SUPPLEMENTAL ANALYSIS OF RCJ RESOLUTION

Alternatives to Goodman-Kruskal Gamma Correlations

Resolution refers to the within-person correlation of judgments with outcomes (Nelson, 1984). For a given individual, is a higher metacognitive judgment associated with a better outcome? As noted in the main paper, we used Goodman-Kruskal gamma correlations to capture RCJ resolution with respect to recognition memory. Gamma correlations have been critiqued as indices of resolution (Benjamin & Diaz, 2008; Masson & Rotello, 2009).

We also calculated a series of alternative statistics intended to capture the resolution (relative accuracy) of RCJs with respect to recognition memory that can be compared to the gamma correlations reported in this paper. These measures are primarily based on applications of Signal Detection Theory. They are listed below and data are provided in Table S1). For some calculations, it was necessary to first bin the continuous RCJs into 6 groups of roughly equal sizes and then calculate "Type-2" hit and false alarm rates (e.g. Benjamin & Diaz, 2008). We binned these judgments for each participant to account for idiosyncrasies in how learners use the continuous 0 to 100 RCJ rating scale. We provide both aggregate (i.e. estimated resolution for all ratings within each group) and estimated resolution separately for the Shared and Distinctive condition. The different indices agree in indicating greater RCJ resolution for people who engaged in distinctive encoding at study. They also are in good agreement indicating no age deficits in RCJ resolution. Hence the results we report in the main paper are robust with respect to variations in the specific method of measuring RCJ resolution.

The different measures we report are defined as follows:

- *Area Under the Curve (AUC)*[*†]: Cumulative type-2 hit (HRs) and false alarm rates (FARs) are translated into a receiver-operator characteristic (ROC) curve against a horizontal line with a slope of 1 emanating from the origin (Benjamin & Diaz, 2008). The area under the curve is then calculated assuming that there are Gaussian correct and incorrect response distributions. Values range between 0.0 and 1.0, with values over 0.5 indicating above-chance metamemory accuracy.
- A_g[†]: Calculates a non-parametric alternative to area under the curve that is agnostic to the shape of the HR and FAR distributions. Each coordinate on the curve is used to calculate the area using the trapezoidal rule (Pollack & Hsieh, 1969).
  - $A_g = 0.5[\sum_{k=0}^{n}(HR_{k+1} + HR_k) * (FAR_{k+1} - FAR_k)]$
- A_z[†]: Also estimates area under the curve using type-2 ROC values transformed using a cumulative normal distribution function (Stanislaw & Todorov, 1999).
  - $A_z = \Phi\left[\frac{h_0}{\sqrt{1+m^2}}\right]$
- d_a[†]: Calculates area under the curve in a type-2 ROC function via a monotonic transformation of the HRs and FARs. The metric is argued to be equally valid for data with distributions that are assumed to have equal or unequal variances (Benjamin & Diaz, 2008; Masson & Rotello, 2009), which is typically the case with recognition memory ROCs. In theory, large, positive d_a values reflect greater distance of the person's ROC curve from a chance-baseline when the ROC crosses the midpoint at a level of neutral bias. Higher values indicate greater metamemory accuracy.
  - $d_a = \Phi\left[\frac{\sqrt{2}*h_0}{\sqrt{1+m^2}}\right]$, or

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[*] Calculated using raw judgments.
[†] Calculated using binned judgments.

- $d_a = \sqrt{\frac{2}{1+m^2}} * \Phi[HR - (FAR * m)]$

- $G*$[‡]: Benjamin and Diaz's (2008) alternative to the Goodman-Kruskal gamma that corrects for non-linearity. (Also called *V* by Nelson, 1984).
  - $G^* = log\left(\frac{\gamma + 1}{1 - \gamma}\right)$

[‡] Calculated using raw judgments.

Table S1. Alternative metacognitive accuracy measures for RCJs. These are computed for each participant and then presented as means averaging over persons. Parametric standard errors of these mean values are provided in parentheses.

	OA – 2 Day Delay			YA – 2 Day Delay			YA – 7 Day Delay		
	All	Shared	Distinctive	All	Shared	Distinctive	All	Shared	Distinctive
AUC*	0.69 (0.02)	0.64 (0.02)	0.76 (0.03)	0.75 (0.03)	0.68 (0.03)	0.82 (0.03)	0.68 (0.01)	0.61 (0.02)	0.75 (0.02)
AUC†	0.68 (0.02)	0.65 (0.02)	0.71 (0.03)	0.72 (0.03)	0.66 (0.04)	0.79 (0.04)	0.67 (0.01)	0.61 (0.01)	0.74 (0.02)
A_g	0.62 (0.03)	0.58 (0.04)	0.67 (0.04)	0.52 (0.03)	0.52 (0.03)	0.53 (0.05)	0.63 (0.02)	0.56 (0.02)	0.69 (0.02)
A_z	0.71 (0.07)	0.50 (0.10)	0.97 (0.08)	0.56 (0.09)	0.24 (0.10)	0.87 (0.11)	0.54 (0.06)	0.33 (0.08)	0.74 (0.09)
d_a	1.00 (0.10)	0.71 (0.14)	1.37 (0.11)	0.80 (0.13)	0.34 (0.13)	1.23 (0.16)	0.76 (0.09)	0.47 (0.12)	1.05 (0.12)
G*	1.28 (0.13)	0.88 (0.12)	1.71 (0.22)	1.42 (0.20)	0.93 (0.23)	1.95 (0.28)	0.96 (0.10)	0.49 (0.10)	1.30 (0.16)