

## Appendix

### Appendix A

Errors from going against the recognition heuristic can result from both (a) over- or underuse of the recognition heuristic (e.g., going against the recognition heuristic 20% of the time when  $\alpha = .90$  must necessarily lead to errors) and (b) lack of sensitivity (nonuse in wrong cases). Perfect accuracy can only be achieved if both the extent of use of the recognition heuristic matches exactly the level of  $\alpha$  and the heuristic is suspended precisely in those cases where the unrecognized object has the higher criterion value. If the degree of adherence to the recognition heuristic (denoted as  $k$ , defined as the proportion choices in line with the recognition heuristic when it was applicable) does not match  $\alpha$ , errors will inevitably occur. Index  $c$  expresses the sensitivity of the use of the recognition heuristic irrespective of over- and underuse, respectively.

The expected accuracy  $E(\text{Accuracy}_{\text{randuse}})$  with a random nonuse of the recognition heuristic given the person's  $\alpha$  and use of the recognition heuristic  $k$  is calculated by

$$E(\text{Accuracy}_{\text{randuse}}) = \alpha \times k + (1 - \alpha) \times (1 - k) \quad (1)$$

With a perfectly sensitive non-use, leading to the maximum accuracy with a given  $k$  and  $\alpha$

$$\max \text{Accuracy}_{\alpha,k} = \begin{cases} 1 \times k + (1 - \alpha) \times \frac{(1 - \alpha)}{(1 - k)} \times (1 - k) & k < \alpha \\ \frac{\alpha}{k} \times k + 1 \times (1 - k) & k \geq \alpha \end{cases} \quad (2)$$

or

$$\max \text{Accuracy}_{\alpha,k} = \begin{cases} k + (1 - \alpha)^2 & k < \alpha \\ \alpha + (1 - k) & k \geq \alpha \end{cases} \quad (3)$$

$c$  expresses the actual accuracy (when recognition discriminates) proportional to the accuracy that a person would have achieved by not using the recognition heuristic randomly, minus the accuracy achievable by chance alone. It is defined as

$$c = \frac{\text{Accuracy}_{\text{RHapplicable}} - E(\text{Accuracy}_{\text{randuse}})}{\max \text{Accuracy}_{\alpha,k} - E(\text{Accuracy}_{\text{randuse}})} \quad (4)$$

The correlations of  $c$  with  $d'$ , a parametric SDT sensitivity measure, and  $A'$ , a non-parametric accuracy measure (Pollack & Norman, 1964), were  $r = .91$  and  $r = .90$ , respectively.

## Appendix B

The classification works as follows. For each mechanism  $k \in \{\text{RECALL (Guess), EQW (Guess), RECALL-EQW, EQW-RECALL}\}$  and each individual the likelihood is calculated that the vector of choices by the individual was produced by the mechanism. More specifically, it determines for each item type  $j$  (defined by the pattern of predictions made by the tested mechanisms for the item type) the likelihood of  $n_{jk}$ , the observed number of choices for item type  $j$  that are in line with the mechanism  $k$ . For the application of a strategy an application error  $\varepsilon_k$  was included. The application error  $\varepsilon_k$  is determined simply by the proportion of errors, that is, the relative frequency of choices that are not in line with the prediction of the mechanism:  $\hat{\varepsilon}_k = n - n_k$ , with  $n$  referring to the number of comparisons and  $n_k$  to the number of choices that are in line with the prediction of mechanism  $k$ .

The overall likelihood for each mechanism is then calculated by multiplying the likelihoods across all item types:

$$L_k = p(n_{jk} | k, \varepsilon_k) = \prod_{j=1}^J \binom{n_j}{n_{jk}} \times (1 - \varepsilon_k)^{n_{jk}} \times \varepsilon_k^{(n_j - n_{jk})} \quad (5)$$

A participant is assigned to the mechanism with the highest likelihood. Instead of the likelihoods, Table A reports for each mechanism and participant the  $G^2$ , a measure of fit calculated by  $G^2 = (-2) \times \ln(L_k)$ .  $G^2$  is equivalent to twice the difference between the maximum possible log likelihood (= 1) and the obtained log likelihood (e.g., Ratcliff & Smith, 2004). A participant is assigned to the mechanism with the lowest  $G^2$ .

Table A. Classification of participants based on the fits of the 4 compound mechanisms and, for comparison, the classification to the six mechanisms based on the number of comparisons won.

part#	$\epsilon$	$G^2 (= -2LL)$				Mechanism with highest likelihood	Classification when prediction after Step 1 possible
		EQW (guess)	RECALL (guess)	EQW-RECALL	RECALL-EQW		Mechanism(s) with most points
#1	.24	55.58	42	45.03	43.37	RECALL (guess)	SCH-Group
#2	.30	26.63	45.71	22.33	17.81	RECALL-EQW	RECALL, SCH-Group, SCH-Contact
#3	.31	26.64	72.83	44.01	70.9	EQW (guess)	EQW, WADD
#4	.26	58.93	54.44	54.73	37.27	RECALL-EQW	SCH-Group
#5	.22	77.91	49.75	61.1	49.22	RECALL-EQW	SCH-Group
#6	.16	81.39	108.6	60.72	89.52	EQW-RECALL	EQW, RECALL
#7	.26	89.33	63.32	89.44	59.96	RECALL-EQW	RECALL
#8	.32	34.07	38.71	38.85	31.35	RECALL-EQW	RECALL, SCH-Group, SCH-Contact
#9	.32	47.18	43.8	46.98	29.81	RECALL-EQW	RECALL, SCH-Contact
#10	.37	30.72	39.57	33.4	37.67	EQW (guess)	EQW, WADD
#11	.16	25.97	174.51	27.18	40.49	EQW (guess)	EQW, WADD
#12	.19	45.93	91.23	46.92	41.13	RECALL-EQW	RECALL
#13	.22	31.43	95.74	33.33	15.12	RECALL-EQW	RECALL
#14	.22	57.12	102.04	48.54	37.55	RECALL-EQW	RECALL, SCH-Group
#15	.24	83.48	61.05	68.09	44.96	RECALL-EQW	RECALL, SCH-Contact
#16	.32	47.06	49.86	44.34	40.45	RECALL-EQW	SCH-Group
#17	.37	46.94	62.94	48.09	40.17	RECALL-EQW	SCH-Contact
#18	.28	31.44	60.66	29.09	27.23	RECALL-EQW	RECALL, SCH-Group
#19	.26	31.78	126.53	62.55	113.39	EQW (guess)	EQW, WADD
#20	.30	60.3	47.95	56.88	39.69	RECALL-EQW	RECALL, SCH-Group, SCH-Contact
#21	.35	32.54	44.42	28.84	41.34	EQW-RECALL	TTB
#22	.32	52.96	42.24	52.04	35.44	RECALL-EQW	SCH-Group
#23	.16	30.66	155.79	54.03	110.68	EQW (guess)	EQW, WADD
#24	.17	36.68	169.14	34.11	124.98	EQW-RECALL	TTB
#25	.33	44.81	40.12	43.37	40.89	RECALL(guess)	RECALL, SCH-Contact
#26	.39	38.14	32.86	36.79	32.81	RECALL-EQW	SCH-Group
#27	.19	39.09	178.42	25.27	151.41	EQW-RECALL	EQW, WADD
#28	.28	41.64	32.4	36.43	38.46	RECALL (guess)	RECALL
#29	.26	30.59	96.77	28.76	80.18	EQW (guess)	EQW, WADD
#30	.25	33.43	55.22	37.09	52.48	EQW (guess)	EQW, WADD, TTB
#31	.31	33.33	44.06	31.64	22.03	RECALL-EQW	RECALL, SCH-Contact
#32	.26	63.77	86.18	60.72	60.72	EQW-RECALL	RECALL
#33	.31	31.75	37.56	29.12	23.39	RECALL-EQW	RECALL
#34	.38	22.41	37.87	23.73	32.37	EQW (guess)	EQW, WADD
#35	.17	24.44	96.27	33.7	74.62	EQW (guess)	EQW, WADD
#36	.37	36.24	33.42	33.86	27.12	RECALL-EQW	SCH-Group, SCH-Contact
#37	.06	86.49	54.63	78.91	65.71	RECALL (guess)	RECALL, SCH-Group
#38	.51	43.36	50.43	43.88	46.05	guessing	RECALL, SCH-Group
#39	.37	31.78	28.12	30.66	27.75	RECALL-EQW	SCH-Group
#40	.24	44.74	44.15	44.31	44.31	RECALL (guess)	RECALL