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Title: Positive or Correlated Channels in Parallel Race Systems: Help or Hurt?

Abstract: It's been known for some time that independent and perceptually separable channel dimensions can produce redundancy gains in that

Performance (2 signals) > Performance (1 signal) (1)

Hence, Wendell Garner's ingenious but incomplete thesis that (1) implies configurality (i.e., integral dimensions) is not quite right. (His 'Garner filtering speeded classification method did not suffer this artifact.) However, when performance is better than probability summation we call that "super capacity" with our C(t)>1. When the Miller race inequality is violated, super capacity is present but super capacity does not imply Miller's race inequality (Miller, 1982). Super capacity can be due to correlations between channel times and/or channel processing activations (e.g., Colonius, 1990; Townsend & Wenger, 2004; Eidels, Houpt, Altieri, Pei, and Townsend, 2011). Paradoxically (actually we have here an *antinomy* rather than a true paradox), in some cases a negative correlation causes high super capacity and in others a positive correlation does so. This talk indicates how and why, with actual dynamic systems lending nice examples.

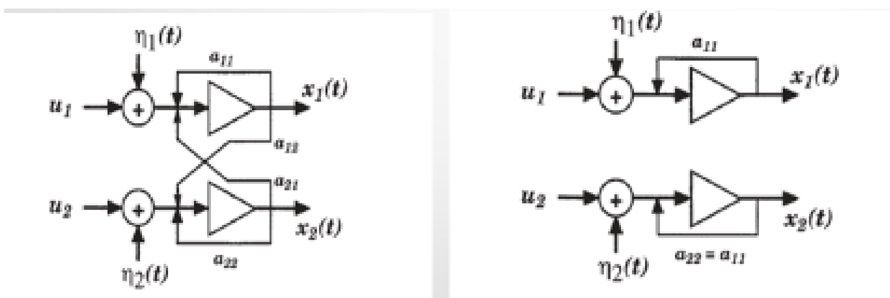

Table 2

Major Empirical and Theoretical Regularities and Relationships to Be Considered

Relationship	Description
$P_{AB}(T_A \le t \text{ OR } T_B \le t) = P_{AB}[\min(T_A, T_B) \le t] \le P_A(T_A \le t) + P_B(T_B \le t)$	Miller inequality (bound; e.g., Miller, 1982)
$P_{AB}(T_A \le t \text{ OR } T_B \le t) = P_A(T_A \le t) + P_B(T_B \le t) - P_A(T_A \le t)P_B(T_B \le t)$	Prediction for first-terminating processing, assuming UCIP
$P_{AB}(T_A \le t \text{ OR } T_B \le t) \ge \max[P_A(T_A \le t), P_B(T_B \le t)]$	Grice inequality (bound; Grice, Canham, & Boroughs, 1984; Grice, Canham, & Gwynne, 1984)
$P_A(T_A \le t) + P_B(T_B \le t) - 1 \le P_{AB}(T_A \le t \text{ AND } T_B \le t) \le \min[P_A(T_A \le t), P_B(T_B \le t)]$	Colonius–Vorberg inequalities (bounds; Colonius & Vorberg, 1994)
$C_o(t) = \dfrac{H_{AB}(t)}{H_A(t) + H_B(t)}$	Capacity coefficient, OR task
$C_a(t) = \dfrac{K_A(t) + K_B(t)}{K_{AB}(t)}$	Capacity coefficient, AND task

Note. UCIP = unlimited capacity, independent, parallel.