First-trial priming effects in task-switching: A source-activation model

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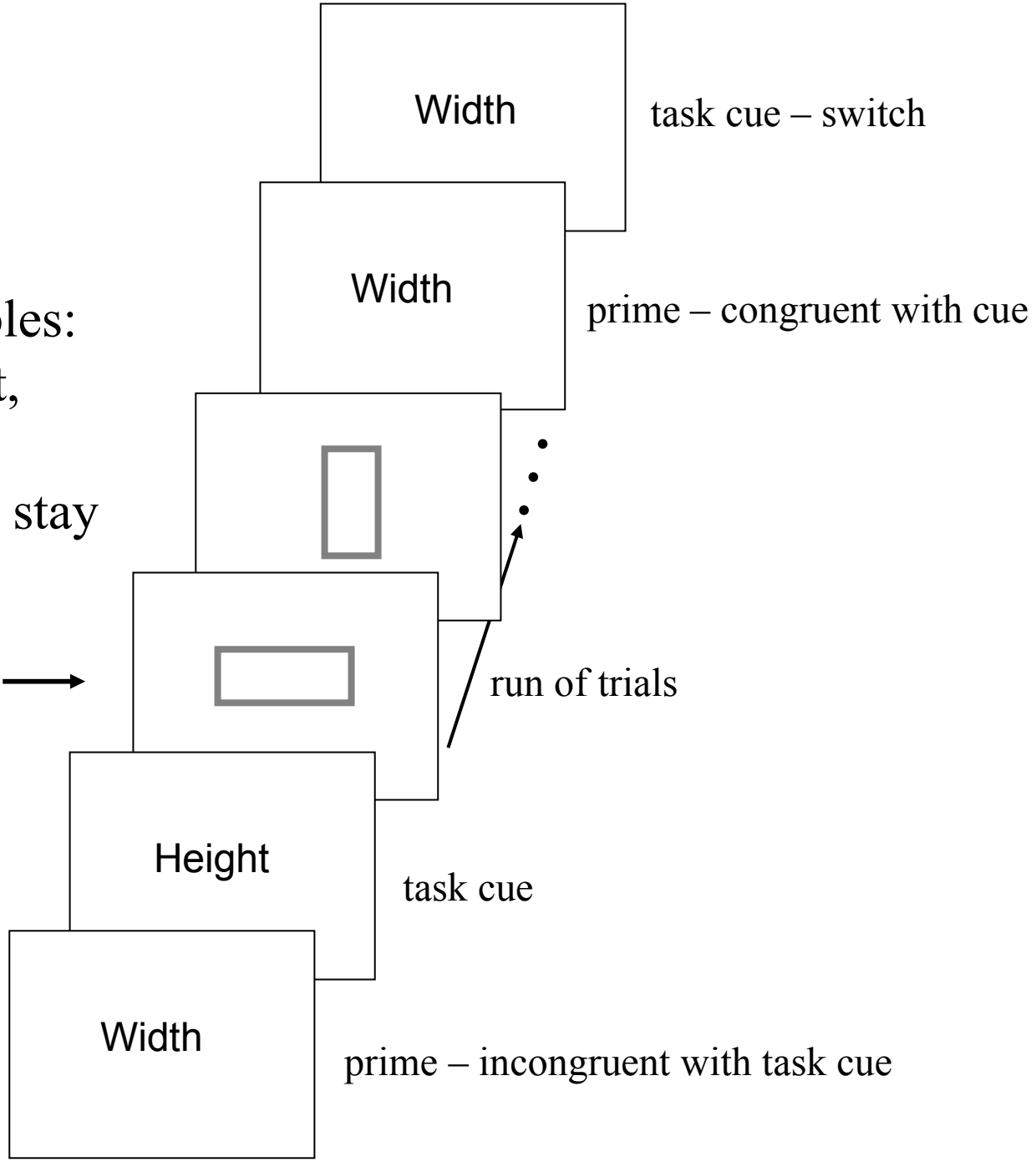
Task switching

- One aspect of cognitive control
- Literature is dominated by *switch cost*
  - Performance penalty when the task switches from one trial to the next
  - Operating time for the switching homunculus (e.g., Monsell, 2003)
  - The tail wagging the dog — must look beyond switch cost to more basic effects and processes (Altmann, 2003; Altmann & Gray, under review)

Trial line

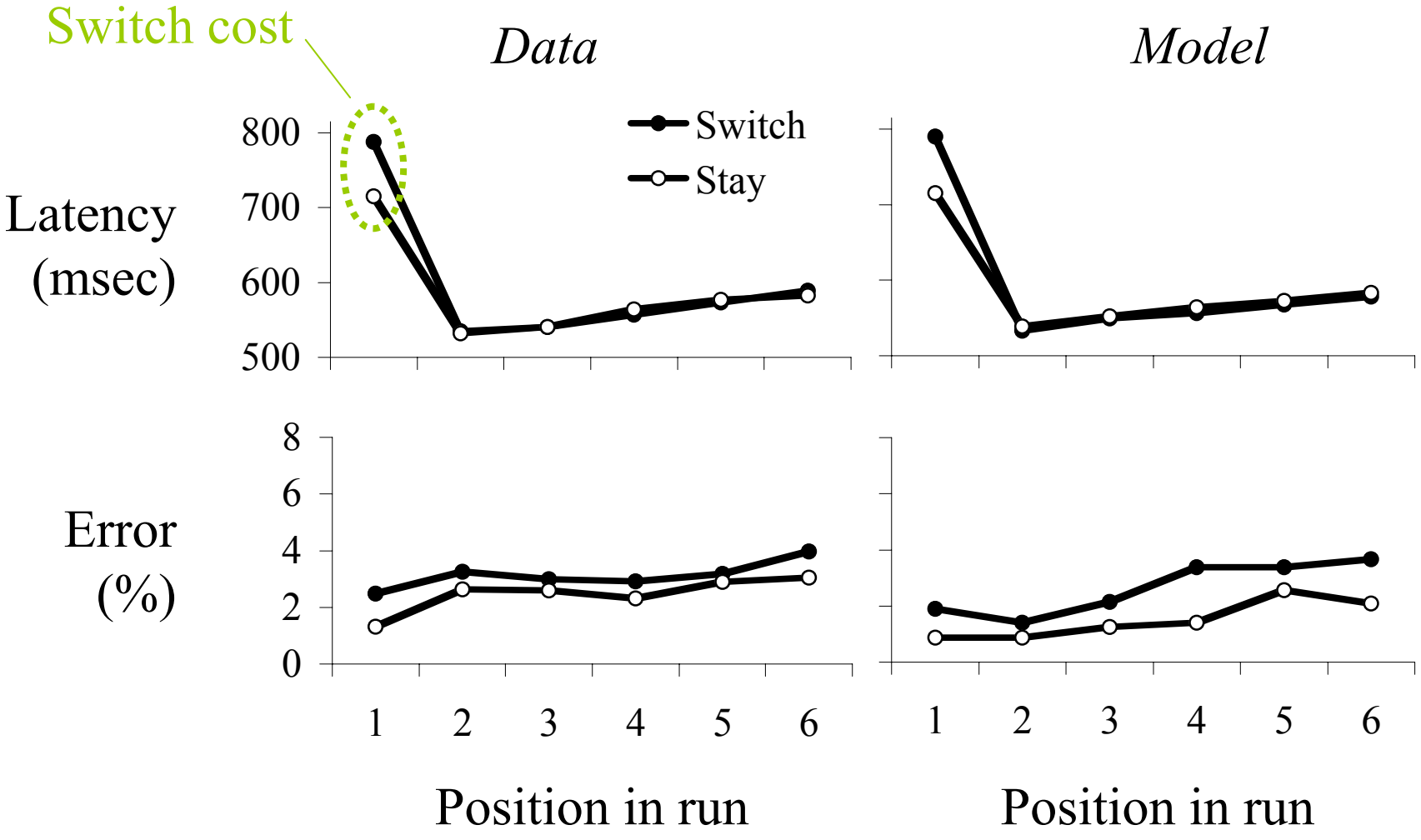
Independent variables:
Prime: incongruent, congruent, neutral
Continuity: switch, stay

Primary measure:
First-trial latency →

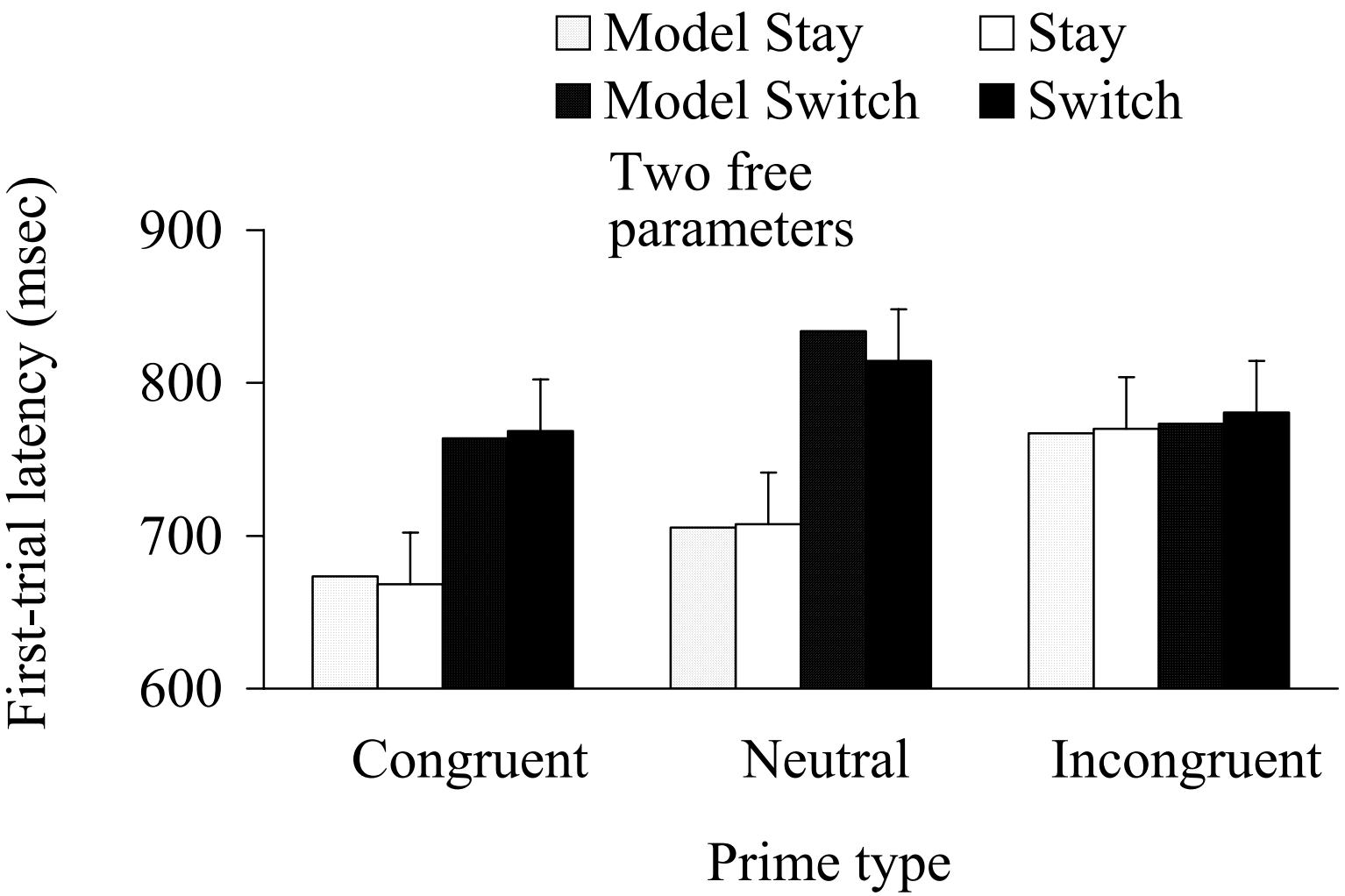


Basic phenomena

(see Altmann, 2002; Altmann & Gray, under review)



First-trial priming effects



A source-activation account

old task	prime	task cue	conflicting sources in focus	predicted rank
...A	A	A	**0**	1
...A	B	B	**1**	3
...A	N	A	**.5**	2
...A	N	B	**1.5**	4
...A	B	A	**1**	3
...A	A	B	**1**	3

Other mechanisms

- Conflicting sources increase interference
  - Formalized as the *interference level*
    (Altmann & Trafton, 2002)
- Causing the retrieval threshold to increase
  - Through *threshold adaptivity*, an architectural response to increased interference
    (Altmann, ACT-R 2000)
- Prolonging the cue-activation process
  - A time-consuming series of massed retrievals
    (Altmann & Gray, under review)

Conclusions

- An explanation of first-trial priming effects
  - Within a broader, memory-based model of cognitive control
- A somewhat involved explanation
  - But invokes no brand new mechanisms (all have other applications)
  - And it runs

References

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