In addition to the inferential information derived from the omnibus F-test, it is often useful to provide a measurement of effect size as well. In an ANOVA design a widely used effect size measurement is eta squared (η^2) as well as partial eta squared (η_p^2). So this function computes eta squared as well as partial eta squared.

rma_eta(rma_data, id = 1, append = FALSE)

As input parameter it needs a repeated measures data file which meets the above described requirements. It also contains the **id = 1** argument. If **append = TRUE** both effect size measures are added to the ANOVA-table.

Eta squared is basically the ANOVA equivalent to the determination coefficient R^2 and therefore interpretable as the proportion of variance in the depended variable which can be explained by the factor and for a one way repeated measures ANOVA it is computed as

$$\eta^2 = \frac{SS_{Factor}}{SS_{Error} + SS_{Subject} + SS_{Factor}}.$$

```
anova_table = rma(rma_data, id = id)[[1]]

SS_Factor = anova_table[2, 2]
SS_Error = anova_table[4, 2]
SS_K_Total = anova_table[6, 2]

# Compute standard eta^2
eta_sq = SS_Factor/SS_K_Total
```

In most cases where a repeated measures ANOVA is preferred to a ANOVA without repeated measures the effect of interest (factor effect) and therefore its sum of squares tends to be small in comparison to the between subject variance. If the aim is an effect size measure which only takes within subject variance into account, the partial eta square can be computed in the one way repeated measures ANOVA as

$$\eta_p^2 = \frac{SS_{Factor}}{SS_{Error} + SS_{Factor}}.$$

```
# Compute partial eta^2
eta_partial = SS_Factor/(SS_Factor + SS_Error)
```

The results of the computational steps described above are summarized in a table, which is later returned by the function.

```
# Create separate table for effect sizes
effect_size_table = data.frame(check.names = FALSE, Source = "Factor", `eta squared` =
        eta_sq, `partial eta squared` = eta_partial)
rownames(effect_size_table) = NULL
```

However for a repeaded measures ANOVA the so called generalized eta squared is recommended by Bakeman (2005; see also Olejnik & Algina, 2003), since it allows a comparison of effect sizes between different designs. Luckily in the one way ANOVA the generalized eta squared is equal to eta squared. So the function will eventually return the tables with both effect size measures. If the function argument **append = TRUE** the ANOVA table with both effect size measures attached will be provided as well.

```
if (append == TRUE) {
	return(anova_table)
} else {
	return(effect_size_table)
}
```

For the analysis of the Ringelmann-data $\eta^2 = X$, which indicated that X% of the variation in the depended variable can be explained by the factor levels. If only the within subject variance is considered as explainable variation in the depended variable $\eta_p^2 = X$, which indicates that X% of the within subject variation in the depended variable can be explained by the factor levels. Necessarily $\eta^2 \leq \eta_p^2$ will always hold.

Literature

Bakeman, R. (2005). Recommended effect size statistics for repeated measures designs. *Behavior Research Methods*, 37, 379-384.

Olejnik, S. & Algina, J. (2003). Generalized eta and omega squared statistics: Measures of effect size for some common research designs. *Psychological Methods*, 8, 434-447.