Package 'archdata'

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Title Example Datasets from Archaeological Research

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Suggests ca, circular, plotrix, MASS, spatstat

Description The archdata package provides several types of data that are typically used in archaeological research. It provides all of the data sets used in ``Quantitative Methods in Archaeology Using R'' by David L Carlson, one of the Cambridge Manuals in Archaeology.

License GPL (>= 2)

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R topics documented:

`archdata-package` *archdata - Archaeological Data Sets*

Description

Includes archaeological data sets used in *Quantitative Methods in Archaeology Using R* by David L Carlson (Cambridge Manuals in Archaeology).

Details

Package:	archdata
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`Acheulean` Seven African Acheulean Sites

`Arnhofen` Point pattern of mining pits from the Neolithic chert mine at Arnhofen

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EWBurials Ernest Witte Cemetery, Austin, County, Texas, U.S.A.

Fibulae Bronze La Tène fibulae from Műnsingen, Switzerland

Handaxes Lower Paleolithic handaxes from Furze Platt, Maidenhead, Berkshire, England

MaskSite Mask Site, Alaska, USA

Mesolithic British Mesolithic assemblages

Michelsberg Younger Neolithic Pottery from Central Europe

Nelson Prehistoric Ceramics at Pueblo San Cristobal, New Mexico, U.S.A.

Olorgesailie.maj Major stone tool classes, Olorgesailie, Kenya

Olorgesailie.sub Stone tool subclasses, Olorgesailie, Kenya

OxfordPots Distribution of Late Romano-British Oxford Pottery

PitHouses Late Stone Age and Early Sami Iron Age Pithouses in Arctic Norway

RBGlass1 Romano-British Glass, Major and Minor Elements

RBGlass2 Romano-British Glass, Trace Elements

RBPottery Romano-British Pottery

Snodgrass House pits at the Mississippian Snodgrass site in Butler County, Missouri, U.S.A.

TRBPottery Neolithic TRB Pottery from Demark

Author(s)

David L. Carlson and Georg Roth
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References

See individual data sets for information on the source and publications illustrating their use.

Acheulean *Seven African Acheulean Sites*

Description

Stone tool assemblage data from a paper by Lewis Binford (1972). The sites include Olorgesailie, Isimila, Kalambo Falls, Lochard, Kariandusi, Broken Hill, and Nsongezi. Data include approximate latitude and longitude for each site as well as the frequency for each of 12 stone tool types.

Usage

```
data(Acheulean)
```

Format

A data frame with 7 observations showing the site location and the number of specimens for each of 12 stone artifact types. The localities are identified by `rownames`.

`Lat` Latitude (approximate)

`Long` Longitude (approximate)

`HA` Number of handaxes

`CL` Number of cleavers

`KN` Number of knives

`FS` Number of flake scrapers

`D` Number of discoids

`CS` Number of core scrapers

`P` Number of picks

`CH` Number of choppers

`SP` Number of spheroids

`OLT` Number of other large tools

`SS` Number of small scrapers

`OST` Number of other small tools

Details

Binford (1972) presents the percentages for 12 tool types at 32 assemblages from 7 sites (including Olorgesailie) which was based on Maxine Kleindienst's analysis of Lower Paleolithic Acheulean sites in Africa (1961 and 1962). The data were also analyzed by Glynn Isaac (1977). To create the Acheulean data set, the percentages in the original publication have been converted back to counts by dividing by 100 and multiplying by the number of tools. The assemblages from each site are summed. The largest assemblage is Kalambo Falls with 1349 artifacts and the smallest is Broken Hill (Kabwe) with 94. The `rownames` identify each site and an attribute named `Variables` provides variable labels for each column.

Source

Binford, L. R. 1972. Contemporary Model Building: Paradigms and the Current State of Paleolithic Research. In *Models in Archaeology*, edited by D. L. Clarke, pp 109–166. Methuen.

References

Carlson, David L. 2017. *Quantitative Methods in Archaeology Using R*. Cambridge University Press, pp 304-314.

Isaac, Glynn Ll. 1977. *Olorgesailie: Archeological Studies of a Middle Pleistocene Lake Basin in Kenya*. University of Chicago.

Kleindienst, Maxine R. 1961. Variability within the Late Acheulian assemblage in East Africa. *South African Archaeological Bulletin* 16: 35–52.

Kleindienst, Maxine R. 1962. Components of the East African Acheulian assemblage: an analytic approach. In *Actes du IVe Congrès Panafricain de Préhistoire et de l'Étude du Quaternaire*, ed. C. Mortelmans and J. Nenquin, pp 81-105.

Examples

```
data(Acheulean)
# Compute percentages for each assemblage
Acheulean.pct <- prop.table(as.matrix(Acheulean[,3:14]), 1)*100
round(Acheulean.pct, 2)
plot(OST~HA, Acheulean.pct)
boxplot(Acheulean.pct)
```

Arnhofen *Point pattern of mining pits from the Neolithic chert mine at Arnhofen*

Description

The list object contains two data tables of coordinates, one representing the centers of round mining pits, the other holding the vertices of the observed polygonal area. Data was generated by G. Roth in 2006 (Roth 2008). Spatial distance unit is meter. For converting the data to a point pattern see **Examples**.

Usage

```
data(Arnhofen)
```

Format

A list with two entries. The first is a data frame, `points`, with 216 observations of `x` and `y` coordinates. Each line represents the center of a round mining pit. The second is a data frame, `window`, with 100 observations and 3 variables, `x`, `y`, and vertex `ID`. Each line represents a vertex of the polygonal observation area.

`points$x` (num) x coordinates of pit centers in m

`points$y` (num) y coordinates of pit centers in m

`window$x` (num) x coordinates of observation window vertices in m

`window$y` (num) y coordinates of observation window vertices in m

`window$id` (num) id for observation window vertices

Details

The coordinates in dataframe `points` represent the centres of 216 mining pits in the southeastern section of the 2001 excavation at the Neolithic chert mine of Abensberg-Arnhofen (Roth 2008). Direct dates for mining from the excavation place the site at 5300-4200 BC while use of mined material ends with the Bell Beaker Culture suggesting an end date for the mine of ca. 2200 BC. The regular pit pattern presented here dates to about 4200 BC, i.e. to the Münchshöfen Culture (4500-4000 BC). Arnhofen is the largest neolithic mine in Germany. The mining organization was analyzed by Roth (2008) using point pattern analysis (cf. Baddeley et al. 2016) which showed the neolithic mining to be conducted by farmers from surrounding villages (presumably on a seasonal basis).

The pit centers were located manually in a GIS using excavation maps from between 3 to 4 m below present surface. Mining pits were similar to vertical tubes with an average diameter of 1 m and a rounded horizontal section. A point therefore represents the center of such a vertical tube in the horizontal plane. A few of the pits reached a depth of nearly 8 m below surface. The vertices of the observation area polygon circumscribe a slightly smaller region than the excavated area. The list contains the additional attributes: reference for the data, short data description (site) and geographical coordinates (Lat/Lon) of the excavation.

Source

Roth, G. 2008. *Geben und Nehmen, Eine Wirtschaftshistorische Studie zum Neolithischen Hornsteinbergbau von Abensberg-Arnhofen, Kr. Kelheim (Niederbayern)* [in 4 volumes]. online PhD-thesis, University of Cologne 2008. http://kups.ub.uni-koeln.de/4176.

References

Baddeley, A., E. Rubak and R. Turner. 2016. *Spatial Point Patterns: Methodology and Applications with R*. CRC Press. Boca Raton.

Examples

```
# data and package spatstat by A. Baddeley et al. 2016 for point pattern analysis
# package spatstat is described and illustrated in Baddeley et al. (2016)
if (requireNamespace("spatstat", quietly = TRUE)) {
library(spatstat)
data(Arnhofen)
ap <- Arnhofen       # to shorten the following code

# generate observation window object; note the polygonal outline.
arnwin <- owin(poly=ap$window[, 1:2])

# generate point process pattern object from points and owin object
app <- ppp(ap$points$x, ap$points$y, arnwin)
unitname(app) <- c("metre", "metres")   # optional, asign unitnames

# note that owin vertices traverse the polygon anticlockwise
plot(arnwin)
points(ap$window[, 1:2], pch=3, cex=.5)
text(ap$window[, 1], ap$window[, 2], ap$window[, 3], pos=3, cex=.7)

# visual inspection of the point process pattern
plot(app)

# Computing the summary function "centered Besag's L" assuming
# homogeneous intensity. Centered Besag's L is just a conveniently
# transformed Ripley's K. see references in ?Lest.

set.seed(1)
Lcentrd <- envelope(app, Lest, nsim=49, nrank=1, global=TRUE, r=seq(0,7, 0.01),
     correction="translate", transform=expression(.-r))
# for the arguments see ?Kest and ?envelope.
```

```
tm <- "Centered Besags's L for Arnhofen-Southeast"  # title

plot(Lcentrd, legendpos="bottomright", legendargs=list(bg="white"),
     main=tm, las=1)

# The deviations below envelopes suggest regular inter point distances
# at the 1 percent level - deviations above would have suggested clustering
# with r representing the radius of round clusters.

plot(Lcentrd, xlim=c(.5,2), legendpos="topright", legendargs=list(bg="white"),
     las=1, main=tm)
(inhibr <- Lcentrd$r[Lcentrd$obs<Lcentrd$lo])

# significant inhibition between pits with an average diameter of 1 m pits
# were spaced at regular distances up to about 0.7 m apart:

max(inhibr) - 1

citation("spatstat") # don't forget to reference the method.
} else {
  cat("This example requires package spatstat.\n")
}
```

BACups *Bronze Age Cups from Italy*

Description

Measurements on Early and Late Bronze Age ceramic cups from Italy analyzed by Lukesh and Howe (1978).

Usage

```
data("BACups")
```

Format

A data frame with 60 observations on the following 6 variables.

`RD` Rim Diameter

`ND` Neck Diameter

`SD` Shoulder Diameter

`H` Total Height

`NH` Neck Height

`Phase` Chronological Phase: Protoapennine, Subapennine

Details

These data on the dimensions of Bronze Age cups from Italy are a subset extracted from a set published by Lukesh and Howe (1978) of the specimens for which full data was available. The data were scanned from Table A4 (Appendix A) in Baxter (1994). The Protoapennine cups are Early Bronze Age while the Subapennine cups are Late Bronze Age.

Source

Baxter, M. J. 1994. *Exploratory Multivariate Analysis in Archaeology*. Edinburgh University Press. Edinburgh.

Lukesh S. S. and S. Howe 1978. Protoapennine vs. Subapennine: Mathematical Distinction Between Two Ceramic Phases. *Journal of Field Archaeology* 5: 339-47.

Examples

```
data(BACups)
by(BACups[, -6], BACups$Phase, summary)
plot(RD~H, BACups, pch=as.numeric(Phase))
legend("topleft", levels(BACups$Phase), pch=1:2)
```

BarmoseI.grid *Flakes per grid unit from Barmose I, South Zealand, Denmark*

Description

Flake counts for each of 107 contiguous grid units at the Barmose I Maglemosian site used by Blankholm (1991) to illustrate several spatial analysis methods.

Usage

```
data(BarmoseI.grid)
```

Format

A data frame with 107 observations on the following 3 variables.

`North` North coordinate of southwest corner of unit

`East` East coordinate of southwest corner of unit

`Debitage` Number of flakes

Details

Barmose I is an early Maglemosian (7500 - 6000 BCE) site located in Barmosen in South Zealand, Denmark. The site was excavated in 1967-1971 by Axel Johansson (Johansson 1971 and 1990). Flake counts and grid coordinates were taken from Figure 100 in Blankholm (1991) for `BarmoseI.grid`. `BarmoseI.pp` includes the locations of 473 artifacts from Appendix C of Blankholm's book.

Source

Blankholm, Hans Peter. 1991. *Intrasite Spatial Analysis in Theory and Practice*. Aarhus University Press.

References

Carlson, David L. 2017. *Quantitative Methods in Archaeology Using R*. Cambridge University Press, pp 358-367.

Johansson, Axel. 1971. Barmosegruppen. Præboreale Bopladsfund me Skiveøkser i Sydsjælland. Foreløbig Meddelelse. *Historisk Samfund for Præstø Amt*. Årbog 1968, pp. 101-170.

Johansson, Axel. 1990. *Barmosegruppen. Præboreale Bopladsfund i Sydsjælland*. Årbog. Aarhus University Press.

Examples

```
data(BarmoseI.grid)
plot(North~East, BarmoseI.grid, xlim=c(0, 12), ylim=c(0, 14), type="n", asp=1)
with(BarmoseI.grid, text(East+.5, North+.5, Debitage, cex=.8))
```

BarmoseI.pp *Piece plotted artifacts from Barmose I, South Zealand, Denmark*

Description

Two dimensional locations of 473 artifacts at the Barmose I Maglemosian site used by Blankholm (1991) to illustrate several spatial analysis methods.

Usage

```
data(BarmoseI.pp)
```

Format

A data frame with 473 observations on the following 4 variables.

`North` North coordinate

`East` East coordinate

`Class` Numeric code used by Blankholm: `1`, `2`, `3`, `4`, `5`, `6`, `7`, `8`, `9`, `10`, `11`

`Label` Artifact type: `Scrapers`, `Burins`, `Lanceolate Microliths`, `Microburins`, `Flake Axes`, `Core Axes`, `Square Knives`, `Blade/Flake Knives`, `Denticulated/Notched Pieces`, `Cores`, `Core Platforms`

Details

Barmose I is an early Maglemosian (7500 - 6000 BCE) site located in Barmosen in South Zealand, Denmark. The site was excavated in 1967-1971 by Axel Johansson (Johansson 1971 and 1990). Flake counts and grid coordinates were taken from Figure 100 in Blankholm (1991) for `BarmoseI.grid`. `BarmoseI.pp` includes the locations of 473 artifacts from Appendix C of Blankholm's book (1991).

Source

Blankholm, Hans Peter. 1991. *Intrasite Spatial Analysis in Theory and Practice*. Aarhus University Press.

References

Carlson, David L. 2017. *Quantitative Methods in Archaeology Using R*. Cambridge University Press, pp 367-377.

Johansson, Axel. 1971. Barmosegruppen. Præboreale Bopladsfund me Skiveøkser i Sydsjælland. Foreløbig Meddelelse. *Historisk Samfund for Præstø Amt*. Årbog 1968, pp. 101–170.

Johansson, Axel. 1990. *Barmosegruppen. Præboreale Bopladsfund i Sydsjælland*. Årbog. Aarhus University Press.

Examples

```
data(BarmoseI.pp)
plot(North~East, BarmoseI.pp, asp=1, pch=as.numeric(Class))
legend("bottomleft", levels(BarmoseI.pp$Label), pch=1:11, cex=.75)
```

Bornholm *Female Iron Age Graves, Bornholm, Denmark*

Description

Data on the occurrence of 39 different types of ornamentation in 77 female graves at Iron age sites in in Bornholm, Denmark.

Usage

```
data("Bornholm")
```

Format

A data frame with 77 observations on the following 42 variables.

`Number` Observation Number

`Site` Site/Bural Number

`Period` Chronological period: `1a`, `1b`, `2a`, `2b`, `2c`, `3a`, and `3b`

`N2c` count

`R3d` count

`N2a` count

`Q3b` count

`R3c` count

`N1` count

Q3c count
O1 count
O2 count
N2e count
I3 count
R3b count
K1a count
Q3a count
I2 count
K1c count
K1b count
H count
Q3d count
J1d count
S1 count
D count
Q2 count
S3 count
P2 count
P4 count
G3 count
E2a count
P3 count
R3a count
R1 count
E2b count
G2 count
I1b count
G1 count
F count
P1 count
I1a count
A2e count

Details

Nielsen used data on 39 different types of ornaments from Ørsnes (1966) to seriate a series of 77 Late Germanic Iron Age (CE 550 - 800) graves from Bornholm, Denmark (1988, Table 4 and Figure 7). Baxter re-analyzed the data to illustrate correspondence analysis (1994: 104-107, Table A6). These data were taken from Nielsen's Table 4 showing her seriation. Baxter's version is scrambled in order to evaluate different seriation methods and does not include the ornament types (illustrated in Nielson's Figure 7). The data include Ørsnes's period and subperiod designations (1966).

Source

Baxter, M. J. 1994. *Exploratory Multivariate Analysis in Archaeology*. Edinburgh University Press. Edinburgh.

Nielsen, K. H. 1988. Correspondence Analysis Applied to Hords and Graves of the Germanic Iron Age. In *Multivariate Archaeology: Numerical Approaches in Scandinavian Archaeology*, edited by Torsten Madsen, pp 37-54. Jutland Archaeological Society Publications XXI. Arahus University Press.

Ørsnes, M. 1966. *Form og stil i Sydskandinaviens yngre germanske jernalder*. Nationalmuseets skrifter. Arkæologisk-historisk række 11. Copenhagen.

Examples

```
if (requireNamespace("MASS", quietly = TRUE)) {
  data(Bornholm)
  Bornholm.ca <- MASS::corresp(Bornholm[, 4:42], nf=2)
  plot(Bornholm.ca$rscore, pch=substring(Bornholm$Period, 1, 1), cex=.75)
  boxplot(Bornholm.ca$rscore[, 1]~Bornholm$Period, main="First CA Axis by Period")
} else {
  cat("This example requires the MASS package.\n")
}
```

DartPoints *Five dart point types from Fort Hood, Texas, U.S.A.*

Description

Metric and categorical measurements on 91 Archaic dart points recovered during surface surveys at Fort Hood, Texas representing five types.

Usage

```
data(DartPoints)
```

Format

A data frame with 91 observations on the following 17 variables.

`Name` Dart point type: `Darl`, `Ensor`, `Pedernales`, `Travis`, `Wells`

`Catalog` Fort Hood catalog number

`TARL` Texas Archeological Research Laboratory site number

`Quad` Fort Hood Quad

`Length` Maximum Length (mm)

`Width` Maximum Width (mm)

`Thickness` Maxmimum Thickness (mm)

`B.Width` Basal width (mm)

`J.Width` Juncture width (mm)

`H.Length` Haft element length (mm)

`Weight` Weight (gm)

`Blade.Sh` Blade shape: `E` -Excurvate, `I` -Incurvate, `R` -Recurvate, `S` -Straight

`Base.Sh` Base shape: `E` -Excurvate, `I` -Incurvate, `R` -Recurvate, `S` -Straight

`Should.Sh` Shoulder shape: `E` -Excurvate, `I` -Incurvate, `S` -Straight, `X` -None

`Should.Or` Shoulder orientation: `B` -Barbed, `H` -Horizontal, `T` -Tapered, `X` -None

`Haft.Sh` Shape lateral haft element `A` -Angular, `E` -Excurvate, `I` -Incurvate, `R` -Recurvate, `S` -Straight

`Haft.Or` Orientation lateral haft element: `C` -Concave, `E` -Expanding, `P` -Parallel, `T` -Contracting, `V` -Convex

Details

Measurements on five types of dart points from Fort Hood in central Texas (Darl, Ensor, Pedernales, Travis, and Wells). The points were recovered during 10 different pedestrian survey projects during the 1980's and were classified and measured by H. Blaine Ensor using the system created by Futato (1983) as described in Carlson, S., et al 1987, pp 51-70 and Appendices 4 and 7.

Source

Fort Hood Projectile Points. Electronic database compiling the results of multiple surface surveys at Fort Hood in the possession of David L. Carlson, Department of Anthropology, Texas A&M University, College Station, TX. The artifacts are curated at Fort Hood, TX by the Cultural Resources Branch of the Directorate of Public Works.

References

Carlson, David L. 2017. *Quantitative Methods in Archaeology Using R*. Cambridge University Press, pp 52-60, 99-103, 106-107, 109-115, 148-157, 182-185, 198-211.

Carlson, S. B., H. B. Ensor, D. L. Carlson, E. A. Miller, and D E. Young. 1987. Archaeological Survey at Fort Hood, Texas Fiscal Year 1984. *United States Army Fort Hood. Archaeological Resource Management Series, Research Report Number 14*.

Futato, E. M. 1983. Projectile Point Morphology: Steps Toward a Formal Account. in Proceedings of the Thirty-fourth Southeastern Archaeological Conference, Lafayette, Louisiana, October 27-19, 1977. *Southeastern Archaeological Conference. Bulletin* 21: 38–81.

Examples

```
data(DartPoints)
boxplot(Length~Name, DartPoints)
plot(Width~Length, DartPoints, pch=as.numeric(Name), main="FOrt Hood Dart Points")
legend("topleft", levels(DartPoints$Name), pch=1:5)
```

EIAGraves *Early Iron Age Graves - Tell el-Far'ah, Palestine*

Description

Counts of 52 different ceramic types in 6 large tombs and 10 broadly contemporaneous groups of tombs.

Usage

```
data("EIAGraves")
```

Format

A data frame with 52 rows (ceramic types) found in 16 units (a grave or a group of graves).

`Type` Ceramic type number

`G100` 19 broadly contemporaneous graves and tombs

`G200B` 30 broadly contemporaneous graves and tombs

`G200C` 28 broadly contemporaneous graves and tombs

`G201` An indidivual tomb

`G229` An indidivual tomb

`G500N` 19 broadly contemporaneous graves and tombs

`G532` An indidivual tomb

`G542` An indidivual tomb

`G552` An indidivual tomb

`G562` An indidivual tomb

`G600` 52 broadly contemporaneous graves and tombs

`G800` 39 broadly contemporaneous graves and tombs

`G900B` 41 broadly contemporaneous graves and tombs

`G900L` 3 broadly contemporaneous graves and tombs

`G900S` 5 broadly contemporaneous graves and tombs

`G900U` 7 broadly contemporaneous graves and tombs

Details

The data on counts of 52 different ceramic types in 6 large tombs and 10 broadly contemporaneous groups of tombs come from Tell el-Far'ah (South), Palestine. They were originally published in McClellan (1979). The data were scanned from Table 2.5 in Baxter (2003, p. 25-6). The 52 rows correspond to different pottery types found in association with the burials.

Source

Baxter, M. J. 2003. *Statistics in Archaeology*. Arnold, London.

McClellan, T. L. 1979. Chronology of the 'Philistine' Burials at Tell el-Farah (South). *Journal of Field Archaeology* 6: 57-73.

Examples

```
data(EIAGraves)
# How many ceramics of each type?
# Exclude the first column which is the ceramic type number
rowSums(EIAGraves[, -1])
# How many tomb groups contain each type?
rowSums(EIAGraves[, -1]>0)
# How many ceramics in each tomb group?
colSums(EIAGraves[, -1])
# How many types are found in each tomb group?
colSums(EIAGraves[, -1]>0)
```

EndScrapers *Upper Paleolithic End Scrapers from Castenet A and Ferrassie H, France*

Description

Data on 3000 Upper Paleolithic end scrapers from two sites analyzed by James Sackett (1966) and reanalyzed by Dwight Read (1974 and 2007).

Usage

```
data(EndScrapers)
```

Format

A data frame with 48 observations on the following 6 variables.

`Width` Width: `Narrow`, `Wide`

`Sides` Sides: `Convergent`, `Parallel`

`Curvature` End Curvature: `Round`, `Medium`, `Shallow`

`Retouched` Retouching: `Retouched`, `Unretouched`

`Site` Site: `Castenet A`, `Ferrassie H`

`Freq` Number of end scrapers

Details

The scrapers are grouped on 5 categorical variables into 48 groups. Sackett's analysis employed Chi square and the examination of residuals. Read used the data to illustrate loglinear modelling (1974, 2007). The data come from Tables IV and VIII (pp 373 and 380) in Sackett's original article

Source

Sackett, James R. 1966. Quantitative Analysis of Upper Paleolithic Stone Tools. *American Anthropologist* 68(2): 356–394.

References

Carlson, David L. 2017. *Quantitative Methods in Archaeology Using R*. Cambridge University Press, pp 72-77, 91-94.

Read, Dwight W. 1974. Some Comments on Typologies in Archaeology and an Outline of a Methodology. *American Antiquity* 39: 216-242.

Read, Dwight W. 2007. *Artifact Classification: A Conceptual and Methodological Approach*. Left Coast Press.

Examples

```
data(EndScrapers)
xtabs(Freq~Site+Curvature, EndScrapers)
xtabs(Freq~Curvature+Sides+Site, EndScrapers)
```

EngrBone *Upper Paleolithic Engraved Bone Design Elements - Spain*

Description

Counts of 44 engraved bone design elements at five Upper Paleolithic hunter-gatherer sites in Cantabrian, Spain.

Usage

```
data("EngrBone")
```

Format

A data frame with 44 types of engraved bone found at 5 sites.

`A` Altamira

`CM` Cueto de la Mina

`EJ` El Juyo

`EC` El Cierro

`LP` La Paloma

Details

Counts of 44 engraved bone design elements at five prehistoric hunter-gatherer sites in Cantabrian, Spain. The data were originally analyzed by Conkey (1980) and appear in this format in Kaufman (1998). Kintigh (1984) used these data to illustrate a method for comparing the diversity between samples. The data were scanned from Table 2.4 in Baxter (2003, p. 24).

Source

Baxter, M. J. 2003. *Statistics in Archaeology*. Arnold, London.

References

Conkey, M. W. 1980. The Identification of Prehistoric Hunter-Gatherer Aggregation Sites: The Case of Altamira. *Current Anthropology* 21: 609-30.

Kaufman, D. 1998. Measuring Archaeological Diversity: An Application of the Jackknife Technique. *American Antiquity* 63: 73-85.

Kintigh, K. 1984. Measuring Archaeological Diversity by Comparison with Simulated Assemblages. *American Antiquity* 49: 44-54.

Examples

```
data(EngrBone)
# Number of engraved bone specimens at each site
NS <- colSums(EngrBone)
# Number of kinds of engraved bone at each site
NT <- colSums(EngrBone>0)
plot(NS, NT, xlab="Number of Specimens", ylab="Number of Types", main="Engraved Bone", las=1)
text(NS, NT, names(EngrBone), pos=c(1, 3, 3, 3, 3))
Key <- apply(attr(EngrBone, "Variables"), 1, paste, collapse=" - ")
legend("topleft", legend=Key)
```

ESASites *Early Stone Age Sites - Norway*

Description

Data on 43 Early Stone Age assemblages in Norway come originally from Bølviken et al (1982).

Usage

```
data("ESASites")
```

Format

A data frame with 43 observations on the following 16 variables.

`TA` Tanged Arrows

`BA` Blade Arrows

`TOA` Transverse and Oblique Arrows

`AA` Atypical Arrows

`M` Microliths

`FK` Flake Knives

`BK` Blade Knives

NK Notched Knives

CFS Core and Flake Scrapers

BS Blade Scrapers

DS Disc Scrapers

Bu Burins

Ax Axes

Ch Chisels

SAx Slate Axes

Pf Perforators

Details

Data on 43 Early Stone Age (8000 - 4000 BCE) assemblages in Norway come originally from Bølviken et al (1982). The data were scanned from Table A5 (Appendix A) in Baxter (1994).

Source

Baxter, M. J. 1994. *Exploratory Multivariate Analysis in Archaeology*. Edinburgh University Press. Edinburgh.

Bølviken, E., E. Helskog, K. Helskog, I. M. Holm-Olsen, L. Solheim, and R. Bertelsen. 1982. Correspondence Analysis: An Alternative to Principal Components. *World Archaeology* 14: 41-60.

References

Carlson, David L. 2017. *Quantitative Methods in Archaeology Using R*. Cambridge University Press, pp 398-410.

Examples

```
data(ESASites)
NS <- rowSums(ESASites)
NT <- rowSums(ESASites > 0)
plot(NS, NT, xlab="Number of Artifacts", ylab="Number of Types", main="Early Stone Age Sites",
    las=1)
```

EWBurials *Ernest Witte Cemetery, Austin, County, Texas, U.S.A.*

Description

Sex, age, burial group, location, and burial orientation and direction facing from the Ernest Witte site, a Late Archaic cemetery in Texas (Hall 1981).

Usage

```
data(EWBurials)
```

Format

A data frame with 49 observations on the following 7 variables.

`Group` Cemetery group, a factor with levels `1`, `2`

`North` North grid location of the burial in meters (excavation grid system)

`West` East grid location of the burial in meters (excavation grid system)

`Age` Age category, a factor with levels `Fetus`, `Infant`, `Child`, `Adolescent`, `Young Adult`, `Adult`, `Middle Adult`, `Old Adult`

`Sex` a factor with levels `Female`, `Male`

`Direction` circular data in degrees indicating the direction of the individual measured from the head along the vertebral column

`Looking` circular data in degrees indication the direction the individual is facing

`Goods` Presence or absence of grave goods

Details

The Ernest Witte site in Austin County, Texas contains four burial groups from different time periods. Group 1 includes 60 interments and that occurred between about 2000 and 1200 BCE. Group 2 is the largest with 148 interments. The burials in this group were interred between about CE 200 and 500. Groups 3 and 4 include only 10 and 13 interments and date to CE 500 to 1500, but are not included in this data set which was taken from Appendix II (Hall 1981). Two of the variables, `direction` and `looking`, are circular data and require package `circular`. Hall (2010) provides a summary of the site and its significance.

Source

Hall, G. D. 1981. Allen's Creek: A Study in the Cultural Prehistory of the Lower Brazos River Valley. *The University of Texas at Austin. Texas Archeological Survey. Texas. Research Report No.* 61.

References

Carlson, David L. 2017. *Quantitative Methods in Archaeology Using R*. Cambridge University Press, pp 350-357.

Hall, G. D. 2010. Ernest Witte site. *Handbook of Texas Online* https://www.tshaonline.org/handbook/entries/ernest-witte-site. Texas State Historical Association.

Examples

```
data(EWBurials)
xtabs(~Age+Sex+Group, EWBurials)

if (requireNamespace("circular", quietly = TRUE)) {
  plot(EWBurials$Direction)
} else {
  cat("This example requires package circular.\n")
}
```

`Fibulae` *Bronze La Tene fibulae from Munsingen, Switzerland*

Description

The La Tène fibulae from the Iron Age cemetery of Münsingen near Berne, Switzerland (100 - 500 BCE) described by F. R. Hodson (1968).

Usage

```
data("Fibulae")
```

Format

A data frame with 30 observations on the following 16 variables.

`Grave` Grave number

`Mno` Museum number

`FL` Foot Length

`BH` Bow Height

`BFA` Bow Front Angle

`FA` Foot Angle

`CD` Coil Diameter

`BRA` Bow Rear Angle

`ED` Element Diameter

`FEL` Foot Extension Length

`C` Catchplate

`BW` Bow Width

`BT` Bow Thickness

`FEW` Foot Extension Width

`Coils` Number of Coils

`Length` Total Length

Details

The La Tène fibulae from the Iron Age cemetery of Münsingen near Berne, Switzerland were reported by F. R. Hodson (1968). They were featured in several papers by Hodson over the years and used to illustrate a variety of multivariate statistical techniques. The data here were taken from Doran and Hodson (1975), Table 9.1. These are the raw measurements including 5 missing values in foot extension thickness and 1 in foot extension length.

Source

Doran, J. E. and F. R. Hodson. 1975. *Mathematics and Computers in Archaeology*. Harvard University Press, Cambridge, Massachusetts.

Hodson, F. R. 1968. *The La Tène Cemetery at Műnsingen-Rain*. Stampfli, Berne.

References

Carlson, David L. 2017. *Quantitative Methods in Archaeology Using R*. Cambridge University Press, pp 88-91, 95-99, 103-109, 127-129, 132-138, 162-169.

Hodson, F. R., P. H. A. Sneath, J. E. Doran. 1966. Some Experiments in the Numerical Analysis of Archaeological Data. *Biometrika* 53: 311-324.

Hodson, F. R. 1969. Searching for Structure within Multivariate Archaeological Data. *World Archaeology* 1: 90-105.

Hodson, F. R. 1970. Cluster Analysis and Archaeology: some New Developments and Applications. *World Archaeology* 1: 299-320.

Hodson, F. R. 1971. Numerical Typology and Prehistoric Archaeology. In *Mathematics int eh Archaeological and Historical Sciences*, edited by F. R. Hodson, D. G. Kendall and P. Tautu, pp 30-45. Edinburgh University Press, Edinburgh.

Sneath, P. H. A. 1968. Goodness of Intuitive Arrangements into Time Trends Based on Complex Pattern. *Systematic Zoology* 17: 256-260.

Examples

```
data(Fibulae)
t(sapply(Fibulae[, 3:16], quantile, na.rm=TRUE))
plot(density(Fibulae$Length, bw="SJ"), main="Kernel Density Plot of Length")
```

Handaxes — *Lower Paleolithic handaxes from Furze Platt, Maidenhead, Berkshire, England*

Description

Handaxes from the Furze Platt site stored at the Royal Ontario Museum.

Usage

```
data(Handaxes)
```

Format

A data frame with 600 observations on the following 8 variables.

`Catalog` Specimen catalog number

`L` Maximum Length

L1 Distance from the butt to the location of the maximum breadth measured along the length dimension

B Maximum breadth

B1 Breadth measured at 1/5 of the length from the tip. Measured perpendicular to the length

B2 Breadth measured at 1/5 of the length from the butt. Measured perpendicular to the length

T Maximum thickness, not necessarily measured at the maximum breadth

T1 Thickness measured at B1

Details

The data consist of measurements on 600 handaxes from the Furze Platt site stored at the Royal Ontario Museum that were measured by William Fox. The measurements follow the system used by Derek Roe (Roe 1964, 1968, 1981). Fox's measurements were digitized by Tony Baker and uploaded to his website.

Source

Fox, William and Tony Baker. 2006. Dimensions of 600 Acheulean Handaxes from Furze Platt, Maidenhead, Berkshire, England. Archived at https://web.archive.org/web/20080515113522/http://www.ele.net/acheulean/FPatROM.htm. 11 Accessed January 2021.

References

Baker, Tony. 2006. The Acheulean Handaxe. Archived article available at https://web.archive.org/web/20080831233847/http://www.ele.net:80/acheulean/handaxe.htm. Accessed 11 January 2021.

Carlson, David L. 2017. *Quantitative Methods in Archaeology Using R*. Cambridge University Press, pp 221-231, 269-277, 321-330.

Fox, William. 1969. An Analysis of the R. O. M. Collection, Lower Paleolithic Implements: Furze Platt, Maidenhead, Berkshire, England. Unpublished paper and notes in the possession of the author.

Roe, D. A. 1964. The British Lower and Middle Paleolithic: some problems, methods of study and preliminary results. *Proceedings of the Prehistoric Society* 30: 245–267.

Roe, D. A. 1968. British Lower and Middle Paleolithic Handaxe groups. *Proceedings of the Prehistoric Society* 34: 1–82.

Roe, D. A. 1981. *The Lower and Middle Paleolithic Periods in Britain*. Routledge.

Examples

```
data(Handaxes)
summary(Handaxes)
```

MaskSite *Mask Site, Alaska, USA*

Description

The distribution of five categories of artifacts at the Mask site, occupied by the Nunamiut (Binford 1978a).

Usage

```
data("MaskSite")
```

Format

A data frame with 494 observations on the following 3 variables.

`X` horizontal coordinate

`Y` vertical coordinate

`Category` a factor with levels `Artifacts`, `Spent Cartridges`, `Wood Shavings`, `Bone Splinters`, and `Large Bones`

Details

The Mask Site was reported by Binford (1978a) as an example of a hunting stand where Nunamiut men watched for game as part of a larger ethnoarchaeological study of the Nunamiut (Binford 1978b). The data from the site have been widely used to illustrate the utility of various methods of intra site spatial analysis (including Baxter 2003, Blankholm 1991, Kintigh 1990, and Whallon 1984). The data consist of 494 locations of five different classes (artifacts, spent cartridges, wood shavings, bone splinters, and large bones). The data were scanned from Appendix A (Blankholm 1991).

Source

Binford, L. R. 1978a. Dimensional Analysis of Behavior and Site Structure: Learning from an Eskimo Hunting Stand. *American Antiquity* 43: 330 - 361.

Blankholm, Hans Peter. 1991. *Intrasite Spatial Analysis in Theory and Practice*. Aarhus University Press.

References

Baxter, M. 2003. *Statistics in Archaeology*. Arnold Applications in Statistics.

Binford, L. R. 1978b. Nunamiut Ethnoarchaeology. Academic Press.

Kintigh, K. 1990. Intrasite Spatial Analysis: A Commentary on Major Methods. In *Mathematics and Information Science in Archaeology: A Flexible Framework*, edited by A. Voorrips, pp 165-200. Studies in Modern Archaeology 3. Holos.

Whallon, R. 1984. Unconstrained Clustering for the Analysis of Spatial Distributions in Archaeology. In *Intrasite Spatial Analysis in Archaeology*, edited by H. Hietala, pp 242 - 277. Cambridge University Press.

Examples

```
data(MaskSite)
plot(Y~X, MaskSite, main="Mask Site", asp=1, pch=as.numeric(Category), cex=.75)
legend("bottomright", levels(MaskSite$Category), pch=1:5)
```

`Mesolithic` *British Mesolithic assemblages*

Description

Counts of 5 different stone artifact types from 33 Mesolithic sites in Britain.

Usage

```
data("Mesolithic")
```

Format

A data frame with 33 observations on the following 5 variables.

`Microliths` Number of microliths

`Scrapers` Number of scrapers

`Burins` Number of burins

`Axes` Number of axes

`Saws` Number of saws

Details

Data on 33 Mesolithic (9000 - 4000 BCE) assemblages are a subset Pitts (1979) extracted from a set published by Mellars (1976). The data were scanned from Table A3 (Appendix A) in Baxter (1994).

Source

Baxter, M. J. 1994. *Exploratory Multivariate Analysis in Archaeology*. Edinburgh University Press. Edinburgh.

Mellars, P. 1976. Settlement Patterns and Industrial Variability in the British Mesolithic. In *Problems in Economic and Social Archaeology*, edited by Sieveking, G de G., I. H. Longworth, and K. E. Wilson, pp 375-99. Duckworth, London.

Pitts, M. W. 1979. Hides and Antlers: A New Look at the Gatherer-Hunter Site at Star Carr, North Yorkshire, England. *World Archaeology* 11: 32-44.

Examples

```
data(Mesolithic)
Mesolithic.pct <- prop.table(as.matrix(Mesolithic), 1)*100
apply(Mesolithic.pct, 2, quantile)
cor(Mesolithic.pct)
```

Michelsberg *Younger Neolithic Pottery from Central Europe*

Description

A sites by types table of abundance data on vessel types in archaeological features of the Younger Neolithic Michelsberg Culture from Belgium, France and Germany by Birgit Höhn (2002).

Usage

```
data(Michelsberg)
```

Format

A data frame with 109 observations on the following 42 variables. Each line represents one feature. Some categorical variables are not converted to factors.

`id` Unique identifier (categorical, integer)

`site_name` Name of site (categorical, character)

`catalogue_nr` Number in catalogue of Höhn (2002) (categorical, integer)

`feature_nr` Number of the archaeological feature (categorical, numeric)

`to3` Pot/vessel type 3 count

`f4` Bottle type 4 count

`b2` Beaker type 2 count

`to2` Pot/vessel type 2 count

`b3` Beaker type 3 count

`b7` Beaker type 7 count

`kw5` Carinated bowl type 5 count

`vg1` Storage vessel type 1 count

`vg2` Storage vessel type 2 count

`t4a` Tulip beaker type 4a count

`kw2` Carinated bowl type 2 count

`kw4` Carinated bowl type 4 count

`b5` Beaker type 5 count

`t3b` Tulip beaker type 3b count

`f3` Bottle type 3 count

`kw3` Carinated bowl type 3 count

`kw1` Carinated bowl type 1 count

`b6` Beaker type 6 count

`to1` Pot/vessel type 1 count

`b1` Beaker type 1 count

`t3a` Tulip beaker type 3a count

`vg4` Storage vessel type 4 count

`ks2` Conical bowl type 2 count

`ks1` Conical bowl type 1 count

`t2b` Tulip beaker type 2b count

`f2` Bottle type 2 count

`bs3` Globular bowl type 3 count

`t2a` Tulip beaker type 2a count

`bs2` Globular bowl type 2 count

`b4` Beaker type 4 count

`bs1` Globular bowl type 1 count

`f1` Bottle type 1 count

`t1b` Tulip beaker type 1b count

`vg3` Storage vessel type 3 count

`t1a` Tulip beaker type 1a count

`mbk_phase` MBK phase according to Lüning (1967) as an ordered factor with levels `I` < `I/II` < `II` < `II/III` < `III` < `III-V` < `III/IV` < `IV` < `IV/V` < `Munz` < `V`

`x_utm32n` x coordinate in m; projection UTM WGS 84, zone 32 nord

`y_utm32n` y coordinate in m; projection UTM WGS 84, zone 32 nord

Details

Höhn (2002) recorded pottery vessel shapes from 108 archaeological features (pits, ditches etc.) from 69 sites of the Central European Younger Neolithic Michelsberg Culture (MBK; 4350-3500 BC) following Lüning's (1967) typology. Her correspondence analysis of the abundance data (columns 5 to 39) exhibits a pronounced Guttman effect or arch, suggesting the data set is structured by a time gradient. Recently Mischka et al. (2015) projected an 109th Michelsberg assemblage, Flintbek LA48, a pit with Michelsberg pottery from a North German site of the Funnel Beaker Culture (TRB), as a supplementary row into the existing chronology thereby connecting the relative chronologies of TRB and MBK. The data frame contains as attributes the references for the data, a typological key and the map projection. Note that ambiguous fragments of conical bowls (ks1 and ks2) are assigned as 0.5 to each of the two types resulting also in positive entries suitable to analysis by CA.

Source

Höhn, B. 2002. *Die Michelsberger Kultur in der Wetterau. Universitätsforschungen zur prähistorischen Archäologie 87*. Bonn: Habelt.

Mischka, D., Roth, G. and K. Struckmeyer 2015. Michelsberg and Oxie in contact next to the Baltic Sea. In: *Neolithic Diversities. Perspectives from a conference in Lund, Sweden. Acta Archaeologica Lundensia Ser. 8, No. 65*, edited by Kr. Brink et al., pp 241–250.

Lüning, J. 1967. Die Michelsberger Kultur: Ihre Funde in zeitlicher und räumlicher Gliederung. *Berichte der Römisch-Germanischen Kommission* 48, 1-350.

Examples

```
if (requireNamespace("ca", quietly = TRUE)) {
data(Michelsberg)
str(Michelsberg)
names(Michelsberg)[5:39]
attributes(Michelsberg)$typological_key

# geographical distribution
xy <- as.matrix(Michelsberg[,41:42])/1000
plot(xy, asp=1, pch=16, col=rgb(.3,.3,.3,.5))
text(xy[,1], xy[,2], Michelsberg$id, cex=.7, pos=2)
# Note site 109 to the Northeast;

# preparing the data set for CA
abu <- Michelsberg[, 5:39]
rownames(abu) <- Michelsberg$id

# CA with site 109, Flintbek LA48, as supplementary row
MBK.ca <- ca::ca(abu, ndim=min(dim(abu)-1), suprow=109 )

# asymmetric biplot with row quality and column contribution
plot(MBK.ca, map="rowprincipal", contrib=c("relative", "absolute"))

title(main="Row-isometric Biplot of Michelsberg CA", cex.sub=.7,
     sub="color intensity represents quality for sites and contributions for types")
} else {
  cat("This example requires package ca to run.\n")
}
```

Nelson *Prehistoric Ceramics at Pueblo San Cristobal, New Mexico, USA*

Description

Ceramic distribution in a midden deposit at Pueblo San Cristobal reported by Nels Nelson in 1916.

Usage

```
data(Nelson)
```

Format

A data frame with 10 observations on the following 8 variables.

`Depth` Depth in feet from 1 to 10 for 1 foot arbitrary excavation levels

`Corrugated` Number of corrugated ware ceramics

`Biscuit` Number of Biscuit ware ceramics

`Type_I` Number of two and three color painted ware ceramics

`Type_II_Red` Number of two color glazed red ware ceramics

`Type_II_Yellow` Number of two color glazed yellow ware ceramics

`Type_II_Gray` Number of two color glazed gray ware ceramics

`Type_III` Number of three color glazed ware ceramics

Details

Data from a midden deposit at San Cristobal in the American Southwest. It has been used as a classic illustration of the potential for creating a relative chronology using frequency seriation of ceramic artifact types. The site was occupied approximately from CE 1350 to 1680. Ceramic artifact fragment counts are presented for each 1-foot (30 cm) arbitrary level excavated in the midden deposit. When converted to percentages (usually excluding the corrugated ware), the data illustrate a classical "battleship curve" like those described in Ford (1962).

Source

Nelson, N. C. 1916. Chronology of the Tano Ruins, New Mexico. *American Anthropologist* 18(2): 159–180.

References

Carlson, David L. 2017. *Quantitative Methods in Archaeology Using R*. Cambridge University Press, pp 381-386, 390-393.

Ford, J. A. (1962) A Quantitative Method for Deriving Cultural Chronology. *Pan American Union, Technical Manual No* 1.

Examples

```
data(Nelson)
# Remove Depth and Corrugated and compute percentages
Nelson.pct <- prop.table(as.matrix(Nelson[,3:7]), 1)*100
# Percentages for each type by level
round(Nelson.pct, 2)

# Battleship plot from plotrix package
if (requireNamespace("plotrix", quietly = TRUE)) {
  plotrix::battleship.plot(Nelson.pct, col="gray")
} else {
  cat("This example requires package plotrix.\n")
}
```

`Olorgesailie.maj` *Major stone tool classes, Olorgesailie, Kenya*

Description

The data represent the number of specimens in each of 6 major artifact classes recovered from 19 localities at the Lower Paleolithic site of Olorgesailie as described in Isaac (1977).

Usage

```
data(Olorgesailie.maj)
```

Format

A data frame with 19 observations showing the number of specimens for each of 6 stone artifact types.

`Large.cutting.tools` Number of large cutting tools

`Heavy.duty.tools` Number of heavy duty tools

`Large.scrapers` Number of large scrapers

`Other.large.tools` Number of other large tools

`Small.tools` Number of small tools

`Spheroids` Number of spheroids

Details

The data come from Table E1 in Isaac (1977: 239). The `rownames` identify localities in the lower, middle and upper strata to provide relative chronological placement. They are in the same order as the columns in the table: LS1 (BBB), LS2 (BBA), LS3(FB), LS4(FB-HL), LS5(FB-I3), MS1a(DE/89 A-L), MS1b(DE/89 A-I), MS2a(DE/89 B-L), MS2b(DE/89 B-I), MS3(DE/89 C), MS4(H/6), MS5(H/9 A), MS6(H/9 AM), MS7(Mid), MS8(Meng), MS9(LHS), US1(TRTrM10), US2(Hog), US3(MFS). Potts (2011) provides updated information on the site complex.

Source

Isaac, Glynn Ll. 1977. *Olorgesailie: Archeological Studies of a Middle Pleistocene Lake Basin in Kenya*. The University of Chicago Press.

References

Carlson, David L. 2017. *Quantitative Methods in Archaeology Using R*. Cambridge University Press, pp 115-119, 138-142.

Potts, R. 2011. Olorgesailie–Retrospective and current synthesis. In *Casting the net wide: papers in honor of Glynn Isaac and his approach to human origins research*, edited by J. Sept and D. Pilbeam, pp 1–20. American School of Prehistoric Resarch Monographs in Archaeology and Paleoanthropology.

Examples

```
data(Olorgesailie.maj)
# Chi square after removing the first two columns and simulating the p
# value since there are a number of very small expected values
chisq.test(Olorgesailie.maj, simulate.p.value=TRUE)
# Compute percentages over the localities
Olor.pct <- prop.table(as.matrix(Olorgesailie.maj), 1)*100
boxplot(Olor.pct)
```

`Olorgesailie.sub` *Stone tool subclasses, Olorgesailie, Kenya*

Description

The data represent the number of specimens in each of 16 artifact subclasses recovered from 19 localities at the Lower Paleolithic site of Olorgesailie as described in Isaac (1977).

Usage

```
data(Olorgesailie.sub)
```

Format

A data frame with 19 observations showing the stratum, locality and the number of specimens for each of 16 stone artifact types.

`Strat` stratum: `Lower`, `Middle`, `Upper`

`Locality` Locality

`HA` Number of handaxes

`PHA` Number of pick-like handaxes

`CHA` Number of chisel handaxes

`CL` Number of cleavers

`KN` Number of knives

`BLCT` Number of broken large cutting tools

`PAT` Number of picks and trièdres

`CH` Number of choppers

`CS` Number of core scrapers

`LFS` Number of large flake scrapers

`CB` Number of core bifaces

`OLT` Number of other large tools

`SSS` Number of small scrapers simple

`SSNP` Number of small scrapers nosed point

`OST` Number of other small tools

`SP` Number of spheroids

Details

The data come from Table E1 in Isaac (1977: 239). The `Locality` contains the column headings in the original table. The `rownames` are the same as those in `Olorgesailie.maj`. The attribute `Variables` in the data frame includes the full variable names. Potts (2011) provides updated information on the site complex.

Source

Isaac, Glynn Ll. 1977. *Olorgesailie: Archeological Studies of a Middle Pleistocene Lake Basin in Kenya*. The University of Chicago Press.

References

Carlson, David L. 2017. *Quantitative Methods in Archaeology Using R*. Cambridge University Press, pp 280-293.

Potts, R. 2011. Olorgesailie–Retrospective and current synthesis. In *Casting the net wide: papers in honor of Glynn Isaac and his approach to human origins research*, edited by J. Sept and D. Pilbeam, pp 1–20. American School of Prehistoric Research Monographs in Archaeology and Paleoanthropology.

Examples

```
data(Olorgesailie.sub)
# Chi square after removing the first two columns and simulating the p
# value since there are a number of very small expected values
chisq.test(Olorgesailie.sub[,3:18], simulate.p.value=TRUE)
# Compute percentages over the localities
Olor.pct <- prop.table(as.matrix(Olorgesailie.sub[,3:18]), 1)*100
boxplot(Olor.pct, cex.axis=.7)
```

`OxfordPots` *Distribution of Late Romano-British Oxford Pottery*

Description

Percentages of Late Romano-British Oxford Pottery on 30 sites

Usage

```
data("OxfordPots")
```

Format

A data frame with 30 observations on the following 7 variables.

`Place` Site name

`OxfordPct` Percentage of Oxford pottery

`OxfordDst` Distance to Oxford in miles

`NewForestPct` Percentage of New Forest pottery

`NewForestDst` Distance to New Forest

`WalledArea` Acreage of walled towns

`WaterTrans` Availability of a water transportation link, 1=probable presence

Details

In several publications Ian Hodder analyzed the spatial distribution of Late Romano-British pottery produced at Oxford as evidence of trade and marketing patterns. These data come from the article by Fulford and Hodder (1974). In addition to the percentage of Oxford pottery and the distance to Oxford for 30 sites, data on New Forest pottery was included and information on walled town size and the availability of water transportation.

Source

Fulford, M. and I. Hodder. 1974. A Regression Analysis of Some Late Romano-British Pottery: A Case Study. *Oxoniensia* 39: 26-33.

References

Hodder, I. 1974. A Regression Analysis of Some Trade and Marketing Patterns. *World Archaeology* 6: 172-189.

Hodder, I. and C. Orton. 1976. *Spatial Analysis in Archaeology*, pp 117-119.

Examples

```
data(OxfordPots)
# Construct Fulford and Hodder's Figure 3
Oxford.lm1 <- lm(log(OxfordPct)~OxfordDst, OxfordPots, subset=WaterTrans==0)
Oxford.lm2 <- lm(log(OxfordPct)~OxfordDst, OxfordPots, subset=WaterTrans==1)
plot(log(OxfordPct)~OxfordDst, OxfordPots, xlim=c(0, 160), yaxt="n", ylim=c(0, 3.25),
     ylab="Percentage of Oxford Pottery", xlab="Distance (miles)",
     pch=c(1, 16)[WaterTrans+1], cex=1.5, lwd=2)
# Add log y-axis
axis(2, log(c(1, 5, 10, 20)), c(1, 5, 10, 20), las=1)
abline(Oxford.lm1, lwd=2)
abline(Oxford.lm2, lwd=2)
```

PitHouses *Late Stone Age and Early Sami Iron Age Pithouses in Arctic Norway*

Description

The morphology of 45 Arctic Norway pithouses is described in terms of 6 categorical variables.

Usage

```
data("PitHouses")
```

Format

A data frame with 45 observations on the following 6 variables.

`Hearths` a factor with levels `None`, `One`, `Two`, and `Charcoal Conc`

`Depth` a factor with levels `Deep` and `Shallow`

`Size` a factor with levels `Small`, `Medium`, and `Large`

`Form` a factor with levels `Oval` and `Rectangular`

`Orient` a factor with levels `Parallel Coast` and `Gabel Toward Coast`

`Entrance` a factor with levels `One Side`, `Front and One Side`, and `None`

Details

Data on the morphology of pit houses from Arctic Norway described by Engelstad (1988). The data were scanned from Table A7 in Baxter (1994). The category labels are used rather than the numeric values listed in Table A7. The data represent the Group C pithouses as described in Engelstad (1988) which was more variable than groups A or B. The data were converted into an incidence matrix (Table A8 in Baxter (1994) and Table 3 in Englestad (1988)) and used in a multiple correspondence analysis.

Source

Baxter, M. J. 1994. *Exploratory Multivariate Analysis in Archaeology*. Edinburgh University Press.

Engelstad, E. 1988. Pit Houses in Arctic Norway - An Investigation of Their Typology Using Multiple Correspondence Analysis. In *Multivariate Archaeology*, edited by T. Madsen, pp. 71-84. Aarhus University Press.

References

Carlson, David L. 2017. *Quantitative Methods in Archaeology Using R*. Cambridge University Press, pp 192-197.

Examples

```
data(PitHouses)
# Crosstabulation of Hearths with Size
PitHouses.tbl <- xtabs(~Hearths+Size, PitHouses)
PitHouses.tbl
barplot(PitHouses.tbl, ylab="Frequency", main="Arctic Norway Pithouses", beside=TRUE,
    legend.text=TRUE, args.legend=list(title="Hearths"))
barplot(prop.table(PitHouses.tbl, 2)*100, ylim=c(0, 60), main="Arctic Norway Pithouses",
    ylab="Percent", beside=TRUE, legend.text=TRUE, args.legend=list(title="Hearths"))
```

RBGlass1 *Romano-British Glass, Major and Minor Elements*

Description

The concentrations for 11 major and minor elements in 105 Romano-British waste glass specimens from two furnace sites (Leicester and Mancetter).

Usage

```
data("RBGlass1")
```

Format

A data frame with 105 observations on the following 12 variables.

`Site` a factor with levels `Leicester` and `Mancetter`

`Al` Percentage Aluminum

`Fe` Percentage Iron

`Mg` Percentage Magnesium

`Ca` Percentage Calcium

`Na` Percentage Sodium

`K` Percentage Potassium

`Ti` Percentage Titanium

`P` Percentage Phosphorus

`Mn` Percentage Manganese

`Sb` Percentage Antinmony

`Pb` Percentage Lead

Details

The concentrations for 11 major and minor elements in 105 Romano-British waste glass specimens from two furnace sites (Leicester and Mancetter) come from Caroline Jackson's Ph. D. thesis at Bradford University. The data here were scanned from from Baxter (1994) Table A1. Measurements are percentage for each element.

Source

Baxter, M. J. 1994. *Exploratory Multivariate Analysis in Archaeology*. Edinburgh University Press.

Jackson, C. M. 1992. A Compositional Analysis of Roman and Early Post-Roman Glass and Glass Working Waste from Selected British Sites Towards an Understanding of the Technology of Glass-Making Through Analysis by Inductively-Coupled Plasma Spectrometry. Unpublished PhD thesis. Bradford University (BL: D214554).

References

Baxter, M. J., Cool H.E.M., Heyworth M.P. and Jackson, C.M. 1995. Compositional Variability in Colourless Roman Vessel Glass. *Archaeometry* 37(1), 129-141.

Baxter, M. J., Cool, H. E. M. and Jackson, C. M. (2005). Further Studies in the Compositional Variability of Colourless Romano-British Glass. *Archaeometry* 47, 47-68.

Carlson, David L. 2017. *Quantitative Methods in Archaeology Using R*. Cambridge University Press, pp 245-247, 256-261.

Jackson, C M, J R Hunter, S E Warren, and H E M Cool. 1991. The Analysis of Blue-Green Glass and Glassy Waste from Two Romano-British Glass Working Sites. In *Archaeometry 1990*, edited by E. Pernicka and G. A. Wagner, pp 295-304. Birkhäuser Verlag.

Examples

```
data(RBGlass1)
RBGlass1.pca <- prcomp(RBGlass1[, -1], scale.=TRUE)
biplot(RBGlass1.pca, xlabs=abbreviate(RBGlass1$Site, 1), cex=.75)
```

RBGlass2 *Romano-British Glass, Trace Elements*

Description

The concentrations for 11 trace elements in 105 Romano-British waste glass specimens from two furnace sites (Leicester and Mancetter).

Usage

```
data("RBGlass2")
```

Format

A data frame with 105 observations on the following 12 variables.

`Site` a factor with levels `Leicester` and `Mancetter`

`Ba` Barium ppm

`Co` Cobalt ppm

`Cr` Chromium ppm

`Cu` Copper ppm

`Li` Lithium ppm

`Ni` Nickel ppm

`Sr` Strontium ppm

`V` Vanadium ppm

`Y` Yttrium ppm

`Zn` Zinc ppm

`Zr` Zirconium ppm

Details

The concentrations for 11 trace elements in 105 Romano-British waste glass specimens from two furnace sites (Leicester and Mancetter) come from Caroline Jackson's Ph. D. thesis at Bradford University. The data here were scanned from from Baxter (1994) Table A2. Measurements are parts per million (ppm) for each of 11 elements.

Source

Baxter, M. J. 1994. *Exploratory Multivariate Analysis in Archaeology*. Edinburgh University Press.

Jackson, C. M. 1992. A Compositional Analysis of Roman and Early Post-Roman Glass and Glass Working Waste from Selected British Sites Towards an Understanding of the Technology of Glass-Making Through Analysis by Inductively-Coupled Plasma Spectrometry. Unpublished PhD thesis. Bradford University (BL: D214554).

References

Baxter, M. J., Cool H.E.M., Heyworth M.P. and Jackson, C.M. 1995. Compositional Variability in Colourless Roman Vessel Glass. *Archaeometry* 37(1), 129-141.

Baxter, M. J., Cool, H. E. M. and Jackson, C. M. (2005). Further Studies in the Compositional Variability of Colourless Romano-British Glass. *Archaeometry* 47, 47-68.

Jackson, C M, J R Hunter, S E Warren, and H E M Cool. 1991. The Analysis of Blue-Green Glass and Glassy Waste from Two Romano-British Glass Working Sites. In *Archaeometry 1990*, edited by E. Pernicka and G. A. Wagner, pp 295-304. Birkhäuser Verlag.

Examples

```
data(RBGlass2)
RBGlass2.pca <- prcomp(RBGlass2[, -1], scale.=TRUE)
biplot(RBGlass2.pca, xlabs=abbreviate(RBGlass2$Site, 1), cex=.75)
```

RBPottery *Romano-British Pottery*

Description

Results of chemical analyses of 48 specimens of Romano-British pottery from 5 sites in 3 regions.

Usage

```
data("RBPottery")
```

Format

A data frame with 48 observations on the following 12 variables.

`ID` Sample ID

`Kiln` Kiln: `Gloucester`, `Llanedeyrn`, `Caldicot`, `Islands Thorns`, and `Ashley Rails`

`Region` Region: `Gloucester`, `Wales`, and `New Forest`

`Al2O3` Percentage aluminum trioxide

`Fe2O3` Percentage Iron trioxide

`MgO` Percentage magnesium oxide

`CaO` Percentage calcium oxide

`Na2O` Percentage sodium oxide

`K2O` Percentage potassium oxide

`TiO2` Percentage titanium dioxide

`MnO` Percentage manganese oxide

`BaO` Percentage barium oxide

Details

Results of chemical analyses of 48 specimens of Romano-British pottery published by Tubb, et al. (1980). The numbers are the percentage metal oxide. "Kiln" indicates at which kiln site the pottery was found. The kiln sites come from three regions (1=Gloucester, (2=Llanedeyrn, 3=Caldicot), (4=Islands Thorns, 5=Ashley Rails)). The data were scanned from Table 2.2 in Baxter (2003, p. 21) and preserve three probable typographical errors in the original publication. Those errors are the values for TiO2 in line 4 (sample GA4), for MnO in line 35 (sample C13), and for K2O in line 36 (sample C14). Versions of these data are also available as `Pottery` in package `car`, `pottery` in package `HSAUR`, and `Pottery2` in package `heplots`.

Source

Baxter, M. J. 2003. *Statistics in Archaeology*. Arnold.

Tubb, A., A. J. Parker, and G. Nickless. 1980. The Analysis of Romano-British Pottery by Atomic Absorption Spectrophotometry. *Archaeometry* 22: 153-71.

References

Carlson, David L. 2017. *Quantitative Methods in Archaeology Using R*. Cambridge University Press, pp 247-255, 335-342.

Examples

```
data(RBPottery)
print(aggregate(RBPottery[, -c(1:3)], list(Region=RBPottery$Region), mean), digits=2)
plot(Na2O~CaO, RBPottery, pch=as.numeric(Region)-1)
legend("topright", levels(RBPottery$Region), title="Region", pch=0:2)
```

Snodgrass *House pits at the Mississippian Snodgrass site in Butler County, Missouri, U.S.A.*

Description

Information on the size, location and contents of 91 house pits at the Snodgrass site which was occupied between about CE 1325-1420.

Usage

```
data(Snodgrass)
```

Format

A data frame with 91 observations on the following 15 variables.

`East` East grid location of house in feet (excavation grid system)

`South` East grid location of house in feet (excavation grid system)

`Length` House length in feet

`Width` House width in feet

`Segment` Three areas within the site `1`, `2`, `3`

`Inside` Location within or outside the "white wall" `Inside`, `Outside`

`Area` Area in square feet

`Points` Number of projectile points

`Abraders` Number of abraders

`Discs` Number of discs

`Earplugs` Number of earplugs

`Effigies` Number of effigies

`Ceramics` Number of ceramics

`Total` Total Number of artifacts listed above

`Types` Number of kinds of artifacts listed above

Details

The data from 91 house pits at the Snodgrass site were reported by Price and Giffin in 1979. The layout of the houses follows a grid pattern with the long axis oriented northeast surrounded by a fortification trench. There is also evidence of an interior wall that may have separated the houses inside that wall from those outside the wall. Price and Griffin use differences in house size and artifact composition to suggest that those differences may have reflected rank differences between the occupants of the two areas. That conclusion has been questioned on a number of grounds by Cogswell, et al (2001), but the data are still useful for illustrating a number of quantitative methods. The data come from the appendices except for the house locations which were estimated from the base map in Figure 10 (Price and Griffin 1979).

Source

Price, J. E. and J. B. Griffin. 1979. The Snodgrass Site of the Powers Phase of Southeast Missouri. *Anthropological Papers. Museum of Anthropology, University of Michigan, No.* 66.

References

Carlson, David L. 2017. *Quantitative Methods in Archaeology Using R*. Cambridge University Press, pp 171-183, 232-242.

Cogswell, J. W., M. J. O'Brien, and D. S. Glover. 2001. The Artifactual Content of Selected House Floors at Turner and Snodgrass. In *Mississippian Community Organization: The Powers Phase in Southeastern Missouri*, edited by M. J. O'Brien, pp 181–229. Kluwer Academic/Plenum.

Examples

```
data(Snodgrass)
plot(-South~East, Snodgrass, main="Snodgrass Site", pch=as.numeric(Inside)+4, asp=1)
legend("topleft", levels(Snodgrass$Inside), pch=5:6)
boxplot(Area~Inside, Snodgrass)
```

TRBPottery *Neolithic TRB Pottery from Demark*

Description

Measurements at 8 landmarks along one side of 118 Neolithic TRB (Trichterrandbecherkultur, Funnelneckbeaker culture) pottery vessels representing 3 different groups.

Usage

```
data("TRBPottery")
```

Format

A data frame with 118 observations on the following 17 variables.

`Form` a factor with levels `Funnel beakers`, `Bowls`, and `Flasks`

`AX` Point 1, x

`AY` Point 1, y

`BX` Point 2, x

`BY` Point 2, y

`CX` Point 3, x

`CY` Point 3, y

`DX` Point 4, x

`DY` Point 4, y

`EX` Point 5, x

EY Point 5, y

FX Point 6, x

FY Point 6, y

GX Point 7, x

GY Point 7, y

HX Point 8, x

HY Point 8, y

Details

The data are based on a study by E. K. Nielsen (1983) of Neolithic Pottery of 135 complete pots. The measurements are taken at landmarks identified along the profile of each pot (see Madsen, 1988 Figure 5). The data were reanalyzed by Madsen (1988). Baxter (1994) reanalyzed the data using several different methods. The data were scanned from Table 1 in Madsen (1988, p. 18) which included only 118 pots.

Source

Madsen, T. 1988. Multivariate Statistics and Archaeology. In *Multivariate Archaeology: Numerical Approaches in Scandinavian Archaeology*, edited by T. Madsen, pp 7 - 28.

Nielsen, E. K. 1983. Tidligneolitiske Keramikfund. Unpublished thesis. Institute of Archaeology, University of Copenhagen.

References

Baxter, M. J. 1994. *Exploratory Multivariate Analysis in Archaeology*. Edinburgh University Press, pp 128-132.

Examples

```
data(TRBPottery)
TRBPottery.frm <- aggregate(TRBPottery[, -1], list(Form=TRBPottery$Form), mean)
Xvals <- TRBPottery.frm[, seq(2, 16, by=2)]
Yvals <- TRBPottery.frm[, seq(3, 17, by=2)]
matplot(t(Xvals), t(Yvals), xlab="X", ylab="Y", type="l", asp=1, las=1, col="black", lwd=2)
legend("topleft", levels(TRBPottery$Form), lty=1:3, col="black", lwd=2)
```

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