

Influence of Participant Response Strategies on Effects of Secondary Tasks

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Abstract

Previous investigation on examining concurrence costs in secondary tasks following quick reactions indirectly found that speed-accuracy trade-off strategies by participants influenced results (Hendrick, 2008). The purpose of this study was to more systematically identify the strategies used by participants in order to examine its effect on RT performance followed by speeded and non-speeded secondary tasks.

Participants ($N=26$) were tested on two days with 30 trials per condition each day. In response to a visual stimulus, they moved their hand to a button as quickly as possible. In the secondary task conditions, they then picked up a small object and pressed a second button as quickly as possible (speeded) or at their leisure (non-speeded). After testing on day 2, they were given a short survey about the strategies they used. RTs under the four conditions were compared: Control (simple RT), 2-choice go/no-go, and 2-choice go/no-go followed by a non-speeded secondary task and followed by a speeded secondary task.

There was a significant condition effect ($p < .05$) with simple RT the fastest condition overall ($M=275$ ms, $SE=7.9$ ms) and the non-speeded secondary task the slowest ($M=423$ ms, $SE=16.0$ ms). There was no significant difference between the go/no-go and the speeded secondary task conditions ($M=377$ ms, $SE=9.8$ ms and $M=365$ ms, $SE=10.0$ ms, respectively). When comparing RT based on the self-disclosed strategies in the speeded condition, there were no significant differences. In the non-speeded secondary task condition however, RT did differ significantly based on the strategy used ($p < .05$). Participants who indicated that they focused on reacting quickly were significantly faster than those who indicated they focused more on leisurely picking up the object rather than on reacting ($M=354$ ms, $SE=20.3$ ms and $M=449$ ms, $SE=16.0$ ms, respectively). When reanalyzing the data for the eight participants who in fact followed the instructions (to react as quickly as possible), simple RT was still the fastest ($M=256$ ms, $SE=4.9$ ms), however there was no significant differences among the other three 2-choice conditions.

When controlling for strategies used, results support earlier findings that performing a secondary task (in this case speeded or non-speeded) did not delay the initial response. Since results did in fact vary across subjects, researchers can not assume that participants are always following the given instructions.



Figure 1. MOART reaction/movement time apparatus (Lafayette Instrument, model 35600)

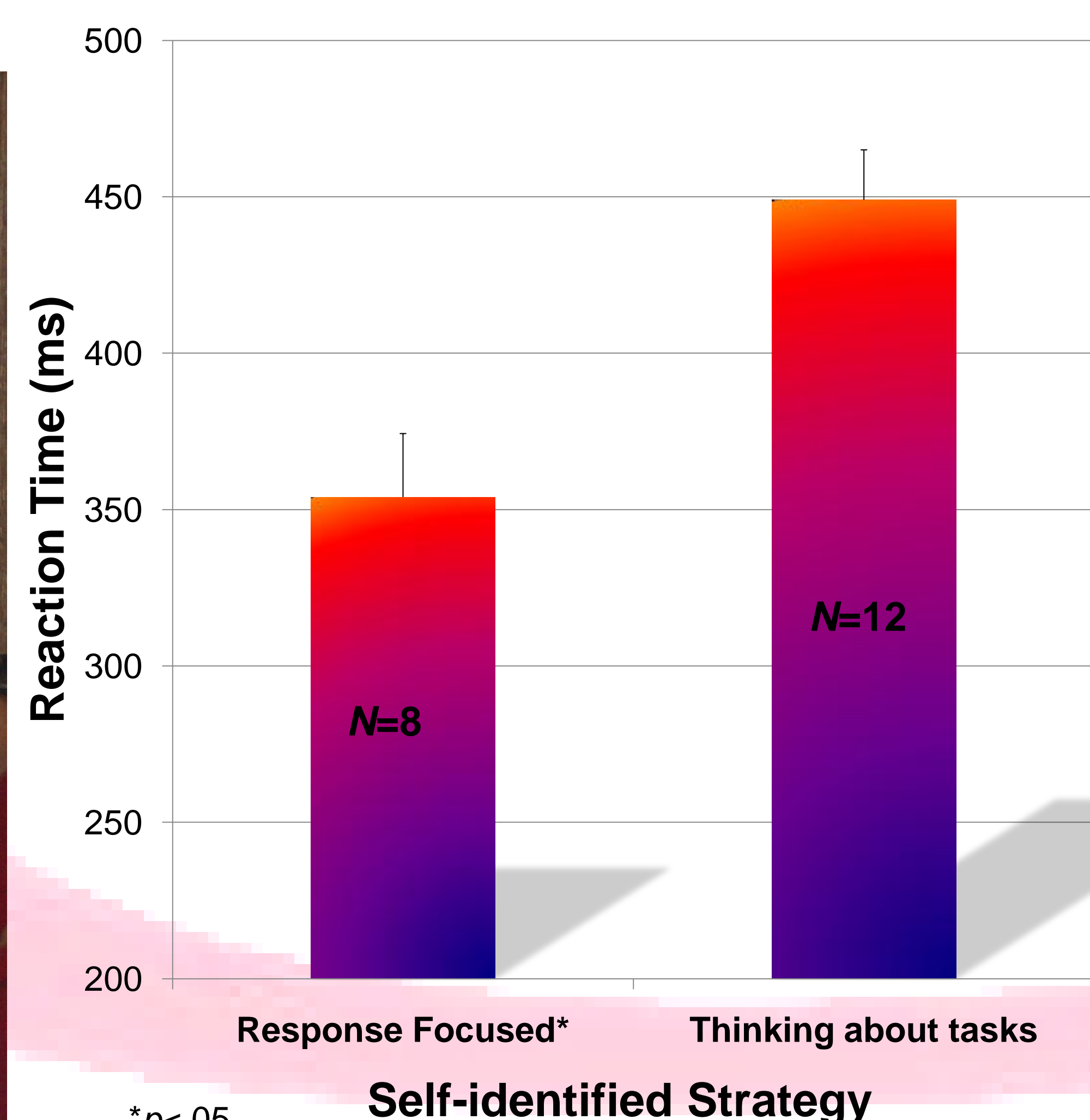


Figure 3. RT Means by Two Most Common Strategies (A and D) in Non-Speeded Condition

Purpose

To more systematically identify the strategies used by participants (compared to a previous study, Hendrick (2008)) in order to examine its effect on RT performance followed by speeded and non-speeded secondary tasks.

Methods and Procedures

- RT task:
 - MOART reaction/movement time panel (see figure 1)
 - Visual stimulus following visual warning stimulus;
 - Foreperiods = 1, 2 or 3 seconds.
 - Odds for Go/No-Go condition were 50%;
- Surveyed about strategy used in the non-speeded task included:
 - A. I focused on reacting quickly to the light. I dealt with the hacky sac afterwards. (therefore you didn't really think about the hacky sac)
 - B. Knowing that I had to pick up the hacky sac helped me to relax on the reaction off the C0 button. I think I reacted faster than in the Go-no-go block when there was no hacky sac.
 - C. Knowing I had to pick up the hacky sac, made this task more complex than the Go-no-go block when there was no hacky sac. As a result I think I was slower in reacting here.
 - D. Concentrating on a leisurely pace to pick up the hacky sac, made me react slower to the light.
 - E. I used a variety of the above strategies from trial to trial.
 - F. The strategy I used was different from above.
- Repeated measures ANOVA ($\alpha = .05$) with Tukey post hoc tests.

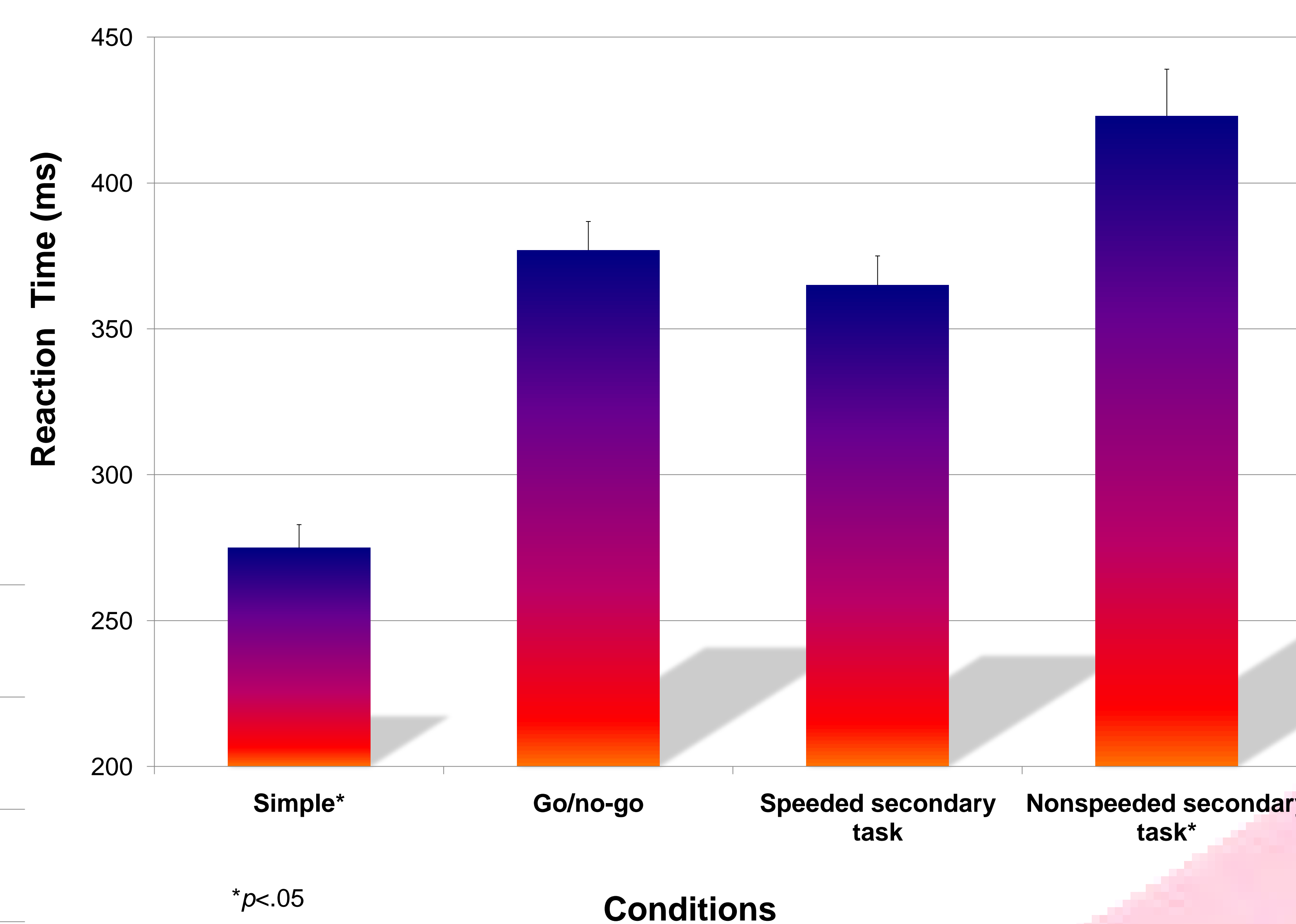


Figure 2. Reaction Time Means Across Four Conditions for all Subjects ($N=26$)

Key References

- Dornier, L.A., & Reeve, T.G. (2000). Divided attention costs for speeded and nonspeeded secondary task [Abstract]. *Research Quarterly for Exercise and Sport*, 72, A46.
- Fischman, M.G., McAlister, R.B., & Kinley, S.J. (2005). Concurrence costs in non-speeded secondary tasks. *Journal of Human Movement Studies*, 48, 281-290.
- Hendrick, J. L. (2008). Complexity effects or concurrence costs for nonspeeded secondary tasks [Abstract]. *Journal of Sport & Exercise Psychology*, 30, S89.
- Noble, M. E., Sanders, A. F., & Trumbo, D. A. (1981). Concurrence costs in double stimulation tasks. *Acta Psychologica*, 49, 141-158.

Results

- Simple RT was significantly fastest condition overall and the non-speeded secondary task was the slowest condition overall (see Figure 2). There was no significant differences among the other conditions.
- Strategy effects:
 - *Speeded Condition*: No significant difference in RT based on the participant's self-disclosed strategy
 - *Non-speeded Condition*: RT DID differ significantly based on the strategy used. The reacting quickly focus (option A) resulted in significantly faster RTs than the focus of leisurely picking up the hacky sac (option D) (see Figure 3).
- Only using participants who used strategy A (which was in fact the instructions!), RT data were reanalyzed:
 - Simple RT was still the slowest, however there was no significant difference among the other three conditions. (see Figure 4.)

Discussion

When controlling for strategies used by the participants, these findings support those previously found by Hendrick (2008), Dornier and Reeve (2001) and Fischman, et al. (2005, exp. 2), but not by others (e.g. Noble et al., 1981) that the performance of a secondary task (in this case speeded or non-speeded) after a primary RT task did not delay its response. Even the long 2 second delay in the non-speeded condition and the increased stimulus complexity appeared insufficient enough to increase the processing demands of the secondary task. In addition, since results corrected for participants using the intended instructions did in fact differ from the results using all the subjects (which also occurred in the previous study), researchers can not assume that subjects are following the given instructions. This could possibly alter their findings.

Conclusions

1. Researchers assessing information processing should pay close attention to the strategies participants actually utilize during testing.
2. Using increased stimulus complexity of the primary task in double stimulation does not appear to alter the concurrence costs with speeded or non-speeded secondary tasks.

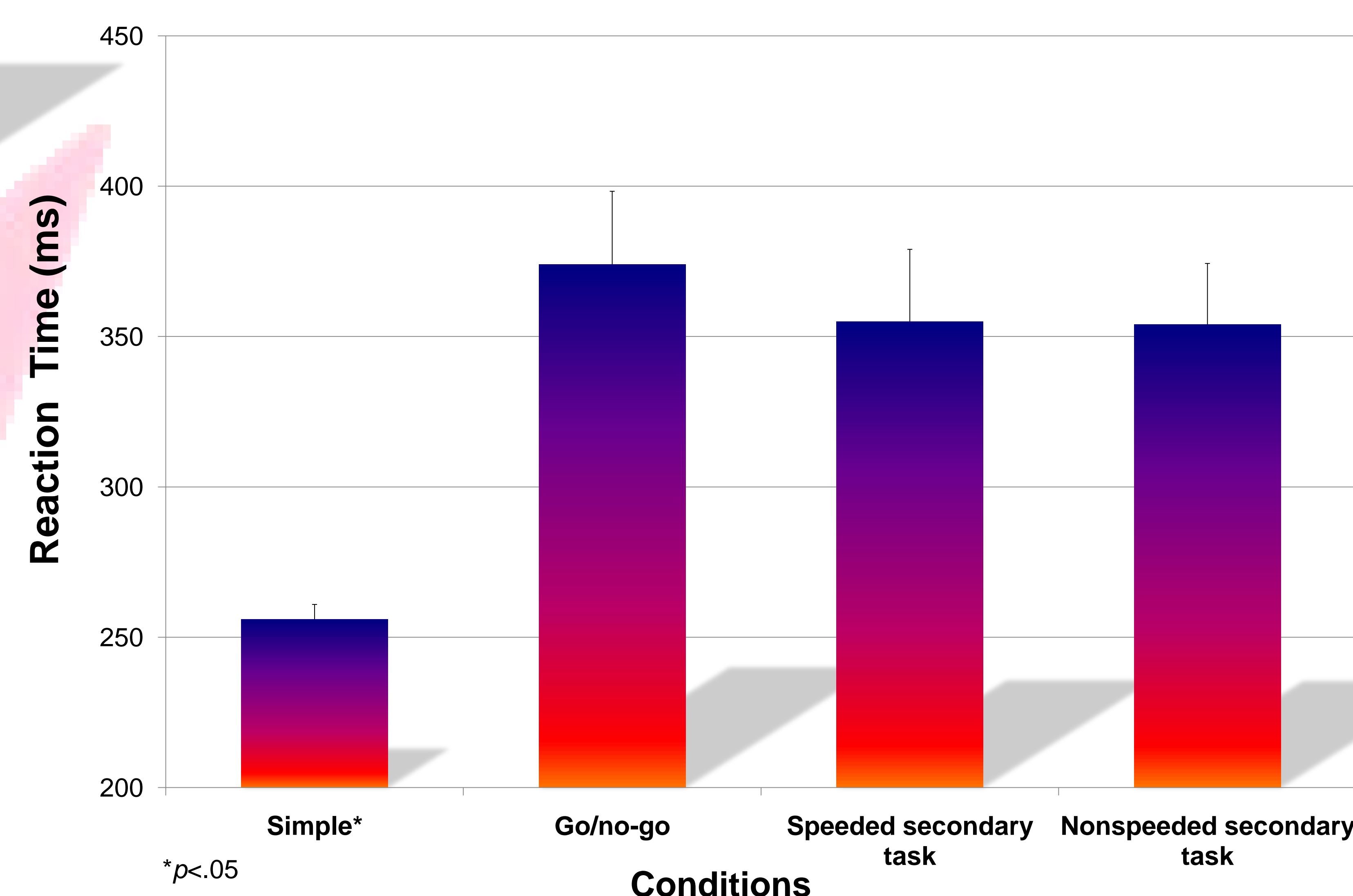


Figure 4. Reanalysis of Reaction Time Means For Subjects Using Correct Strategy ($N=8$)