PSYC 5303 – Lecture 10

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Multiple processes in memory tasks?

Larry Jacoby (1991) argued that memory tasks are not "process pure"

Consider a *stem completion task*:

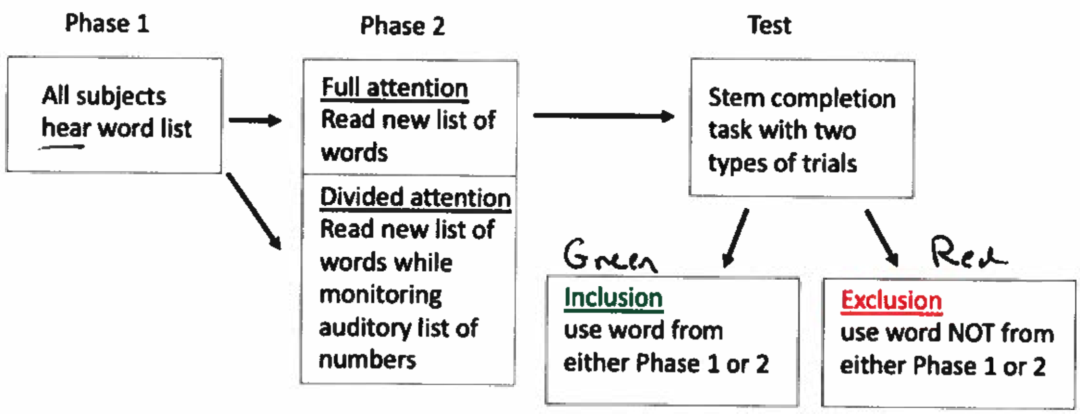
- participant sees word stem: HOR__
  - can be responded to in many ways
    - HORSE, HORDE, etc.
  - does performance reflect **intentional** memory processes?
  - or, does performance reflect **automatic (unconscious)** processes?
  - how can we separate the contribution of each?

To solve this problem, Jacoby developed the **process dissociation procedure**

- a combination of experimental manipulation and mathematical modeling

Process dissociation procedure

Jacoby, Toth, & Yonelinas (1993):



Observed data:

Table 5.4 The probability of completing the stem with a studied item on both inclusion and exclusion tests for experiments

	Performance Component			
	Phase 2		Phase 1	
	Read		*Heard*	
Attention	*Inclusion*	*Exclusion*	*Inclusion*	*Exclusion*
Full	0.61	0.36	0.47	0.34
Divided	0.46	0.46	0.42	0.37

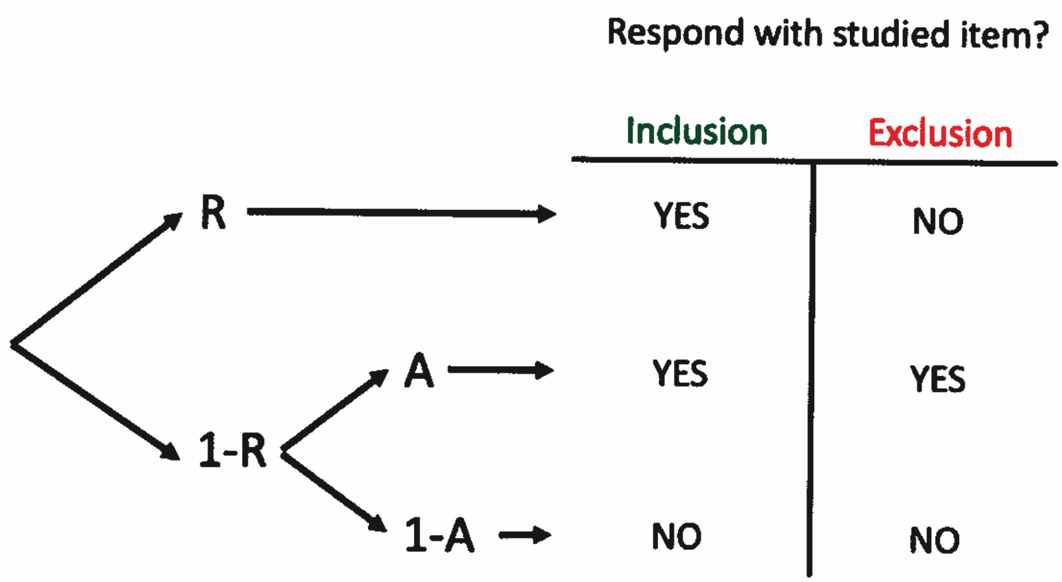
NOTE: "Read" and "Heard" correspond to whether the item came from Phase 1 or Phase 2 of presentation.

SOURCE: Jacoby, Toth, & Yonelinas (1993).

Separating intentional and automatic processing

Consider a processing tree.

- let R = probability of responding from intentional (recollective) processing
- let A = probability of responding from automatic processing



From data to model-based estimates

From an experiment, we observe two quantities:

- P_{inc} = proportion of list words used in Inclusion condition
- P_{exc} = proportion of list words used in Exclusion condition

This gives two equations:

$$P_{\text{inc}} = R + A(1-R) \qquad (1)$$

$$P_{\text{exc}} = A(1-R) \qquad (2)$$

substitute (2) into (1)

$$P_{\text{inc}} = R + P_{\text{exc}}$$

or $$\boxed{R = P_{\text{inc}} - P_{\text{exc}}} \qquad (3)$$

Now solve (2) for A and sub. (3) into it:

$$P_{exc} = A(1-R)$$

$$A = \frac{P_{exc}}{1-R}$$

$$\boxed{A = \frac{P_{exc}}{1 - P_{inc} + P_{exc}}}$$

Let's estimate R, A from some data:

Consider the Jacoby et al. (1993) "read" data:

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SOURCE: Jacoby, Toth, & Yonelinas (1993).

Full attention: $R = P_{inc} - P_{exc} = 0.61 - 0.36 = 0.25$

$$A = \frac{P_{exc}}{1 - P_{inc} + P_{exc}} = \frac{0.36}{1 - 0.61 + 0.36} = 0.48$$

Divided attention: $R = P_{inc} - P_{exc} = 0.46 - 0.46 = 0$

$$A = \frac{P_{exc}}{1 - P_{inc} + P_{exc}} = \frac{0.46}{1 - 0.46 + 0.46} = 0.46$$