

SOM3 - Reading and plotting data

Paixao et al. 2021. The Middle Paleolithic Ground Stones Tools of Nesher Ramla Unit V (Southern Levant)

2021-03-17 13:11:49

Brief description of the script

This R markdown document reads, summarizes and plots data for: *Paixao et al. 2021. Functional analysis of the Middle Paleolithic Ground Stone Tools from Unit V of Nesher Ramla (Central Levante): the application of a multi-scale use-wear approach. Quaternary International*. The document contains:

1. Manuscript's tables,
2. Manuscript's figures (data plots),
3. Supplementary material, including extra tables and figures (data plots)

This R project and respective script follows the procedures described by Marwick et al. 2017. To compile this markdown document do not delete or move files from their original folders. Please note that the tables and figures numbering in this file do not match the numbering in the original manuscript.

For any questions, comments and inputs, please contact:

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Load data into R project

The imported files are in: ../data/raw_data

All figures will be saved in: `r paste0("../figures")`

All tables will be saved in: `r paste0("../data/derived_data")`

Load required libraries

```
library(tidyverse)
library(utis)
library(knitr)
library(janitor)
library(flextable)
library(GGally)
library(doby)
library(ggpubr)
library(tools)
```

See your WD and update the following paths
getwd()

Load data from .csv

```
db1 <- read.csv("../raw_data/generaldb.csv", header=T, ",") # general database
db2 <- read.csv("../raw_data/functionaldb.csv", header=T, ",") # dataset related to functional

# On db1, convert strings to numeric and replace "," by "."
db1$length <- as.numeric(gsub(",", ".", db1$length))
db1$width <- as.numeric(gsub(",", ".", db1$width))
db1$thickness <- as.numeric(gsub(",", ".", db1$thickness))
db1$weight <- as.numeric(gsub(",", ".", db1$weight))

# Filter general dataset (only Nesher Ramla is selected here)
db1nr <- filter(db1, site == "Nesher Ramla")

data_file <- list.files("../analysis/raw_data/", pattern = "\\*.csv$", full.names = TRUE)
```

Tables

General Inventory

```
# Nesher Ramla

inventory <- dblnr %>%
  group_by(raw_material, support) %>%
  summarize(total = n()) %>%
  pivot_wider(names_from = "support",
              values_from = "total",
              values_fill = 0) %>%
  adorn_totals(where = c("row", "col"), fill = "") %>%
  rename("Raw material" = raw_material, Boulder = boulder, Block = block)
write_csv(inventory, "../derived_data/generalinventory_nesher.csv")

table <- flextable(inventory)
table <- set_caption(table, caption = "General inventory of Grounds Stone tools
  from Nesher Layer 5")
knit_print(table)
```

Warning: Warning: fonts used in `flextable` are ignored because the `pdflatex` engine is used and not `xelatex` or `lualatex`. You can avoid this warning by using the `set_flextable_defaults(fonts_ignore=TRUE)` command or use a compatible engine by defining `latex_engine: xelatex` in the YAML header of the R Markdown document.

Table 1: General inventory of Grounds Stone tools from Nesher Layer 5

Raw material	Block	Pebble	Boulder	Total
Flint	1	5	0	6
Limestone	68	392	7	467
Nari	1	0	0	1
Total	70	397	7	474

Typological inventory

```
# Nesher Ramla

type <- dblnr %>%
  group_by(raw_material, typology) %>%
  summarize(total = n()) %>%
  pivot_wider(names_from = "typology",
              values_from = "total",
              values_fill = 0) %>%
```

```

  adorn_totals(where = c("row", "col"), fill = "") %>%
  rename("Raw material" = raw_material)
write_csv(type, "../derived_data/typeinventory_nesher.csv")

table <- flextable(type)
table <- set_caption(table, caption = "Typological inventory by raw material from Nesher Ramla, Layer 5")
knit_print(table)

```

Warning: Warning: fonts used in `flextable` are ignored because the `pdflatex` engine is used and not `xelatex` or `lualatex`. You can avoid this warning by using the `set_flextable_defaults(fonts_ignore=TRUE)` command or use a compatible engine by defining `latex_engine: xelatex` in the YAML header of the R Markdown document.

Table 2: Typological inventory by raw material from Nesher Ramla, Layer 5

Raw material	Hammerstone	Manuport	Undefined	Abrader	Anvil	Chopper	Natural	Pebble Pestle
Flint	1	4	1	0	0	0	0	0
Limestone	108	220	48	11	23	13	43	1
Nari	0	0	0	0	0	0	1	0
Total	109	224	49	11	23	13	44	1

Morphometric analysis

```

# Nesher Ramla

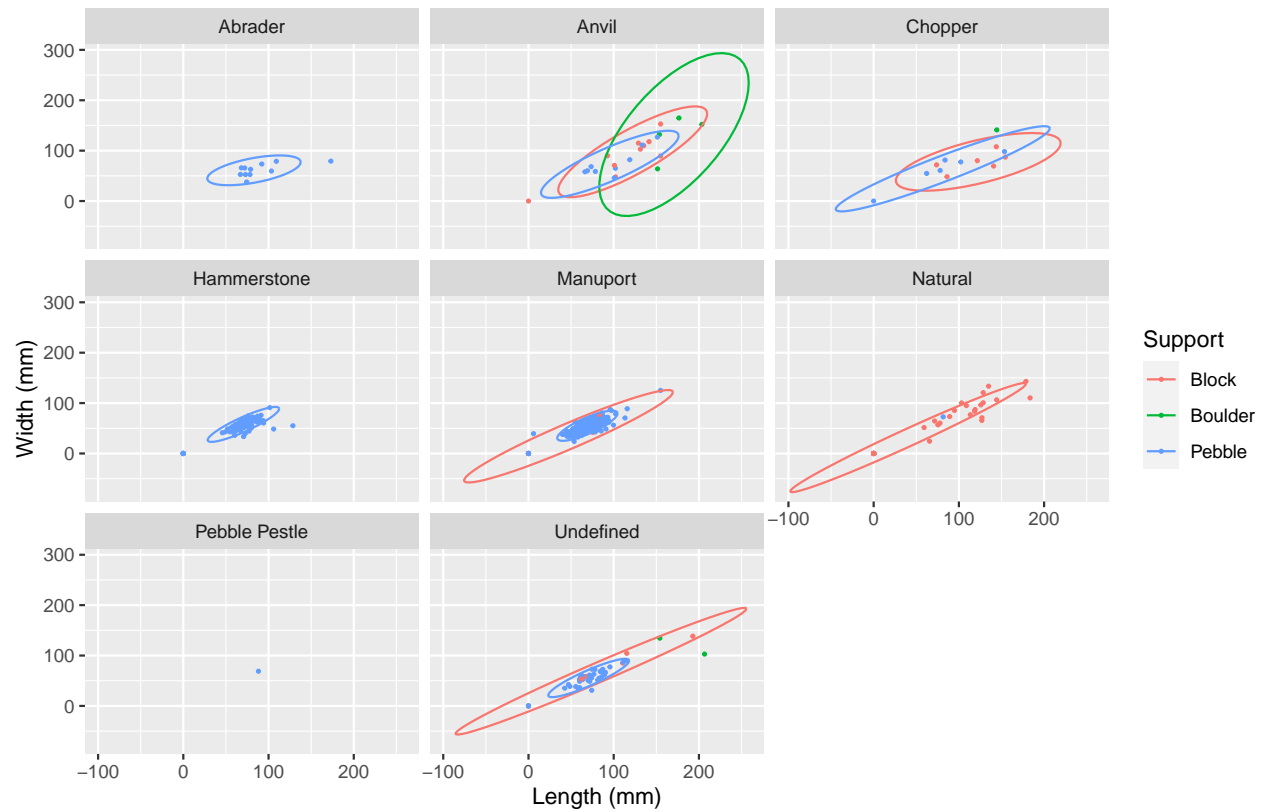
ggplot(db1nr, aes (x = length, y = width, color = support)) +
  geom_point(size=0.5) +
  stat_ellipse() +
  labs(x="Length (mm)", y="Width (mm)", color = "Support") +
  facet_wrap(vars(typology)) +
  scale_color_discrete(labels = c("Block", "Boulder", "Pebble"))

```

Warning: Removed 1 rows containing non-finite values (stat_ellipse).

Warning: Removed 1 rows containing missing values (geom_point).

Warning: Removed 2 row(s) containing missing values (geom_path).



```
ggsave("../plots/metrics_nr.png")
```

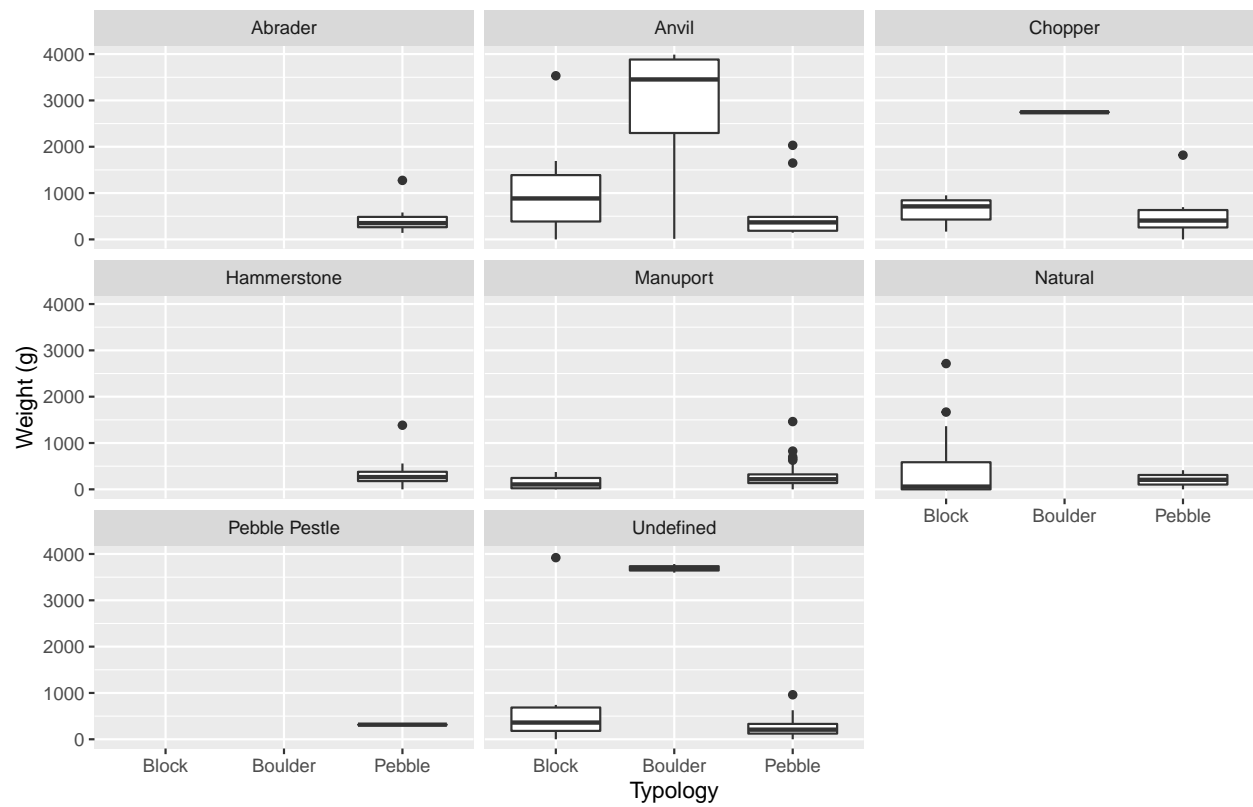
Warning: Removed 1 rows containing non-finite values (stat_ellipse).

Warning: Removed 1 rows containing missing values (geom_point).

Warning: Removed 2 row(s) containing missing values (geom_path).

```
ggplot(db1nr, aes(x = support, y = weight)) +
  geom_boxplot() +
  labs(x="Typology", y="Weight (g)") +
  facet_wrap(vars(typology)) +
  scale_x_discrete(labels = c('Block', 'Boulder', 'Pebble'))
```

Warning: Removed 3 rows containing non-finite values (stat_boxplot).



```
ggsave("../plots/weight_nr.png")
```

Warning: Removed 3 rows containing non-finite values (stat_boxplot).

Use-wear macro damage, first observations

```
# Nesher Ramla

# sampling observation with macro wear traces
damagenr <- filter(dblnr, usewear_macro == 'yes')

# Use-wear damage by tool typology

macrodamage <- damagenr %>%
  group_by(typology, usewear_type) %>%
  summarize(total = n()) %>%
  pivot_wider(names_from = "usewear_type",
              values_from = "total",
              values_fill = 0) %>%
  adorn_totals(where = c("row", "col"), fill = "") %>%
  rename("Typology" = typology, Mixed = mix, "Impact marks" = pecking,
        Polish = polish, Striations = striations)
write_csv(macrodamage, "../derived_data/macrodamage_nr.csv")

table <- flextable(macrodamage)
table <- set_caption(table, caption = "Use-wear damage
  organized by typology, Nesher Ramla - Layer 5")
knit_print(table)
```

Warning: Warning: fonts used in `flextable` are ignored because the `pdflatex` engine is used and not `xelatex` or `lualatex`. You can avoid this warning by using the `set_flextable_defaults(fonts_ignore=TRUE)` command or use a compatible engine by defining `latex_engine: xelatex` in the YAML header of the R Markdown document.

Table 3: Use-wear damage organized by typology, Nesher Ramla - Layer 5

Typology	Impact marks	Polish	Striations	Mixed	Total
Abrader	1	8	2	0	11
Anvil	19	0	1	2	22
Chopper	11	0	0	0	11
Hammerstone	106	0	0	2	108
Pebble	1	0	0	0	1
Pestle					
Undefined	7	16	3	7	33
Total	145	24	6	11	186

Macro wear analysis

```
# Nesher Ramla

# Macro wear traces by tool typology

macrowear <- db2nr %>%
  filter(!is.na(MACROTYPE)) %>%
  group_by(TPOLOGY, MACROTYPE) %>%
  summarize(total = n()) %>%
  pivot_wider(names_from = "MACROTYPE",
              values_from = "total",
              values_fill = 0) %>%
  adorn_totals(where = c("row", "col"), fill = "") %>%
  rename("Typology" = TPOLOGY, "Type 1" = "1", "Type 2" = "2")
```

Error in filter(., !is.na(MACROTYPE)): object 'db2nr' not found

```
write_csv(macrowear, "../derived_data/macrowear_nr.csv")
```

Error in is.data.frame(x): object 'macrowear' not found

```
table <- flextable(macrowear)
```

Error in is.data.frame(data): object 'macrowear' not found

```
table <- set_caption(table, caption = "Macro wear traces
  organized by typology, Nesher Ramla - Layer 5")
knit_print(table)
```

Warning: Warning: fonts used in `flextable` are ignored because the `pdflatex` engine is used and not `xelatex` or `lualatex`. You can avoid this warning by using the `set_flextable_defaults(fonts_ignore=TRUE)` command or use a compatible engine by defining `latex_engine: xelatex` in the YAML header of the R Markdown document.

Table 4: Macro wear traces organized by typology, Nesher Ramla
- Layer 5

Typology	Impact marks	Polish	Striations	Mixed	Total
Abrader	1	8	2	0	11
Anvil	19	0	1	2	22
Chopper	11	0	0	0	11
Hammerstone	106	0	0	2	108
Pebble	1	0	0	0	1
Pestle					
Undefined	7	16	3	7	33
Total	145	24	6	11	186

Micro wear analysis

```
# Using db2 dataset, which contains all micro wear observations  
# This only applies to Nesher Ramla (see Methods and Results chapter for more info)
```

```
microwear <- db2nr %>%  
  filter(MICROTYPE %in% c("A", "B", "C", "D")) %>%  
  group_by(TPOLOGY, MICROTYPE) %>%  
  summarize(total = n()) %>%  
  pivot_wider(names_from = "MICROTYPE",  
              values_from = "total",  
              values_fill = 0) %>%  
  adorn_totals(where = c("row", "col"), fill = "") %>%  
  rename("Typology" = TPOLOGY)
```

```
Error in filter(., MICROTYPE %in% c("A", "B", "C", "D")): object 'db2nr' not found
```

```
write_csv(microwear, "../derived_data/tab6.csv")
```

```
Error in is.data.frame(x): object 'microwear' not found
```

```
table <- flextable(microwear)
```

```
Error in is.data.frame(data): object 'microwear' not found
```

```
table <- set_caption(table, caption = "Micro wear type  
organized by typology, Nesher Ramla - Layer 5")  
knit_print(table)
```

Warning: Warning: fonts used in `flextable` are ignored because the `pdflatex` engine is used and not `xelatex` or `lualatex`. You can avoid this warning by using the `set_flextable_defaults(fonts_ignore=TRUE)` command or use a compatible engine by defining `latex_engine: xelatex` in the YAML header of the R Markdown document.

Table 5: Micro wear type organized by typology, Nesher Ramla - Layer 5

Typology	Impact marks	Polish	Striations	Mixed	Total
Abrader	1	8	2	0	11
Anvil	19	0	1	2	22
Chopper	11	0	0	0	11
Hammerstone	106	0	0	2	108
Pebble	1	0	0	0	1
Pestle					
Undefined	7	16	3	7	33
Total	145	24	6	11	186

Correlation between macro and micro wear traces

```
# sampling observation with macro wear traces type 1
# This only applies to Nesher Ramla (see Methods and Results chapter for more info)
```

```
macro1 <- db2nr %>%
  filter(MACROTYPE == "1", MICROTYPE %in% c("A", "B", "C", "D")) %>%
  group_by(TPOLOGY, MICROTYPE) %>%
  summarize(total = n()) %>%
  pivot_wider(names_from = "MICROTYPE",
              values_from = "total",
              values_fill = 0) %>%
  rename("Typology" = TPOLOGY) %>%
  adorn_totals(where = c("row", "col"), fill = "")
```

Error in filter(., MACROTYPE == "1", MICROTYPE %in% c("A", "B", "C", "D")): object 'db2nr' not found

```
write_csv(microwear, "../derived_data/macro1&micro_nr.csv")
```

Error in is.data.frame(x): object 'microwear' not found

```
table <- flextable(macro1)
```

Error in is.data.frame(data): object 'macro1' not found

```
table <- set_caption(table, caption = "Micro wear traces associated with Macro traces type 1, and organized by typology, Nesher Ramla - Layer 5")
knit_print(table)
```

Warning: Warning: fonts used in `flextable` are ignored because the `pdflatex` engine is used and not `xelatex` or `lualatex`. You can avoid this warning by using the `set_flextable_defaults(fonts_ignore=TRUE)` command or use a compatible engine by defining `latex_engine: xelatex` in the YAML header of the R Markdown document.

Table 6: Micro wear traces associated with Macro traces type 1, and organized by typology, Nesher Ramla - Layer 5

Typology	Impact marks	Polish	Striations	Mixed	Total
Abrader	1	8	2	0	11
Anvil	19	0	1	2	22
Chopper	11	0	0	0	11
Hammerstone	106	0	0	2	108
Pebble Pestle	1	0	0	0	1
Undefined	7	16	3	7	33
Total	145	24	6	11	186

```
# sampling observation with macro wear traces type 2
# This only applies to Nesher Ramla (see Methods and Results chapter for more info)
```

```
macro2 <- db2nr %>%
  filter(MACROTYPE == "2", MICROTYPE %in% c("A", "B", "C", "D")) %>%
  group_by(TYPOLOGY, MICROTYPE) %>%
  summarize(total = n()) %>%
  pivot_wider(names_from = "MICROTYPE",
              values_from = "total",
              values_fill = 0) %>%
  rename("Typology" = TYPOLOGY) %>%
  adorn_totals(where = c("row", "col"), fill = "")
```

Error in filter(., MACROTYPE == "2", MICROTYPE %in% c("A", "B", "C", "D")): object 'db2nr' not found

```
write_csv(microwear, "../derived_data/macro2&micro_nr.csv")
```

Error in is.data.frame(x): object 'microwear' not found

```
table <- flextable(macro2)
```

Error in is.data.frame(data): object 'macro2' not found

```
table <- set_caption(table, caption = "Micro wear traces associated with Macro traces type 2, and organized by typology")
knit_print(table)
```

Warning: Warning: fonts used in `flextable` are ignored because the `pdflatex` engine is used and not `xelatex` or `lualatex`. You can avoid this warning by using the `set_flextable_defaults(fonts_ignore=TRUE)` command or use a compatible engine by defining `latex_engine: xelatex` in the YAML header of the R Markdown document.

Table 7: Micro wear traces associated with Macro traces type 2, and organized by typology, Nesher Ramla - Layer 5

Typology	Impact marks	Polish	Striations	Mixed	Total
Abrader	1	8	2	0	11
Anvil	19	0	1	2	22
Chopper	11	0	0	0	11
Hammerstone	106	0	0	2	108
Pebble	1	0	0	0	1
Pestle					
Undefined	7	16	3	7	33
Total	145	24	6	11	186

Relation between different active areas and macro wear traces within and between tools

```
# Nesher Ramla  
# 2 impact areas
```

```
a <- filter(db2nr, WEAR2 == "yes")
```

Error in filter(db2nr, WEAR2 == "yes"): object 'db2nr' not found

```
a <- select(a, TYPOLOGY, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE)
```

Error in select(a, TYPOLOGY, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE): object 'a' not found

```
b <- a %>%  
  unite(a, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE, sep = "/")
```

Error in unite(., a, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE, sep = "/"): object 'a' not found

```
amostra <- b %>%  
  count(TYPOLOGY, a)
```

Error in count(., TYPOLOGY, a): object 'b' not found

```
sampld <- spread(amostra, key = a, value = n)
```

Error in spread(amostra, key = a, value = n): object 'amostra' not found

```
sampld[is.na(sampld)] <- 0
```

Error in sampld[is.na(sampld)] <- 0: object 'sampld' not found

```
twoimpac <- sampld %>%  
  adorn_totals(where = c("row", "col"), fill = "")
```

Error in adorn_totals(., where = c("row", "col"), fill = ""): object 'sampld' not found

```
table <- flextable(twoimpac)
```

Error in is.data.frame(data): object 'twoimpac' not found

```
table <- set_caption(table, caption = "Tools with 2 active areas  
with macro wear traces, Nesher Ramla - Layer 5")  
knit_print(table)
```

Warning: Warning: fonts used in `flextable` are ignored because the `pdflatex` engine is used and not `xelatex` or `lualatex`. You can avoid this warning by using the `set_flextable_defaults(fonts_ignore=TRUE)` command or use a compatible engine by defining `latex_engine: xelatex` in the YAML header of the R Markdown document.

Table 8: Tools with 2 active areas with macro wear traces, Nesher
Ramla - Layer 5

Typology	Impact marks	Polish	Striations	Mixed	Total
Abrader	1	8	2	0	11
Anvil	19	0	1	2	22
Chopper	11	0	0	0	11
Hammerstone	106	0	0	2	108
Pebble Pestle	1	0	0	0	1
Undefined	7	16	3	7	33
Total	145	24	6	11	186

```
# 3 impact areas
```

```
a <- filter(db2nr, WEAR3 == "yes")
```

```
Error in filter(db2nr, WEAR3 == "yes"): object 'db2nr' not found
```

```
a <- select(a, TYPOLOGY, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE, WEAR3_MARKS_TYPE)
```

```
Error in select(a, TYPOLOGY, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE, WEAR3_MARKS_TYPE): object 'a' not found
```

```
b <- a %>%
  unite(a, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE, WEAR3_MARKS_TYPE, sep = "/")
```

```
Error in unite(., a, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE, WEAR3_MARKS_TYPE, : object 'a' not found
```

```
amostra <- b %>%
  count(TYPOLOGY, a)
```

```
Error in count(., TYPOLOGY, a): object 'b' not found
```

```
sampld <- spread(amostra, key = a, value = n)
```

```
Error in spread(amostra, key = a, value = n): object 'amostra' not found
```

```
sampld[is.na(sampld)] <- 0
```

```
Error in sampld[is.na(sampld)] <- 0: object 'sampld' not found
```

```
threeimpac <- sampld %>%
  adorn_totals(where = c("row", "col"), fill = "")
```

```
Error in adorn_totals(., where = c("row", "col"), fill = ""): object 'sampld' not found
```

```
table <- flextable(threeimpac)
```

Error in is.data.frame(data): object 'threeimpac' not found

```
table <- set_caption(table,caption = "Tools with 3 active areas  
with macro wear traces, Nesher Ramla - Layer 5")  
knit_print(table)
```

Warning: Warning: fonts used in `flextable` are ignored because the `pdflatex` engine is used and not `xelatex` or `lualatex`. You can avoid this warning by using the `set_flextable_defaults(fonts_ignore=TRUE)` command or use a compatible engine by defining `latex_engine: xelatex` in the YAML header of the R Markdown document.

Table 9: Tools with 3 active areas with macro wear traces, Nesher Ramla - Layer 5

Typology	Impact marks	Polish	Striations	Mixed	Total
Abrader	1	8	2	0	11
Anvil	19	0	1	2	22
Chopper	11	0	0	0	11
Hammerstone	106	0	0	2	108
Pebble Pestle	1	0	0	0	1
Undefined	7	16	3	7	33
Total	145	24	6	11	186

```
# 4 impact areas
```

```
a <- filter(db2nr, WEAR4_ == "yes")
```

Error in filter(db2nr, WEAR4_ == "yes"): object 'db2nr' not found

```
a <- select(a, TYPOLOGY, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE,  
           WEAR3_MARKS_TYPE, WEAR4_MARKS_TYPE)
```

Error in select(a, TYPOLOGY, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE, WEAR3_MARKS_TYPE, : object 'a' not found

```
b <- a %>%  
  unite(a, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE, WEAR3_MARKS_TYPE,  
        WEAR4_MARKS_TYPE, sep = "/")
```

Error in unite(., a, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE, WEAR3_MARKS_TYPE, : object 'a' not found

```
amostra <- b %>%
  count(TPOLOGY, a)
```

Error in count(., TPOLOGY, a): object 'b' not found

```
sampld <- spread(amostra, key = a, value = n)
```

Error in spread(amostra, key = a, value = n): object 'amostra' not found

```
sampld[is.na(sampld)] <- 0
```

Error in sampld[is.na(sampld)] <- 0: object 'sampld' not found

```
fourimpac <- sampld %>%
  adorn_totals(where = c("row", "col"), fill = "")
```

Error in adorn_totals(., where = c("row", "col"), fill = ""): object 'sampld' not found

```
table <- flextable(fourimpac)
```

Error in is.data.frame(data): object 'fourimpac' not found

```
table <- set_caption(table, caption = "Tools with 4 active areas with
  macro wear traces, Nesher Ramla - Layer 5")
knit_print(table)
```

Warning: Warning: fonts used in `flextable` are ignored because the `pdflatex` engine is used and not `xelatex` or `lualatex`. You can avoid this warning by using the `set_flextable_defaults(fonts_ignore=TRUE)` command or use a compatible engine by defining `latex_engine: xelatex` in the YAML header of the R Markdown document.

Table 10: Tools with 4 active areas with macro wear traces, Nesher Ramla - Layer 5

Typology	Impact marks	Polish	Striations	Mixed	Total
Abrader	1	8	2	0	11
Anvil	19	0	1	2	22
Chopper	11	0	0	0	11
Hammerstone	106	0	0	2	108
Pebble	1	0	0	0	1
Pestle					
Undefined	7	16	3	7	33
Total	145	24	6	11	186

```
# Use-wear location, files for GIS spatial analysis
```

```
# Hammerstones
```

```
a <- filter(db2nr, TYPOLOGY == "Hammerstone")
```

Error in filter(db2nr, TYPOLOGY == "Hammerstone"): object 'db2nr' not found

```
a <- select(a, WEAR1_LOCATION, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE, WEAR2_LOCATION,  
            WEAR3_MARKS_TYPE, WEAR3_LOCATION,  
            WEAR4_MARKS_TYPE, WEAR4_LOCATION)
```

Error in select(a, WEAR1_LOCATION, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE, : object 'a' not found

```
b <- a %>%  
  unite(a, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE, WEAR3_MARKS_TYPE,  
        WEAR4_MARKS_TYPE, sep = "/")
```

Error in unite(., a, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE, WEAR3_MARKS_TYPE, : object 'a' not found

```
amostra <- b %>%  
  count(WEAR1_LOCATION, WEAR2_LOCATION,  
        WEAR3_LOCATION, WEAR4_LOCATION, a)
```

Error in count(., WEAR1_LOCATION, WEAR2_LOCATION, WEAR3_LOCATION, WEAR4_LOCATION, : object 'b' not found

```
sampld <- spread(amostra, key = a, value = n)
```

Error in spread(amostra, key = a, value = n): object 'amostra' not found

```
sampld[is.na(sampld)] <- 0
```

Error in sampld[is.na(sampld)] <- 0: object 'sampld' not found

```
twoimpac <- sampld %>%  
  rename("1st area" = WEAR1_LOCATION, "2nd area" = WEAR2_LOCATION, "3rd area" = WEAR3_LOCATION,  
        "4th area" = WEAR4_LOCATION) %>%  
  adorn_totals(where = c("row", "col"), fill = "")
```

Error in rename(., `1st area` = WEAR1_LOCATION, `2nd area` = WEAR2_LOCATION, : object 'sampld' not found

```
table <- flextable(twoimpac)
```

Error in is.data.frame(data): object 'twoimpac' not found


```
table <- set_caption(table,caption = "Location of use-wear traces on Hammerstones, Nesher Ramla")
knit_print(table)
```

Warning: Warning: fonts used in `flectable` are ignored because the `pdflatex` engine is used and not `xelatex` or `lualatex`. You can avoid this warning by using the `set_flectable_defaults(fonts_ignore=TRUE)` command or use a compatible engine by defining `latex_engine: xelatex` in the YAML header of the R Markdown document.

Table 11: Location of use-wear traces on Hammerstones, Nesher Ramla

Typology	Impact marks	Polish	Striations	Mixed	Total
Abrader	1	8	2	0	11
Anvil	19	0	1	2	22
Chopper	11	0	0	0	11
Hammerstone	106	0	0	2	108
Pebble Pestle	1	0	0	0	1
Undefined	7	16	3	7	33
Total	145	24	6	11	186

```
# Choppers
a <- filter(db2nr, TYPOLOGY == "Chopper")
```

Error in filter(db2nr, TYPOLOGY == "Chopper"): object 'db2nr' not found

```
a <- select(a, WEAR1_LOCATION, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE, WEAR2_LOCATION)
```

Error in select(a, WEAR1_LOCATION, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE, : object 'a' not found

```
b <- a %>%
  unite(a, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE, sep = "/")
```

Error in unite(., a, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE, sep = "/"): object 'a' not found

```
amostra <- b %>%
  count(WEAR1_LOCATION, WEAR2_LOCATION,a)
```

Error in count(., WEAR1_LOCATION, WEAR2_LOCATION, a): object 'b' not found

```
sampld <- spread(amostra, key = a, value = n)
```

Error in spread(amostra, key = a, value = n): object 'amostra' not found

```
sampled[is.na(sampled)] <- 0
```

Error in sampled[is.na(sampled)] <- 0: object 'sampled' not found

```
twoimpac <- sampled %>%  
  rename("1st area" = WEAR1_LOCATION, "2nd area" = WEAR2_LOCATION) %>%  
  adorn_totals(where = c("row", "col"), fill = "")
```

Error in rename(., `1st area` = WEAR1_LOCATION, `2nd area` = WEAR2_LOCATION): object 'sampled' not found

```
table <- flextable(twoimpac)
```

Error in is.data.frame(data): object 'twoimpac' not found

```
table <- set_caption(table, caption = "Location of use-wear traces on Choppers, Nesher Ramla")  
knit_print(table)
```

Warning: Warning: fonts used in `flextable` are ignored because the `pdflatex` engine is used and not `xelatex` or `lualatex`. You can avoid this warning by using the `set_flextable_defaults(fonts_ignore=TRUE)` command or use a compatible engine by defining `latex_engine: xelatex` in the YAML header of the R Markdown document.

Table 12: Location of use-wear traces on Choppers, Nesher Ramla

Typology	Impact marks	Polish	Striations	Mixed	Total
Abrader	1	8	2	0	11
Anvil	19	0	1	2	22
Chopper	11	0	0	0	11
Hammerstone	106	0	0	2	108
Pebble Pestle	1	0	0	0	1
Undefined	7	16	3	7	33
Total	145	24	6	11	186

```
# Anvils  
a <- filter(db2nr, TYPOLOGY == "Anvil")
```

Error in filter(db2nr, TYPOLOGY == "Anvil"): object 'db2nr' not found

```
a <- select(a, WEAR1_LOCATION, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE, WEAR2_LOCATION,  
  WEAR3_MARKS_TYPE, WEAR3_LOCATION)
```

Error in select(a, WEAR1_LOCATION, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE, : object 'a' not found

```
b <- a %>%
  unite(a, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE,
        WEAR3_MARKS_TYPE, sep = "/")
```

Error in unite(., a, WEAR1_MARKS_TYPE, WEAR2_MARKS_TYPE, WEAR3_MARKS_TYPE, : object 'a' not found

```
amostra <- b %>%
  count(WEAR1_LOCATION, WEAR2_LOCATION,
        WEAR3_LOCATION, a)
```

Error in count(., WEAR1_LOCATION, WEAR2_LOCATION, WEAR3_LOCATION, a): object 'b' not found

```
sampld <- spread(amostra, key = a, value = n)
```

Error in spread(amostra, key = a, value = n): object 'amostra' not found

```
sampld[is.na(sampld)] <- 0
```

Error in sampld[is.na(sampld)] <- 0: object 'sampld' not found

```
twoimpac <- sampld %>%
  rename("1st area" = WEAR1_LOCATION, "2nd area" = WEAR2_LOCATION, "3rd area" = WEAR3_LOCATION) %>%
  adorn_totals(where = c("row", "col"), fill = "")
```

Error in rename(., `1st area` = WEAR1_LOCATION, `2nd area` = WEAR2_LOCATION, : object 'sampld' not found

```
table <- flextable(twoimpac)
```

Error in is.data.frame(data): object 'twoimpac' not found

```
table <- set_caption(table, caption = "Location of use-wear traces on Anvils, Nesher Ramla")
knit_print(table)
```

Warning: Warning: fonts used in `flextable` are ignored because the `pdflatex` engine is used and not `xelatex` or `lualatex`. You can avoid this warning by using the `set_flextable_defaults(fonts_ignore=TRUE)` command or use a compatible engine by defining `latex_engine: xelatex` in the YAML header of the R Markdown document.

Table 13: Location of use-wear traces on Anvils, Nesher Ramla

Typology	Impact marks	Polish	Striations	Mixed	Total
Abrader	1	8	2	0	11
Anvil	19	0	1	2	22
Chopper	11	0	0	0	11

Typology	Impact marks	Polish	Striations	Mixed	Total
Hammerstone	106	0	0	2	108
Pebble Pestle	1	0	0	0	1
Undefined	7	16	3	7	33
Total	145	24	6	11	186

End and Session info

```
sessionInfo()
```

```
R version 4.0.4 (2021-02-15)
Platform: x86_64-apple-darwin17.0 (64-bit)
Running under: macOS Catalina 10.15.7
```

```
Matrix products: default
```

```
BLAS: /Library/Frameworks/R.framework/Versions/4.0/Resources/lib/libRblas.dylib
```

```
LAPACK: /Library/Frameworks/R.framework/Versions/4.0/Resources/lib/libRlapack.dylib
```

```
locale:
```

```
[1] en_US.UTF-8/en_US.UTF-8/en_US.UTF-8/C/en_US.UTF-8/en_US.UTF-8
```

```
attached base packages:
```

```
[1] tools      stats      graphics  grDevices  utils      datasets  methods
[8] base
```

```
other attached packages:
```

```
[1] ggpubr_0.4.0    doBy_4.6.9      GGally_2.1.1    flextable_0.6.4
[5] janitor_2.1.0   knitr_1.31      forcats_0.5.1   stringr_1.4.0
[9] dplyr_1.0.5     purrr_0.3.4     readr_1.4.0     tidyr_1.1.3
[13] tibble_3.1.0    ggplot2_3.3.3   tidyverse_1.3.0
```

```
loaded via a namespace (and not attached):
```

```
[1] httr_1.4.2      jsonlite_1.7.2   carData_3.0-4    modelr_0.1.8
[5] assertthat_0.2.1 highr_0.8         cellranger_1.1.0 yaml_2.2.1
[9] gdtools_0.2.3   pillar_1.5.1     backports_1.2.1  lattice_0.20-41
[13] glue_1.4.2      uuid_0.1-4       digest_0.6.27    RColorBrewer_1.1-2
[17] ggsignif_0.6.1  rvest_1.0.0      snakecase_0.11.0 colorspace_2.0-0
[21] htmltools_0.5.1.1 Matrix_1.3-2     plyr_1.8.6       pkgconfig_2.0.3
[25] broom_0.7.5     haven_2.3.1      scales_1.1.1     openxlsx_4.2.3
[29] officer_0.3.17  rio_0.5.26       farver_2.1.0     generics_0.1.0
[33] car_3.0-10      ellipsis_0.3.1   withr_2.4.1      cli_2.3.1
[37] magrittr_2.0.1  crayon_1.4.1     readxl_1.3.1     evaluate_0.14
[41] fs_1.5.0        fansi_0.4.2      MASS_7.3-53.1    foreign_0.8-81
[45] rstatix_0.7.0   xml2_1.3.2       data.table_1.14.0 hms_1.0.0
[49] lifecycle_1.0.0 munsell_0.5.0    reprex_1.0.0     zip_2.1.1
[53] compiler_4.0.4  Deriv_4.1.3      systemfonts_1.0.1 rlang_0.4.10
```

[57]	grid_4.0.4	rstudioapi_0.13	labeling_0.4.2	base64enc_0.1-3
[61]	rmarkdown_2.7	gtable_0.3.0	abind_1.4-5	curl_4.3
[65]	DBI_1.1.1	reshape_0.8.8	R6_2.5.0	lubridate_1.7.10
[69]	utf8_1.2.1	stringi_1.5.3	Rcpp_1.0.6	vctrs_0.3.6
[73]	dbplyr_2.1.0	tidyselect_1.1.0	xfun_0.22	