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Rethinking the Consistency Assumptions of the Process-Dissociation Procedure

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According to the process-dissociation procedure (Jacoby, 1991), both conscious *(R)* and unconscious *(A)* components of memory can be estimated by contrasting the performance in an inclusion condition with that in an exclusion condition. In formal terms, the probabilities of completing a stem with a studied word in the inclusion test *(I)* and in the exclusion test *(E)* condition are

$$P(I) = R + A\,(1 - R); \quad P(E) = A\,(1 - R)$$

Given these two conditions, the probabilities of conscious recollection *(R)* and automatic influence *(A)* will be

$$R = P(I) - P(E); \quad A = P(E)\,/\,(1-R)$$

The above calculations are based on three critical assumptions; (1). The criterion for responding on the basis of automatic influences are equivalent in the inclusion and exclusion conditions ($Ain = Aex$); (2). Participants are equally likely to attempt to recollect previously studied items in the inclusion and exclusion conditions ($Rin = Rex$), (3). Automatic memory processes and recollection are independent, that is, the probability of *A* does not depend on the probability of *R*. (e.g., Jacoby, 1991; Jacoby et al, 1993). The first two assumptions have been referred to as the consistency assumption (Dodson & Johnson, 1996).

To deal with the problem of violating consistency assumptions, we make a distinction between the estimated probabilities, P'(I) and P'(E), which are data from experiments, and the true probabilities, P(I) and P(E), which are values derived from the logic of the process dissociation model given no violation of consistency assumptions. We first derived mathematically the true probabilities of I and E. These two values were theoretical probabilities assuming that the inclusion and exclusion performance are measured concurrently and thus the underlying assumptions are always met. We then found the relationship between the estimated probabilities and the true probabilities: P(I) = P'(I); P(E) = P'(I) P'(E)

Analyses of Curran and Hintzman (1995) Based on the Concurrent Measurement

This study reports the results from reanalysing Curran & Hintzman's (1995) data to demonstrate that our approach is feasible and in a way solves the problem of the violation of consistency assumptions in the process dissociation procedure. The original results and the new calculated R and A are presented in Table 1.

Curran & Hintzman (1995) manipulated the presentation duration in five experiments. Previous studies have suggested that recollection increases with the presentation duration, but automatic priming does not. However, since there was a violation of the assumptions, they found that the estimate of A' decreased as the presentation duration (and thus R') increased based on both the participant means and the item means. This was particularly evident in the full sample case in which significant negative duration effects of A were revealed in all five experiments except for Experiment 4. Once again, when the assumptions were violated, there was an underestimate of A' as R' increases.

On the other hand, in both Tables 1 and 2, based on the logic of the concurrent measurement, the new calculated A remained constant across presentation durations in Experiments 1, 2, and 3. As for Experiment 4, the presentation duration may have had some real, positive effect on automatic influences, thus the true A was larger for the long duration condition than for the short duration condition. Once again, our new approach enabled us to provide a more reasonable estimate of A even from a full sample.

Table 1 Means of R and A Computed from Participant Means

from Curran & Hintzman (1995)

	R			A		
Exp.	new	1s	10s	new	1s	10s
1	.01	.17	.32	.12	.16	.12
2	.02	.20	.40	.11	.18	.13
3	.12	.32	.50	.30	.31	.23
4	.00	.19	.35	.30	.36	.35
5	.05	.33	.47	.32	.32	.20

from Concurrent Measurement

	R			A		
Exp.	new	1s	10s	new	1s	10s
1	.11	.26	.37	.02	.06	.06
2	.12	.30	45	.02	.08	.08
3	.30	.42	.55	.11	.19	.18
4	.21	.34	.45	.12	.23	.27
5	.25	.43	.52	.15	.21	.15

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