

# Tasks of Executive Control™

## TEC™

### Interpretive Report

Developed by

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#### Client Information

**Client Name:** Sample Client

**Client ID:** Sample

**Gender:** Male

**Age:** 17

**Date of Birth:** 04/01/1997

**Current Grade:** 8<sup>th</sup>

**Handedness:** Right

**Test Date:** 05/03/2014

**Test Form:** Form 1

**Test Description:** ADHD

## User Notes

The Tasks of Executive Control (TEC) is a measure of an individual's cognitive response to increasing working memory load and inhibitory control demand. Although the TEC systematically increases working memory load and inhibitory control demand as the task progresses, it is important to note that the outcome measures (i.e., scores) reflect these processes indirectly. Thus, there are no pure “working memory” or “inhibit” scores. Rather, an individual's working memory and inhibitory control capacity are reflected in his or her patterns of performance across the TEC via several response accuracy and response time scores. These scores are commonly used to measure effects of manipulating working memory and inhibitory control.

Performance on the TEC should be interpreted within the context of other relevant information such as the client's history, observations made of him, and formal test data. The primary purpose of this Interpretive Report is to provide essential scores and concise interpretive information about aspects of an individual's executive functioning, not to establish a given diagnosis. For more detailed information, the TEC provides a Client Report with extensive interpretive information, a Score Report that includes all possible scores, and a Protocol Summary Report that facilitates comparison between an individual's various TEC administrations.

Sample's performance is compared to typically developing peers of the same age and gender in the standardization sample. Scores are scaled so that higher *T* scores indicate poorer performance. A *T* score of 60 or above is considered to have potential clinical meaning. Please see the TEC Professional Manual for detailed information on the rationale for the test, administration and scoring, interpretation, standardization, development, and psychometric properties.

## Summary

Sample completed the Tasks of Executive Control (TEC), a measure of a student's response to increasing working memory load and impulse control demand. He had difficulty “getting into set,” or adjusting to new task demands, but showed improved vigilance, sustained attention, response speed, and consistency of response speed over time or with practice. His performance was negatively affected by increased working memory load. That is, as the task became more demanding of his ability to hold information in working memory, Sample's performance declined more than expected as reflected in his level of vigilance, sustained attention, and consistency of response speed. There was greater difficulty with an added inhibitory demand. Sample's pattern of performance on the TEC in response to increasing working memory load, first without inhibitory demand then with inhibitory demand, is illustrated graphically in figures 2-7 at the end of this report.

## Recommendations

Given this TEC profile, some supportive actions may be helpful. In choosing and implementing interventions and modifications, it is important to compare findings from performance measures of executive function such as the TEC with evidence regarding everyday functioning from parent and/or teacher observations or behavior rating scales such as the Behavior Rating Inventory of Executive Function (BRIEF). This comparison can help clarify if and how an area of difficulty revealed by the TEC is also seen in the student's everyday behavior.

**The TEC revealed that Sample has general difficulty sustaining attention. This suggests that he may experience problems remaining appropriately focused on tasks unless they are inherently interesting or stimulating.** Students with problems sustaining attention, or focusing on routine or common information, are often described as distracted. While they may be able to notice and focus on more unique or novel information (i.e., “maintain vigilance”), they tend to miss everyday kinds of information. For example, they may be less attentive to routine classroom activities or familiar worksheets. Much has been written about supportive actions and interventions for students with problems sustaining attention in general. The main themes include (a) taking frequent, brief “attention” breaks with a motor activity (e.g., walking to the pencil sharpener or taking work to the teacher or parent for review); (b) breaking up lengthier or more mundane tasks into smaller steps that can be completed within a shorter time frame; (c) reducing distractions; (d) introducing more stimulating or higher interest tasks; (e) building in rewards, such as the opportunity to engage in higher interest activities, for completing more tedious tasks; and (f) providing extra support and prompting to help these students remain focused.

**Overall, Sample had difficulty remaining vigilant for infrequent but important stimuli on the TEC.** Students with problems remaining vigilant may miss, or take longer to process and respond to, information that is unexpected, novel, and/or less interesting. For example, they may miss important new instructions in the classroom or key aspects of new information in a lesson. Some suggestions for interventions or supportive actions from teachers and parents include (a) cuing the child that important information is about to be presented (e.g., the teacher says, “This next part is really important”); (b) underlining or bolding particularly important written information; (c) limiting extraneous information or distractions to help promote a focus on the most important information; (d) encouraging reviews of schoolwork to help ensure that important information has not been missed; (e) suggesting that the student take more frequent breaks if vigilance wanes over time; (f) using positive reinforcement to encourage the student to remain vigilant and alert for new information; and (g) ensuring that the student obtains adequate sleep, as poor sleep can impact vigilance.

**Sample's profile suggests difficulties maintaining performance when confronted with increasing working memory demand.** Difficulties managing working memory load often present as appropriate ability to focus attention or perform adequately when tasks are well within a student's grasp, but decreased ability to focus or perform as tasks or activities become more demanding, more complex, or lengthier. Students may become less attentive, less accurate in their work, or feel overwhelmed as demands increase. There are many minor modifications for working memory difficulties that teachers, parents, or other caregivers may use to help strengthen working memory or reduce the overall load, including (a) preteaching the gist or

general framework of new information; (b) reducing the rate of presentation or pace of problem solving; (c) encouraging frequent, brief “attention” breaks with a motor activity (e.g., walking to the pencil sharpener or taking work to the teacher or parent for review); (d) breaking up lengthier or more challenging tasks into smaller steps that can be completed sequentially; (e) reducing potential distractions; (f) encouraging verbal mediation or “self-talk”; and (g) providing a “hard copy” of steps, formulas, or other information to reduce the overall burden on working memory. Minimizing the need for Sample to attend to multiple tasks at the same time (i.e., multi-tasking) may also be helpful in reducing the demands on his working memory.

**Sample’s pattern of performance on the TEC suggests difficulty “getting into set” or getting settled into a task or situation.** For students with this profile, this is often more noticeable when tasks or situations are more challenging or unfamiliar and may reflect anxiety with the unknown or unexpected; difficulty grasping the idea, the demands, or expectations of the task; or a generally cautious approach to unfamiliar activities. Approaches to helping students with this pattern include (a) providing clear and explicit instructions and expectations at the outset of the task, (b) demonstrating or teaching students how to approach a new task, (c) providing guidance through the first part of the task to help them get started, (d) allowing more time for the student to adjust to new demands, (e) providing a model or sample of the task or activity, and (f) allowing the student to observe others in an activity before joining.

**Sample showed difficulty inhibiting impulses on the TEC.** Problems with impulsivity in a student’s everyday behavior are often detected readily. Problems with impulsive responding in problem solving, evidenced by activities such as jumping into a task without understanding the instructions or not reviewing all the task or activity demands before getting started, may be less noticeable. There are many possible interventions and supportive actions for students who have problems with inhibitory control (i.e., impulsivity), and choosing methods often depends on the fit between the student and the intervention within the environment, such as a classroom. Some frequently used methods include (a) providing additional structure in the environment with a clear and consistent set of rules for behavior; (b) reducing distractions; (c) peer modeling (e.g., placing the student with well-regulated peers); (d) reducing workload to manageable amounts; (e) breaking down tasks into smaller “chunks” and giving the student one chunk at a time to reduce the need to delay gratification and provide more frequent opportunities for reinforcement; (f) teaching response delay or “stop and think” methods; (g) asking the student to verbalize one or two plans for approaching a task before beginning work; (h) building in frequent, brief breaks, such as taking completed work to the teacher for review; (i) setting goals for accuracy rather than speed; and (j) using behavior modification methods with frequent reinforcement for inhibiting impulsive responding.

**Overall, Sample showed a tendency to favor response speed over accuracy.** Students with this profile may show a tendency to respond too quickly, with less attention paid to the accuracy of their output. If Sample shows a similar pattern in the classroom, it may be helpful to acknowledge his efforts to be quick in producing work but also to reward accuracy.

**Variable speed of responding is a sensitive indicator of cognitive problems in children and adolescents. It is not, however, specific to a particular cognitive domain, disorder, or diagnosis. Instead, it may reflect difficulty processing and attending to information efficiently; carrying out other mental operations (e.g., learning new information, problem solving); and responding to questions, demands, or tasks in a timely manner.** Students who show variable response speed may feel overwhelmed by demands and may need additional time

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*Client ID: Sample\_ADHD*

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to process information. Intervention strategies include (a) reducing the pace at which information is presented, (b) allowing the student to have additional time to complete tasks or activities, (c) developing clear routines for common tasks, and (d) ensuring that the student accurately understands task demands.

## TEC Interpretation

The TEC is a standardized computer-administered measure of an individual's response to increasing working memory load and inhibitory (impulse control) demand over a lengthy period of time (20-25 minutes). The TEC presents a series of colorful pictures of everyday items and asks the individual to press one button when he or she sees specific, infrequent, pictures (i.e., Target stimuli) that follow a given rule and a different button for all other pictures (i.e., Standard stimuli). Every few minutes, the rules change, becoming more complex and requiring the individual to hold more information in active working memory for longer periods of time while occasionally having to inhibit, or stop, a response entirely. Sample's performance on the TEC is compared to that of other boys his own age.

### Validity of Administration and TEC Summary Score Interpretations

There were no problems with the computer administration of the TEC, and Sample demonstrated an understanding of the task demands and adequate effort, completing all required tasks. A visual representation of Sample's overall performance, as reflected by TEC Summary Scores, can be found in Figure 1. Overall, Sample showed poor accuracy when responding to both Target (Target Correct *T* score = 70) and Standard (Standard Correct *T* score = 61) pictures. This suggests that he was not adequately sustaining attention or remaining vigilant to the information regardless of salience or importance. Speed of responding was within normal limits (Target RT *T* score = 49 & Standard RT *T* score = 44) but more variable than expected (RTSD *T* score = 60) on the TEC as a whole. Variable response time is one of the most sensitive indicators of cognitive difficulties, though it is not specific to a cognitive domain or diagnosis.

### No Inhibit Task Interpretations

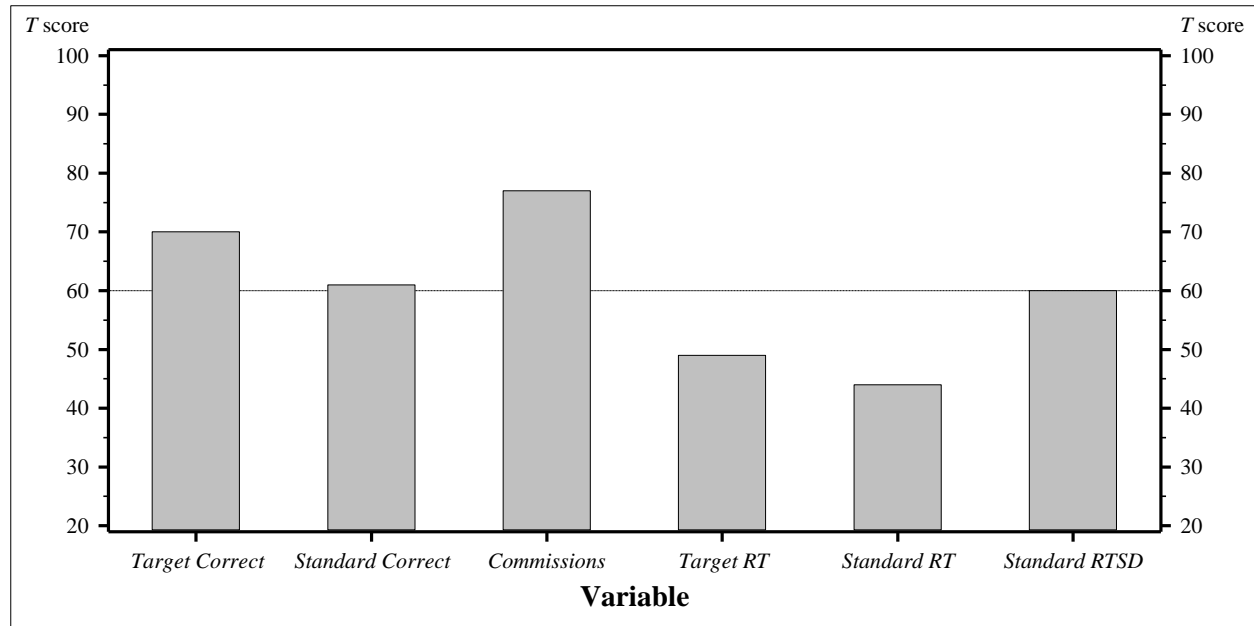
In addition to reviewing overall scores, it is important for the clinician to examine whether performance changed as working memory load increased. Without the added burden of an inhibitory demand, Sample's vigilance for infrequent information was poor, irrespective of working memory load. His sustained attention to frequent information was initially appropriate with minimal working memory load. With an increase in load, however, he had difficulty responding accurately to common pictures. This pattern suggests he has substantial difficulty with executive control, including problems managing greater working memory load. (See Figure 2). Sample's speed of responding to infrequent pictures was slower than expected at the outset of the task but improved despite increased working memory load, while his speed of responding to frequent pictures was appropriate. (See Figure 4). Sample's response speed variability was initially excessive but improved even though working memory load increased. (See Figure 6).

### Inhibit Task Interpretations

In addition to increasing Sample's working memory load, the TEC also introduces an occasional demand to inhibit a response. Overall, there were an excessive number of commission errors, indicating problems with inhibitory or impulse control in general. Sample was impulsive regardless of working memory load. (See Figure 3). Furthermore, in the context of this added inhibitory demand, Sample's vigilance was good at the outset of the task, declined with an increase in working memory load, then improved with a further increase in load. His sustained attention was poor at the outset but improved over time despite increased load. This suggests he has difficulty allocating resources between competing demands, with difficulty "getting into

set” at the outset. (See Figure 3). His speed of responding to both infrequent and frequent pictures was age-appropriate regardless of working memory load. (See Figure 5). The variability of Sample’s response speed was within the expected range at the outset of the task but became excessive with increased working memory load. (See Figure 7).

**Figure 1. Bar Graph of Summary T Scores Obtained for Accuracy and Response Time Variables on the TEC**



*Note.*

**Target Correct** – Accuracy of responses to infrequent pictures. Elevated *T* scores suggest difficulties remaining vigilant for novel information.

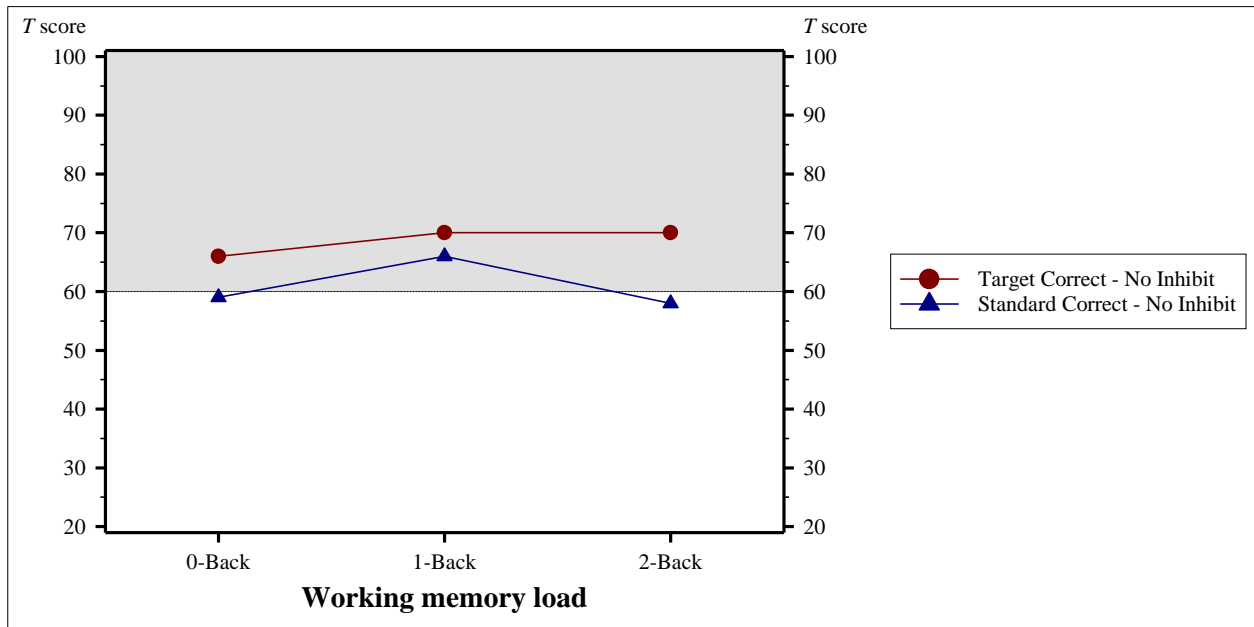
**Standard Correct** – Accuracy of responses to frequent pictures. Elevated *T* scores suggest difficulties sustaining attention to more common information.

**Commissions** – The number of times any button was pressed despite a signal to NOT respond. Elevated *T* scores suggest impulsivity.

**Target RT & Standard RT** – Average speed of responding to each type of picture stimuli. Elevated *T* scores reflect slower than expected response speed. This may reflect slower speed of processing, initiation difficulties, fatigue or a cautious style. Slow response speed is one of the more sensitive indicators of cognitive difficulty.

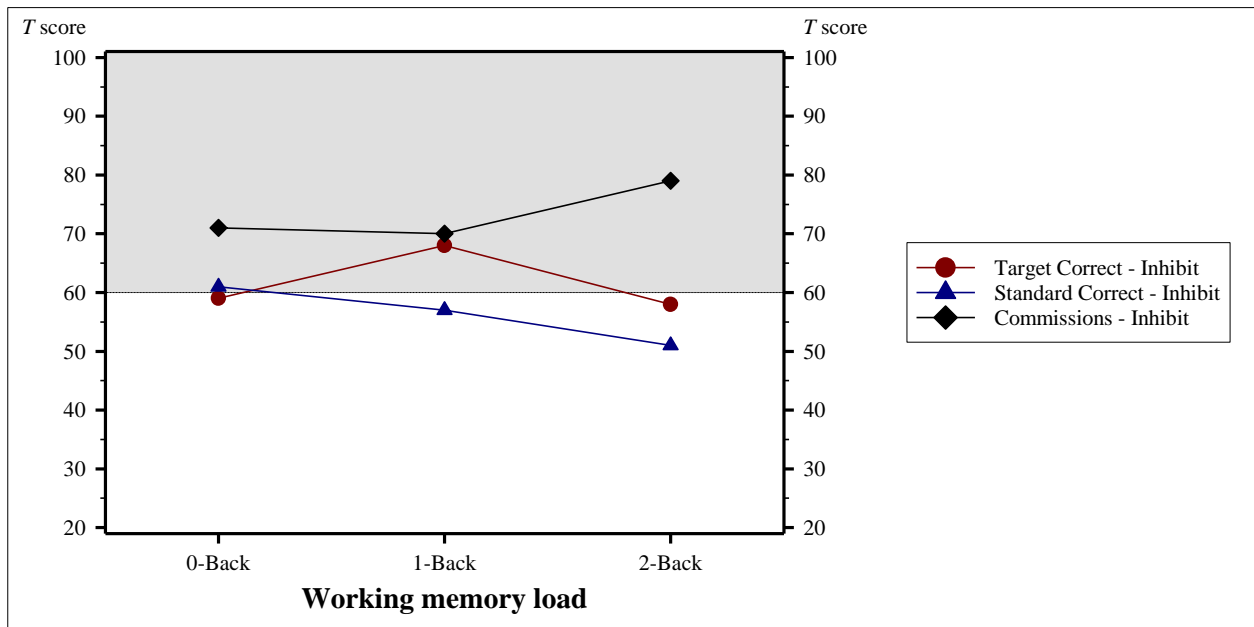
**Standard RTSD or ICV** – Individual variation in response speed is one of the most sensitive indicators of general cognitive difficulty, in particular of attention problems. On the TEC, this is measured by the response time standard deviation of the Standard (frequent) pictures. When response time is much slower than expected, the individual variation is expressed as the ICV, or Intra-individual Coefficient of Variation. This is the variability in response speed controlling for response speed (Standard RTSD/Standard RT). Elevated *T* scores indicate greater than expected variability in response speed.

**Figure 2. Line Graph depicting Target and Standard Correct scores as working memory load increases without inhibitory demand**



Note. Elevated T scores are in the grey range ( $\geq 60$ ) and indicate difficulties remaining vigilant for both novel (infrequent) and common (frequent) pictures when there is NO additional demand of inhibiting responses.

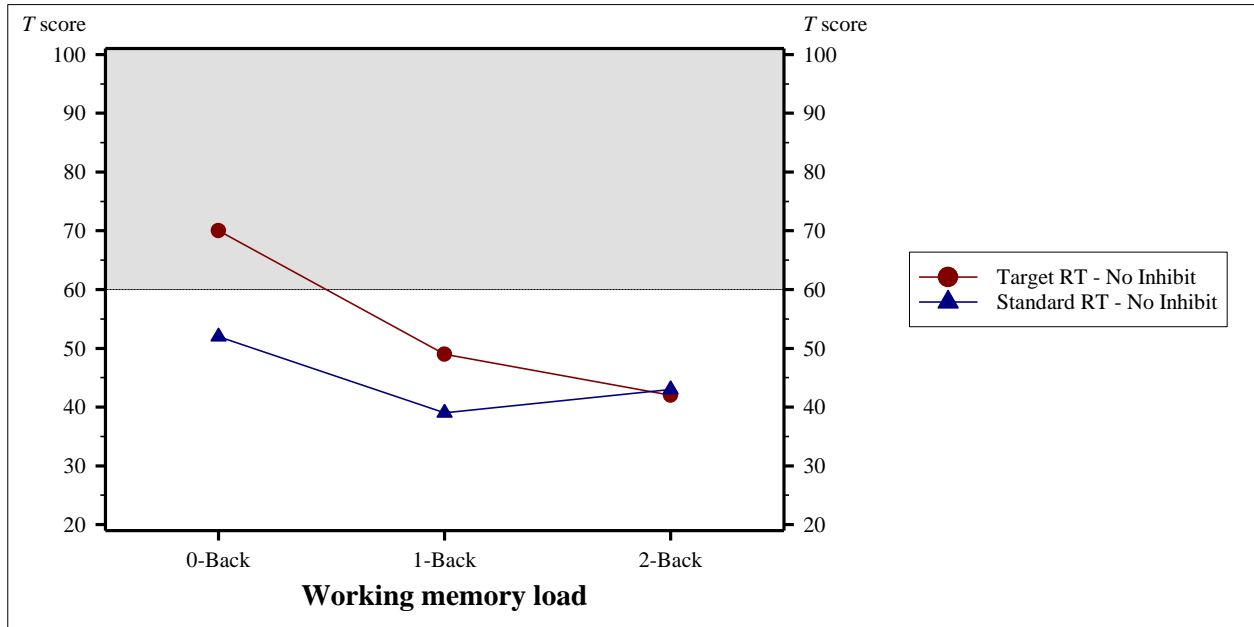
**Figure 3. Line Graph depicting Target and Standard Correct scores and Commission error scores as working memory load increases in the context of inhibitory demand.**



Note. Elevated T scores are in the grey range ( $\geq 60$ ). Target and Standard elevations indicate difficulties sustaining attention to both novel (infrequent) and common (frequent) pictures when there is an additional demand of inhibiting responses. Commission elevations may indicate impulsive responding.

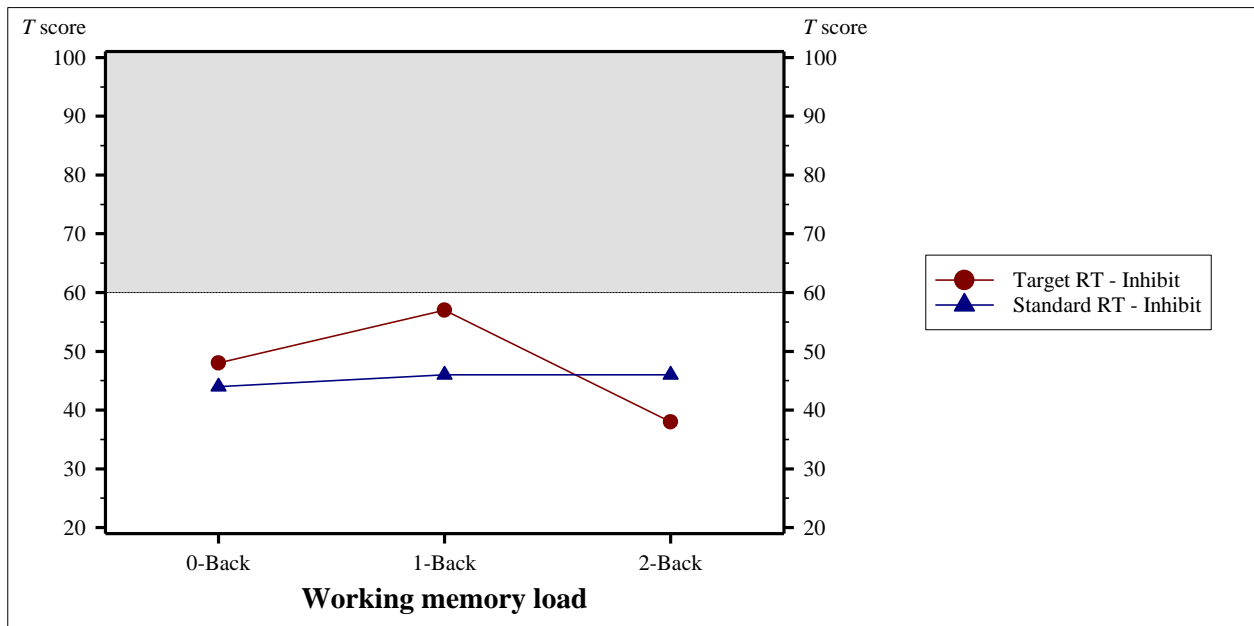


Figure 4. Line Graph depicting Response Time as working memory load increases without inhibitory demand



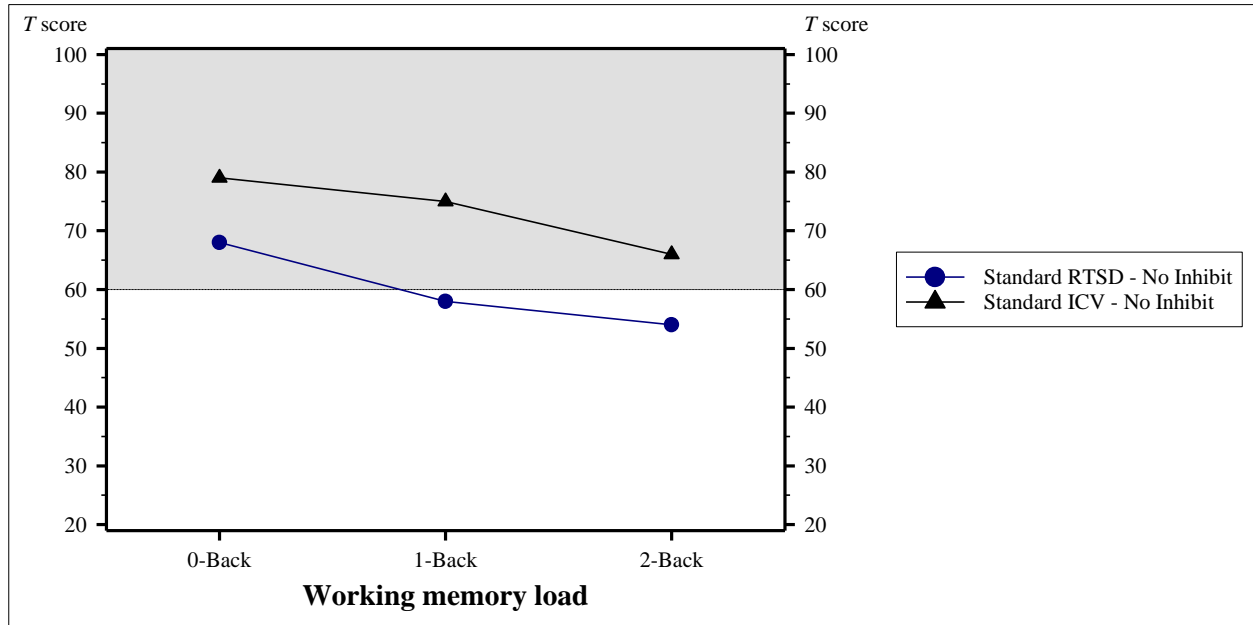
Note. RT = Response Time. Elevated T scores are in the grey range ( $\geq 60$ ) and may reflect slower speed of processing, initiation difficulties, fatigue or a cautious style when there is NO additional demand of inhibiting responses.

Figure 5. Line Graph depicting Response Time as working memory load increases in the context of inhibitory demand



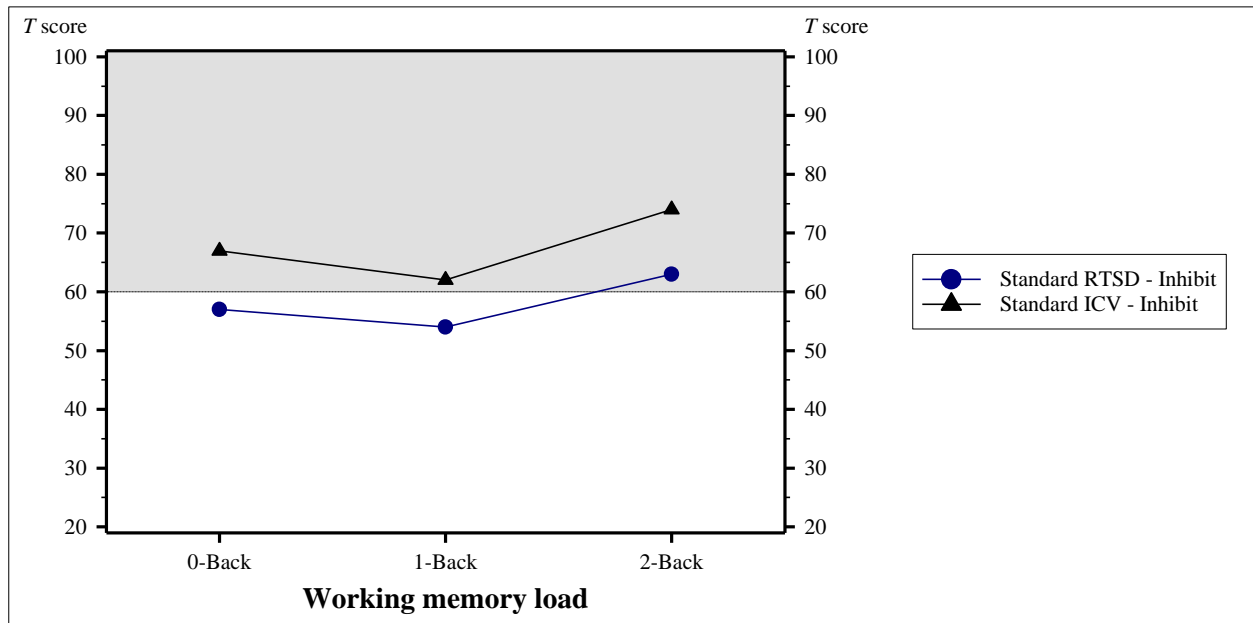
Note. RT = Response Time. Elevated T scores are in the grey range ( $\geq 60$ ) and may reflect slower speed of processing, initiation difficulties, fatigue or a cautious style when there is an additional demand of inhibiting responses.

Figure 6. Line Graph depicting Response Time Variability as working memory load increases without inhibitory demand



Note. RT = Response Time. RTSD = Standard Deviation of the Response Time; ICV = Intra-Individual Coefficient of Variation. Elevated T scores are in the grey range ( $\geq 60$ ) and reflect greater than expected variability in response speed when there is NO additional demand of inhibiting responses.

Figure 7. Line Graph depicting Response Time Variability as working memory load increases in the context of inhibitory demand



Note. RT = Response Time. RTSD = Standard Deviation of the Response Time; ICV = Intra-Individual Coefficient of Variation. Elevated T scores are in the grey range ( $\geq 60$ ) and reflect greater than expected variability in response speed when there is an additional demand of inhibiting responses.

End of Report