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Capacity Coefficient Variations

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Available at: https://works.bepress.com/joseph_houpt/29/



Unlimited capacity UC The resources available to process each part are the same regardless of the number of parts. Stochastic independence among the processing times of the parts. Independence

P Parts are processed at the same time (as opposed to sequentially). Parallel

The standard capacity coefficient [2, 3] is based on the predicted performance of an unlimited capacity, independent, parallel processing model.

- There are analogous measures for exhaustive processing models [3].
- Statistical testing is done using a weighted, integrated difference between the hazard functions [1].
- The same basic test can be used for any of these varieties of capacity coefficient.



CAPACITY COEFFICIENT VARIATIONS

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	$\left \frac{AV}{A+V} \right $	$\frac{\mathrm{AV}}{\mathrm{V}}$	$\frac{AV}{A}$	$\frac{AV}{AV}$	$\frac{\mathrm{AV}}{\mathrm{AV}}$	$\frac{AV}{AV+A}$
86	<	>	<	>	<	<
31	<	>	<	>	\sim	<
28	<	>	<	>	>	>
22	<	>	<	>	>	\sim
17	<	>	<	>	>	<
15	<	>	<	>	\sim	\sim

the quantile of the test statistic.

$$\frac{\mathrm{AV}}{\mathrm{A}}$$

Null model: $H_{AV}(t) = H_A(t)$

- (UC) Unlimited Capacity Independent Processing of Targets Serial Processing of Targets in Fixed Order
- Useful when one source is always present (e.g., if the second target alone is too difficult to detect). • Does not measure any effect of distractors.
- Possible Explanations for AV > A:
- More resources available for parts in context.
- Facilitation between parts (Extreme case: coactive
- Parallel processing (particularly with Vfaster than
- Possible Explanations for AV < A:
- Fewer resources available for parts in context.
- Inhibition between parts.
- Serial processing.

Possible Explanations for AV > AV: • Facilitation between targets.

- Parallel processing (particularly with Vfaster than
- Serial processing in random order or fixed order (V then A).
- Possible Explanations for AV < AV:
- Negative cross-talk
- Inhibition between targets.
- Distractor on one channel facilitates targets on the other.

• Facilitation between targets.

• Negative cross-talk.

• Serial processing.

Possible Explanations for AV < AV + AV:

FIGURE 2: Correlations among the varieties of capacity measures. A(V) indicates responses times were from trials with audio (visual) targets. A(V) indicates responses times were from trials with

[1] J. W. Houpt and J. T. Townsend. Statistical measures for workload capacity analysis. Journal of

[2] J. T. Townsend and G. Nozawa. Spatio-temporal properties of elementary perception: An investigation of parallel, serial and coactive theories. Journal of Mathematical Psychology, 39:321–360,

[3] J. T. Townsend and M. J. Wenger. A theory of interactive parallel processing: New capacity measures and predictions for a response time inequality series. *Psychological Review*, 111:1003–1035,

Null model: $H_{A(\mathbf{V})}(t) = H_A(t)$

Predicted by:

- (UC) Unlimited Capacity
- (I) Independent Processing of Target and Distractor (P) Parallel Processing

(Sf) Serial Processing in Fixed Order

- Possible Explanations for AV > A:
- More resources available for parts in context.

• Negative cross-talk.

Possible Explanations for AV < A:

- Distractors inhibiting targets.
- Fewer resources available for parts in context.