicator factor for technician
- **fac1**: a factor with 3 levels
- **fac2**: a factor with 2 levels
- **purity**: a response factor

Details

This experiment was run by two technicians to study the impact of two process factors on the purity of the product after filtration.

References


Examples

```r
str(purity)
```

railcar

| railcar | Rail car hold times |

Description

Rail car hold times

Format

A data frame with 53 observations on the following variable.

- **days**: a numeric vector
Details

A company ships product to customers in rail cars. The rail cars are delivered by the railroad to a rail siding at the customer's facility. This data records the time that a railcar is held at a customer facility.

References


Examples

```r
str(railcar)
str(railcar2)
```

---

**railcar3**  
*Moisture level versus type of rail car*

Description

Moisture level versus type of rail car

Format

A data frame with 17 observations on the following 2 variables.

```r
type  a factor with levels A B
moisture  a numeric vector
```

Details

Rail cars are used to ship bulk product to customers. A company has two primary styles of cars that it uses for a product that has specific moisture specifications. A customer was seeing variability in the moisture levels of the product when it reached their site.

References


Examples

```r
str(railcar3)
```
**ratings**

**Ratings of raw materials**

### Description

Ratings of raw materials

### Format

A data frame with 26 observations on the following variable.

- **rating**: a numeric vector

### Details

A company has a new raw material that they wish to quickly evaluate. To do so they rate how well their process is running at key steps when using the new material. The rating is done on a scale of 1 - 10 at each key step and then averaged.

### References


### Examples

```r
str(ratings)
```

**ratings2**

**Product ratings and moisture content**

### Description

Product ratings and moisture content

### Format

A data frame with 26 observations on the following 2 variables.

- **rating**: a numeric vector
- **moisture**: a numeric vector

### Details

A company has a new raw material that they wish to quickly evaluate. To do so they rate how well their process is running at key steps when using the new material. The rating is done on a scale of 1 - 10 at each key step and then averaged. In addition the moisture level of the raw material was recorded for each batch.
Anti-reflective coating measurements

This experiment was to test components in an anti-reflective coating. The goal was to minimize the reflectance ($reflect$).

References


Examples

```r
str(reflect)
```
safety

Safety violations over time

Description
Safety violations over time

Format
A data frame with 30 observations on the following 4 variables.

- year: a numeric vector
- place: a factor with levels CA, KY, MI, NY, TN and TX
- employees: a numeric vector
- cases: a numeric vector

References

Examples
```r
str(safety)
```

sales

Sales versus capital expenditure

Description
Sales versus capital expenditure over 48 months

Format
A data frame with 48 observations (ordered by month) on the following 3 variables.

- capital: a numeric vector
- pindex: a numeric vector
- sales: a numeric vector

References

Examples
```r
str(sales)
```
### Surface area of silica

**Description**

Measurements of the surface area \( (m^2/g) \) of three batches of silica as performed by four different lab technicians.

**Format**

A data frame with 12 observations on the following 3 variables.

- **batch** a factor with levels a, b and c
- **tech** a factor with levels A, B, C and D
- **sarea** the surface area in \( m^2/g \) as measured by the lab technician on a sample from the batch

**References**


**Examples**

```r
str(sarea)
xtabs(sarea ~ batch + tech, sarea)
dotplot(reorder(tech, sarea) ~ sarea, sarea,
  groups = batch, type = c("p","a"), aspect = "xy",
  ylab = "Technician",
  xlab = expression("Measured surface area " * (m^2/g) * " of silica batches"),
  auto.key = list(columns = 3, lines = TRUE)
  )
```

### Electrical resistance of battery separators

**Description**

Electrical resistance of battery separators

**Format**

A data frame with 24 observations on the following 4 variables.

- **silica** a factor with levels High Low
- **time** a factor with levels High Low
- **temp** a factor with levels High Low
- **y** a numeric vector
Details

This experiment was run to study the effect of three process factors on the electrical resistance of a battery separator (extruded from a rubber, oil, and silica mix). Each of the three factors, occur at two levels, designated "High" and "Low".

References


Examples

```r
str(separate)
```

---

Soap sales by packaging type

**Description**

Soap sales by packaging type over a 5 week study

**Format**

A data frame with 5 observations on the following 3 variables.

- **box**: number of box packages sold
- **foil**: number of foil packages sold
- **shrink**: number of shrink wrapped packages sold

**Details**

An in-store study was run to test consumer preference of packaging for a soap. The study was run for 5 weeks with the number of packages sold each week recorded. Note, after the third week there was a supply disruption so there were no boxed soaps available for sale.

**References**


**Examples**

```r
str(soap)
```
Stability of a chemical product

Description
Stability of a chemical product

Format
A data frame with 12 observations on the following 4 variables.

- temp: a numeric factor at two levels
- humidity: a numeric factor at two levels
- time: a numeric factor at three levels
- y: a numeric vector

Details
The stability of the active ingredient is critical. This study looks at the impact of temperature and humidity on the stability of the active ingredient over time.

References

Examples
str(stab)

stretch

Description
Stretch of hot pizza cheese

Format
A data frame with 30 observations on the following 3 variables.

- temp: a numeric vector
- cheese: a numeric vector
- stretch: a numeric vector
Details

A critical quality measure of pizza cheese is how well it stretches when it is hot. This study was to evaluate the amount of cheese and the temperature at which the pizza was cooked on the stretch of the hot cheese. Measuring the stretch of pizza cheese is not a precise science, thus, five measurements were taken on each pizza. One pizza was used for each temperature/cheese combination.

References


Examples

str(stretch)

tabular(stretch, digits = 3)

densityplot(~ stretch, subset = (temperature == 'Hot') & (cheese == 'Mozzarella'))

densityplot(~ stretch, subset = (temperature == 'Cold') & (cheese == 'Mozzarella'))

densityplot(~ stretch, subset = (temperature == 'Hot') & (cheese == 'Cheddar'))

densityplot(~ stretch, subset = (temperature == 'Cold') & (cheese == 'Cheddar'))

Description

Measurements of the surface area, in $m^2/g$, of samples of silica, a chemical product with many applications, such as a filler in rubber products. The surface area is a key property of the product.

Format

A data frame with 32 observations on the following variable.

area a numeric vector

References


Examples

str(surfarea)

with(surfarea, summary(area))

densityplot(~ area, surfarea, aspect = 1, type = c("g", "p"),
          xlab = "Standard normal quantiles",
          ylab = expression("Surface area " * (m^2/g) *
              " of batches of silica"))

print(densityplot(~ area, surfarea, aspect = 1, type = c("g", "p"),
          xlab = "Standard normal quantiles",
          ylab = expression("Surface area " * (m^2/g) *
              " of batches of silica")),
          pos = c(0.3,0,1,1))
### tablets

**Lifetime of chlorine tablets**

**Description**

Lifetime of chlorine tablets

**Format**

A data frame with 30 observations on the following 2 variables.

- **batch**: a factor with levels A B C
- **time**: a numeric vector

**Details**

One batch of chlorine tablets (for use in home swimming pools) was suspected of having a problem. To test the batch ten tablets from that batch as well as ten tablets from each of two other batches were tested and compared.

**References**


**Examples**

```r
dput(tables)
```

### temprate

**Effect of water bath on moisture content**

**Description**

Effect of water bath on moisture content

**Format**

A data frame with 12 observations on the following 3 variables.

- **temp**: a numeric vector
- **rate**: a factor with levels FAST MED SLOW
- **response**: a numeric vector
References


Examples

```r
str(tenprate)
```

tennis

| tennis | Durability of tennis ball covers |

Description

Durability of tennis ball covers

Format

A data frame with 20 observations on the following 2 variables.

- type: a factor with levels A, B, C and D
- wear: a numeric vector

References


Examples

```r
str(tennis)
```

tensile

| tensile | Tensile breaking strength of steel samples |

Description

The breaking strength of samples of steel that were stress tested. This data set is called break in Nelson, Coffin and Copeland (2003). We changed the name because break is a reserved word in R.

Format

A data frame with 18 observations on the following variable.

- bstrength: breaking strength (unknown units)
References


Examples

```r
str(thinfilm)
qqmath(~ bstrength, tensile, aspect = 1,
xlab = "Standard normal quantiles",
ylab = "Breaking strength of steel samples (unknown units")
```

---

**thinfilm** *Strength of thin film coatings*

**Description**

Strength of thin film coatings

**Format**

A data frame with 30 observations on the following 3 variables.

- `material`: a factor with levels foil glass
- `comp`: a numeric vector
- `maxload`: a numeric vector

**Details**

“Thin films”, a coating cured on some substrate other than the actual product, are used by researchers in development. Glass and foil are two substrates that are often used. This study was used to study the impact of a component of the coating on the strength of the coating. The researcher also wanted to know if the substrate used to cure the thin film had an impact on the results.

**References**


**Examples**

```r
str(thinfilm)
```
**Description**

The time for a painted panel to reach a nominal temperature of -10 C versus the temperature in a freezer to prepare the panel. Two types of panels were used, original equipment manufacturer (OEM) panels and repair panels. The repair panels have an extra coat of paint.

**Format**

A data frame with 24 observations on the following 3 variables.

- **time**: time, in minutes, for the panel to reach the nominal temperature of -10 C
- **temp**: temperature in the freezer from which the panel is extracted
- **type**: a factor with levels Repair OEM

**Details**

A freezer is used to simulate exposure to cold on automotive paint test panels. A durability test is to be conducted at -10 C. The test is conducted on two types of panels (one type has an additional coat of paint) and there is some time needed to retrieve the panel from the freezer and to place it in the test equipment. This study was run to determine the optimal freezer setting for running the durability test.

**References**


**Examples**

```r
str(timetemp)
xyplot(time ~ temp, timetemp, groups = type,
       type = c("g","p","r"), aspect = 'xy',
       ylab = "Time to reach -10C (min.)",
       xlab = "Temperature in freezer (degrees C)",
       auto.key = list(columns = 2, lines = TRUE))
```
Turbidity of a toothpaste formulation

Description

Results from an experiment to assess the turbidity of a toothpaste formulation. The three factors that are varied at the NaCl level, the reaction temperature and the addition rate of a particular component.

Format

A data frame with 8 observations on the following 4 variables.

<table>
<thead>
<tr>
<th>nacl</th>
<th>NaCl level (2 or 20 ml.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>temp</td>
<td>Reaction temperature (50 or 80 degrees C)</td>
</tr>
<tr>
<td>rate</td>
<td>Addition rate (30 or 60 seconds)</td>
</tr>
<tr>
<td>turbidity</td>
<td>a numeric vector</td>
</tr>
</tbody>
</table>

References


Examples

```r
str(tpaste)
opt <- options(contrasts = c("contr.treatment", "contr.helmert"))
summary(fm6 <- lm(turbidity ~ (NaCl + temp + rate)*3, tpaste))$coefficients
qqmath(coef(fm6)[-1], xlab = "Standard normal quantiles",
       ylab = "Estimated coefficients", aspect = 1, type = c("g", "p"),
       panel = function(...){panel.qqmath(...); panel.qqmathline(..., lty=2, alpha=0.5))
xyplot(sort(abs(coef(fm6)[-1])) ~ sqrt(qchisq(ppoints(7), df = 1)),
       xlab = "Quantiles of absolute value of the standard normal",
       ylab = "Absolute value of estimated coefficients", type = c("g","p"))
summary(fm7 <- lm(turbidity ~ NaCl * rate, tpaste))
options(opt)
```

Mercury level in employee urine samples

Description

Mercury level in employee urine samples

```r
```
uvcoatin

Format

A data frame with 12 observations on the following 5 variables.

- **month** an ordered factor with levels from January to December
- **person1** mercury concentration in person 1’s urine
- **person2** mercury concentration in person 2’s urine
- **person3** mercury concentration in person 3’s urine
- **person4** mercury concentration in person 4’s urine

Details

Employees who work in a high risk area of a chemical plant are monitored monthly for mercury exposure.

References


Examples

```r
str(uranine)
dotplot(month ~ person1 + person2 + person3 + person4, urine,
outer = FALSE, type = c("p","l"),
auto.key = list(columns = 2, lines = TRUE, points = FALSE),
xlab = "Mercury level in urine")
```

uvcoatin

*Comparison of eyeglass ultra-violet coatings*

Description

Comparison of eyeglass ultra-violet coatings

Format

A data frame with 10 observations on the following 3 variables.

- **a** a numeric vector of differences in haze values for the commercial coating
- **b** a numeric vector of differences in haze values for the commercial coating
- **diff** a numeric vector of the differences in the two above vectors
Details
A field test of a new coating was conducted with 10 volunteers who wore glasses on a regular basis. Each subject had one lens coated with a commercial product and one lens coated with a test product. The coatings were applied to the lens in a random fashion such that some subjects had the commercial coating on their right lens and some on their left lens. The haze of each lens was measured at the beginning and the end of the study with the difference in haze being the measure of interest.

References

Examples
```r
str(uvcoatin)
```

---

`uvoven` | *UV absorbance for lens cured in different ovens*

Description
UV absorbance for lens cured in different ovens

Format
A data frame with 60 observations on the following 2 variables.

- `oven` - a factor with levels `A B`
- `uv` - UV absorbance

References

Examples
```r
str(uvoven)
summary(uvoven)
densityplot(~ uv, uvoven, groups = oven, auto.key = list(columns = 2), xlab = "UV absorbance")
qqmath(~ uv, uvoven, groups = oven,
       auto.key = list(space = "right", title = "Oven"),
       xlab = "Standard normal quantiles", type = c("p","g"),
       ylab = "UV absorbance",
       panel = function(...) {
         
         
```
viscosity

Time to gelling of paint samples

Description

Time to gelling of paint samples

Format

A data frame with 17 observations on the following variable.

time a numeric vector

References


Examples

```r
str(viscosity)
with(viscosity, summary(time))
qqmath(~ time, viscosity, aspect = 1,
  xlab = "Standard normal quantiles",
  ylab = "Time until paint sample gelled")
qqmath(~ sqrt(time), viscosity, aspect = 1,
  xlab = "Standard normal quantiles",
  ylab = "Square root of time until paint sample gelled")
```

vitamin

Calcium levels before and after vitamin supplement

Description

Calcium levels before and after vitamin supplement

Format

A data frame with 49 observations on the following 3 variables.

treatment formulation - a factor with levels A, B and C
before Calcium level before the vitamin
after Calcium level after the vitamin
Appearance of washed and unwashed panels

Description

Appearance ratings of washed and unwashed panels

Format

A data frame with 36 observations on the following 3 variables.

- **type**: type of treatment - a factor with levels `NW` (not washed) and `W` (washed)
- **time1**: initial rating
- **time2**: rating after 2 weeks

Details

A particular durability test of paint involves applying drops of acid on the panel. After a particular time point the panel is rated for its ability to withstand the acid. This study involved washing (or not washing) panels and then storing them for two weeks to see if there was a residual effect of the acid on the panel. This was important as panels are often stored and used in presentations so the researchers needed to know if they should wash the panels before storing them.

References

water

**Examples**

```r
str(wash)
summary(wash)
show(plt1 <- xyplot(time2 ~ time1, wash, groups = type,
                     auto.key = list(columns = 2, lines = TRUE),
                     aspect = "iso",
                     type = c("g","p","smooth"),
                     xlab = "Initial rating",
                     ylab = "Rating after 2 weeks",
                     jitter.x = TRUE, jitter.y = TRUE))
tmd(plt1)
densityplot(~ I(time2 - time1), wash, groups = type,
            auto.key = list(columns = 2, lines = TRUE),
            xlab = "Change in rating after two weeks")
```

---

**water**  
*Bacteria concentrations in water samples*

---

**Description**

Bacteria concentrations in water samples

**Format**

A data frame with 50 observations on the following variable.

- **bacteria**: bacteria concentration (ppm)

**References**


**Examples**

```r
str(water)
qqmath(~ bacteria, water, aspect = 1,
       xlab = "Standard normal quantiles",
       ylab = "Bacteria concentration (ppm)")
histogram(~ bacteria, water, breaks = 0:14 - 0.5,
          xlab = "Bacteria concentration (ppm)")
xtabs(~ bacteria, water)
```
## webtraff

**Web site traffic during a marketing campaign**

### Description

Web site traffic during a marketing campaign

### Format

A data frame with 10 observations on the following 2 variables.

- **weeks**: weeks into the marketing campaign - an ordered factor with levels **Q** to **U**
- **traffic**: web site traffic (1000’s of hits per day)

### References


### Examples

```r
str(webtraff)
dotplot(weeks ~ traffic, webtraff, type = c("p","a"),
    xlab = "Web traffic (1000’s of hits per day)",
    ylab = "Weeks into the marketing campaign")
```

## webvisit

**Web site visits over a 3-week period**

### Description

Web site visits over a 3-week period

### Format

A data frame with 21 observations on the following variable.

- **visits**: a numeric vector

### References

**weight**

**Examples**

```r
str(webvisit)
densityplot(~ visits, webvisit,
  xlab = "Web site visits in a 3-week period")
qqmath(~ visits, webvisit, aspect = 1, type = c("g","p"),
  ylab = "Web site visits in a 3-week period",
  xlab = "Standard normal quantiles")
with(webvisit, summary(visits))
```

**Description**

Weight plastic bags held before breaking

**Format**

A data frame with 43 observations on the following variable.

weight  a numeric vector

**References**


**Examples**

```r
str(weight)
densityplot(~ weight, weight,
  xlab = "Weight bag held before breaking")
qqmath(~ weight, weight, ylab = "Weight bag held before breaking",
  aspect = 1, type = c("g","p"), xlab = "Standard normal quantiles")
```

**whitearea**

**Comparison of mixing processes**

**Description**

The percentage of “white area” in a sample of a dark product is used to evaluate how well a white raw material has been mixed into the product. Data are obtained from two processes.

**Format**

A data frame with 48 observations on the following 2 variables.

process  a factor with levels A B
whitearea  a numeric vector
Examples

```
str(whitearea)
qqmath(~ whitearea, whitearea, groups = process, aspect = 1,
  auto.key = list(space = "right", title = "Process"),
  xlab = "Standard normal quantiles",
  ylab = "White area")
t.test(whitearea ~ process, whitearea)
```

yellow  Initial and 1 month color measure of coated lens

Description

Initial and 1 month color measure of coated lens

Format

A data frame with 23 observations on the following 2 variables.

- `b1` a numeric vector of initial color measurements
- `b2` a numeric vector of color measurements after one month

Details

It is undesirable to see color changes in a lens over time.

References


Examples

```
str(yellow)
show(plt1 <- xyplot(b2 ~ b1, yellow, aspect = 'iso', type = c("g","p"),
  xlab = "Initial color measure of lens",
  ylab = "Color measure after 1 month")
show(tmd(plt1)))
```
yield

Yield of a chemical process

Description

Yield of a chemical process

Format

A data frame with 20 observations on the following 3 variables.

- temp  temperature of the slurry (degrees C)
- pH    pH of the slurry
- yield yield of the process (tons)

References


Examples

```R
str(yield)
xyplot(yield ~ temp|cut(pH, seq(6.25, 6.85, len = 4), ordered = TRUE),
       yield, type = c("g","p","r"),
       xlab = "Temperature of the slurry (degrees C)",
       ylab = "Yield (tons)")
```
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