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# Two Goals with One Approach: Elevating Patient Engagement and Outcomes through a Person-Specific Dual Task Prescription

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**Abstract**
*The functional relevance of dual task tolerance has been a widely-studied phenomenon in aging and across a broad range of diagnoses. While there is work to be done, scientists have largely defined the neural networks and neurotransmitters supporting divided attention. As for examination of dual task tolerance, there is much more work to be done in aging and neurologic rehabilitation. While clinician-scientists have developed and validated many tests of divided attention, there are only a few gold standards, largely based in combination with standing balance or ambulation. The clinical application of dual task interference has been widely studied across efforts to slow expected changes with aging, mitigate known disease, or accelerate rehabilitation. The clinical practice of providing a well-timed concurrent distractor and creating a dual task interference that will accomplish preventative or rehabilitative goals, also lags behind. We still know very little about the differences and overlap between modes of divided attention, the dosage required for improvement, and the degree of intensity required to effect change. There is additionally very little science that informs us how to maximize patient engagement when they are being simultaneously challenged in cognition and motor control. In this paper, the authors aim to bridge key gaps in dual-task rehabilitation by providing clinical tools for application, specifically introducing the Rate of Perceived Difficulty (RPD) as a pragmatic framework to support person-specific, measures of intensity, and engaging dual-task prescriptions through shared decision-making, autonomy, and salience.*

## Introduction

Attention is a broad and dynamic cognitive system that dictates what stimuli in your environment you can notice, incorporate, maintain, or filter to navigate daily life. When learners do not allocate attention optimally their safety, independence, or efficiency will be likely compromised. Because of this, rehabilitation professionals commonly evaluate and train attentional demands for functional capacity to cause learners to divide their attention, known as divided attention or Dual Tasking (DT).

Collectively, attention shapes how we plan, perceive and react and therefore has a strong influence on functional performance and motor learning. Focused attention reflects our ability to respond to a single, immediate stimulus. Sustained attention focuses on a single task over time. Selective attention allows us to filter out distractions and concentrate. Divided attention, the most complex form of attention, enables us to manage multiple streams of information simultaneously.

DT is defined as the concurrent performance of two tasks which can be performed independently, measured separately, and have distinct goals (McIsaac et al., 2015). Dual tasking requires high levels of attentional resources to be able to perform and achieve both tasks with distinct goals concurrently. Due to this, DT is an ideal intervention to both assess and train the performance of tasks that replicate the real world functional and cognitive demands in patients' lives. DT is used as an assessment tool to understand executive function, attentional capacities, cognitive reserve, and automaticity of procedural tasks (Poldark, 2005; Greene, 2024; Longhurst 2022; McIsaac 2015). DT has been used as a screening tool for fall risk and as a prodromal marker for Alzheimer's Disease or Parkinson's Disease (Montero-Odasso et al., 2017, Longhurst et al., 2023, Bayot et al., 2020, Belghali et al., 2017). In conjunction with its use as an assessment tool, DT is also prescribed as a stand-alone therapeutic intervention in rehabilitation across a large set of conditions. DT can be prescribed to enhance functional outcomes (independence, adaptability and efficiency) or to improve the automatic nature and quality of movement (Xiao, 2023) for persons with neurologic impairment, as well as those with aspirations of returning to sport. Additionally, DT is effective in rehabilitative or wellness applications, where health seekers have hopes of aging well or mitigating a degenerative condition (Winningham, 2024).

While the scientific evidence for dual tasking is expanding, we continue to lack clarity on the optimal dosing and prescription of DT assessment and intervention (Zainol Abidin et al., 2026; He et al., 2018; Gallou-Guyot, 2020, Hao et al., 2026). This is in part because cognition and attention are complex processes that are non-uniform across age and disease states.

As we define and aspire to deliver evidence-based practice (EBP), we are reminded that EBP requires three key tenets: Best Scientific Evidence, Clinical Expertise, and Patient Preference (Greenhalgh, 2019, Sackett et al., 1996).We additionally need more clarity as related to patient preference in dual tasking, as patient preference is currently an overlooked principle in dual task assessment and intervention.

The purpose of this article is to help advance current practice toward a more person-specific delivery of dual tasking by bridging the two gaps stated above. In this paper, the authors aim to add clarity on the matter of intensity in DT, and to demonstrate a novel framework for improving our use of patient preference. This will be accomplished by synthesizing prior works and delineating how the prescription of dual task difficulty (intensity) can be made more precise (person-specific) and more engaging by leveraging autonomy and investing in the therapeutic alliance.

## Capturing Intensity in Dual Task

In concordance with motor learning and neuroplasticity, a proper therapeutic dosage requires a certain level of intensity. In their 2015 article introducing the taxonomy of task, McIsaac and colleagues advanced the discussion by suggesting therapists prescribe dual task interventions through the therapist's selection of novel and complex interventions. However, novelty and complexity alone do not comprehensively represent the options available in prescribing dual task intensity. As the field of rehabilitation has evolved to become more precise and more person-specific, we now see that capturing intensity requires both engagement of the participant as well as measuring the challenge of the task. While we can infer intensity by observing performance, we cannot pretend to capture task intensity without asking the learner how intense it felt to them.

To provide proper dosage we must know the level of intensity that is being delivered as well as the appropriateness of the challenge being delivered. For example, in high intensity gait training, intensity should be captured by objective measures such as heart rate response. More so, best practice also encourages capturing subjective reports of intensity through the Rate of Perceived Exertion (RPE) or the Rate of Perceived Stability (RPS) during balance tasks (Bae et al., 2025; Shenoy et al., 2022). The use of these intensity measures help clinicians make clearer delineations for progression and regression of interventions as well as increase the opportunities for therapists to engage learners and in result maximize neuroplasticity and motor learning. However, Winningham 2024 noted one limitation of dual task interventions is the ability to control for challenge and intensity of dual task interventions because of their complexity. Measures such as exertion (RPE) and stability (RPS) cannot adequately measure the intensity of dual task interventions due to it measuring a different construct. Not all divided attention tasks require exertion nor stability, yet they must be challenging to be beneficial. Furthermore, knowing how to progress and regress dual task intensity is complex. The equally important question is not just if the task is changed, but how a task should be changed. Should the prioritized task be altered? Should the interference task be altered? Should progression include a combination of both? Should the interference task be changed completely? Could more distractors be added? Traditional measures such as heart rate, RPE, or RPS, while useful in other rehabilitation domains, lack the specificity required to quantify cognitive motor challenge during dual tasking.

Another tool that has been used to help quantify intensity and challenge during complex tasks is the NASA Task Load Index (NTLI) (Cao, 2009). The NTLI captures perceived workload on a visual analogue scale for six distinct task demands. This scale is a comprehensive assessment of intensity during dual task because it considers not just physical demands that RPE and RPS assess, but also the mental demands, effort, and performance - all of which can be prevalent during dual tasking that may not be present in single task interventions. However, the NTLI may not be feasible in the clinical intervention setting for several reasons including it being time extensive as well debates on its objectivity (Bolton et al., 2023). From this, Taberner et al. (2025) suggested taking parts of the NTLI when performing neuro-cognitive interventions to help address this gap.

***Mental Demand*** *– How much mental effort was required?*
***Physical Demand*** *– How physically demanding was the task?*
***Temporal Demand*** *– How rushed or time pressured did you feel?*
***Performance*** *– How successful you think you were at the task.*
***Effort*** *– How hard you had to work to achieve your level of performance.*
***Frustration Level*** *– Feelings of irritation, stress, or discouragement.*

## A Novel Application: The Rate of Perceived Difficulty as a Dual-task Conversation Starter

Hendricks and colleagues first introduced the Rate of Perceived Challenge (RPC) in their 2019 article that was focused on skill development and athletic applications. The authors provided a 10 item scale with visual analog that was proposed to serve as a measure of internal load (perceived by the athlete), as they stated, "the athlete could be asked to rate how technically challenging they perceive the skill session to be (RPC), thus providing a measure of internal technical skill load…". This would be coupled, in Hendricks' model, with a coach's assessment of external load, to create a more precise challenge point. The RPC complemented its predecessors the RPE and RPS, giving us yet another measure to procure internal load from the patient or athlete.

In this paper, we offer a novel scale for reflecting internal load, the Rate of Perceived Difficulty (RPD). The RPD offers 7 unique levels and was developed to describe overarching cognitive-motor task-difficulty, rather than skill. Readers may note that the RPD is built from a basis in RPE and RPS. The RPD provides patients, athletes, students, and those positioned to return to work with an opportunity to rate overall task difficulty, consistent with the RPC as an internal load reference, yet novel as it considers cognitive and motor. Table 1 is the RPD. Readers will note that the 7 point scale offers patients the opportunity to see movement as they progress (seeing the same task self-rated to be easier over time).

| Level | Description |
|---|---|
| 1 | No difficulty, familiar |
| 2 | Easy, minimal challenge |
| 3 | Comfortable, I could tolerate more challenge. |
| 4 | Challenging but doable |
| 5 | Challenging. Surprised that I am winning! |
| 6 | Very challenging. "Almost too difficult." |
| 7 | This feels like I am failing |

While the Rate of Perceived Difficulty will need to undergo further testing to assess the scale and relative value between the intervals (distance from 1 to 3 is the same as the distance from 5 to 7), it is important to introduce it now to readers as an opportunity to offer agency and autonomy in dosage as an intervention tool giving application to the "soft skills" of collaboration.

RPD does not prescribe which task variables to manipulate, but rather informs a person's internal load, consistent with the RPC. Then, the therapist-patient team can determine collaboratively when, and by how much, the intensity should be adjusted. This is a novel approach to collaboratively establish dosage with the patient, whereby both the clinician and patient rate overall task challenge and use this rating to guide future dosage decisions. The authors believe this novel approach will be shown to be a more contemporary and more engaging means by which to determine an optimal challenge point, first described by Guadagnoli and Lee in 2004.

## Prescribing Dual Task Intensity

As noted above, the first variable of McIsaac's taxonomy is novelty. While it is true that more novel tasks cause higher dual task loads (Whitefield & Holdosh, 2021), not all DT interventions should be novel to the learner. The authors suggest that the best use of dual task interventions are actually to proceduralize (or automatize) familiar tasks. This is demonstrated by a systematic review by Ali 2022 that showed that dual tasking in the cognitively impaired had a stronger effect on gait functions rather than cognition itself. Recalling that EBP includes patient preference, clinicians would readily recognize that there are times that patients do not want a novel distractor. Distractors that come from a body of knowledge that they are unfamiliar with may in fact be disengaging.

The second variable of McIsaac et al. (2015) taxonomy on how to capture task intensity is complexity. While it is true that a more complex task should feel more intense, yet not all complexities are appropriate and meaningful as a challenge for the patient (Campbell, 2003). Irrelevant background distractors may feel burdensome or bothersome to patients. More complex tasks can feel more intense, yet hearkening EBP, "Is this what this patient wants (patient preference) and is demonstrating that they can tolerate (clinical expertise)?

Prescribing intensity should consider and may often include novelty and complexity, yet the prescription cannot stop there.

The RPD provides an opportunity to incorporate autonomy and salience through intentional conversation about task intensity. For patients that prefer to have a choice, the RPD can and should be used to give them the autonomy they prefer. This exchange could sound like, "I see that you rated this task a 6 on the scale. This was challenging for you. If we were to practice this again, would you like to keep the difficulty the same, elevate it, or reduce it? For patients that prefer to defer to authority (allow the licensed professional to determine the degree of difficulty (dosage), it is clear from science on choice that this group would classically not benefit from the additional dialogue regarding their preference. The RPD serves this population well though, as it would serve most, by at least giving them the reality-based experience that their rating is important and is being incorporated.

This two-person team (or more, in multidisciplinary team collaboration) provider(s) with the patient) can form a powerful dyad, increasing the effectiveness of all interventions using their combined choices. Geers and colleagues (2013) explain the choice-to-placebo effect pathway, with a "dopamine up, cortisol down" dynamic. This approach may also improve patient tolerance for intensity as well as tolerance for a higher frequency of errors. As for dosage, this exchange can inform a seminal variable that can be burdensome and ambiguous in clinical decision making - "When should we elevate intensity?". What about how or, in what direction we should elevate intensity? Where is the science that guides us as to how (options for and best option to select) to increase dual task intensity? The answer to each of these postulates becomes, "With the patient" and "When the patient permits", combined-with clinical observation of performance and dialogue through the RPD, providing patient choice, autonomy and an opportunity to elevate the therapeutic alliance.

The classic, "it depends" is quite easily resolved, by putting the patient in the proverbial driver's seat, with a reduced set of options (so as to not overwhelm), but choice nonetheless. In a feasibility study by Wollesen and colleagues (2021), the authors illustrated that the science of progression lies in watching how patients respond and adjusting the challenge accordingly. In this way, dual task intensity becomes a dynamic, responsive process, elevated only when patient performance, confidence, and strategy use signal readiness, ultimately supporting safer, more effective motor cognitive gains. The RPD and the novel application described brings expert clinician observations and patient preferences together in a truly collaborative fashion.

### Determining How to Increase Dual-Task Intensity

Determining when and how to increase the intensity of dual-task interference requires both systematic manipulation of task variables and ongoing monitoring of patient response, such as through RPC. Intensity can be increased by adjusting motor task complexity, cognitive task demands, or the degree of interference between tasks, such as by increasing speed or precision requirements, progressing from automatic to generative cognitive tasks, or introducing competing attentional demands.

Another benefit of the RPD is to measure the learner's frustration to maximize the challenge point framework. Guadagnoli & Lee 2004 discusses how high levels of frustration may indicate that a task is beyond the learner's capacity and how this can limit engagement. Frustration can come in many forms, depending on the learner's personality. People can begin to shut-down and limit eye contact or verbal interaction when they are becoming frustrated. Other people may increase their volume or be demonstrative with facial expressions when they are becoming frustrated. If your patient cannot rate their preference for task difficulty, it is up to you to know this person and watch for these antecedent behaviors, adjusting the dose before agitation occurs.

While high error rates can indicate that the task may be too difficult, an arbitrary assignment of 20% failure/error or 80% success cannot serve our doctoring professions well. These values are not person-specific and cannot represent precision rehabilitation where interventions serve the right person at the right time with the right intervention (French et al., 2022). If we do not include the patient, we may overwhelm them, leaving them to feel demotivated or unsafe - or even agitated. However, if we underwhelm a patient, we may leave them feeling un-served, as though their time has been wasted, that they are being pandered-to, or worse-yet, leaving their potential for further gains untapped. The combination of RPD score + error rate may provide clinicians with an unexpected bonus. This may serve as a reliable, actionable method for gauging appropriate error tolerance and dosage tolerance, simultaneously seeing the person and the patient.

Clinicians may be able to deliver both a more precise and a more person-specific dosage of dual task interference if both they and their patient understand the options available to increase intensity (a higher number or greater difficulty on the scale, when indicated and desired). These options could include:

- Change the distractor content - a novel subject to this learner
- Add irrelevant distractors to the environment (information to be filtered)
- Increase the physical demands in the dual task (higher treadmill speed, heavier ankle weight, lower sit to stand surface, compliant surface to stand on/from, or rolling resistance to the w/c)
- Add pressure via consequence (independence, no assistive device, time constraint)

This conversation (which option to choose) affords another opportunity to add autonomy and build therapeutic alliance. When we have the possibility of engaging the learner while delivering a more intense task that they are inviting, the likelihood of success is elevated.

The authors recognize that not all patients prefer autonomy. Some people are disengaged by conversations of preference. For these patients, the RPD may not be a clinically useful tool. The concept may remain efficacious for this population, though, asking after a task if they would prefer the next trial to be more difficult, easier, or stay the same.

In practice, clinicians are not increasing intensity by asking patients to simply "do more," but by intentionally modifying task variables across motor, cognitive, and interference domains. RPD and error rate serve as guiding signals to determine when these variables should be progressed or scaled to maintain an optimal challenge point.

### Determining How to Reduce Dual-Task Intensity

The American Speech-Language and Hearing Association (ASHA) emphasizes that clinicians should skillfully adjust interventions according to individual performance and needs. Utilizing a hierarchical attention approach to training can facilitate this. Dual Task difficulty can be reduced by adjusting task complexity (using simpler cognitive tasks), speed/pacing of motor tasks, stimulus rate (frequency of cognitive demands), and reducing environmental complexity (irrelevant distractors). Yuzlu et al. (2022) found that stepping down dual task complexity, from integrated (traditional DT training) to lower attentional formats (motor and cognitive tasks performed sequentially), does not compromise improvements in balance or gait. Consecutive Dual Tasking provides a practical, lower intensity option for individuals who are unable to manage the attentional load required for simultaneous dual tasking, making this study directly relevant to clinical strategies for scaling attentional demand downward. Furthermore, this is exemplified in the DUALITY trial (Strouwen et al., 2017). Participants with Parkinson's Disease were stratified into two groups that did both cognitive and balance training either consecutively (without dual task intervention) or concurrently (with dual task interventions). The results of the study showed no favorable training towards the dual task group over consecutive treatment. This does not highlight that dual task intervention is not an effective intervention; on the contrary, it demonstrates that when deficits persist in multiple domains, it is important to train capacity and performance to high intensities either by performing tasks individually through interdisciplinary care or simultaneously through divided attention. This then poses the question of what to do if complexity, speed, stimulus rate, distractors and format have all been adjusted and your patient remains unsuccessful.

For the physical therapist, when a patient continues to struggle with dual task performance it may be a sign that the attentional load remains too high. In these situations, an effective next step is to move down the hierarchy of attention using the Sohlberg and Mateer (1987) framework. For example, a patient with moderate dementia who becomes unsafe when walking while naming animals, despite repeated task simplification, may benefit more from sustained or selective attention training (e.g., continuous walking with a single salient cue) rather than continued divided attention demands. Further reductions may include alternating attention (walk, then stop to respond) before reintroducing integration. At this point, collaboration with speech language pathology is ideal, as SLPs can provide structured interventions such as Attention Process Training to strengthen attentional capacity (Sohlberg & Mateer, 1987), while PT continues to progress balance, gait, and mobility at a level that supports safety, learning, and participation rather than exceeding cognitive capacity.

## Conclusion

The authors recognize that this contribution has a unique opportunity to elevate dual task intervention - across all three allied health professions. It is one small step for providers and ultimately for patients. The RPD now presents an important next step for the field, one that invites systematic study, refinement and application. The RPD will need to be scientifically assessed and vetted - this will require scientists to accept the charge. Providing patients with a novel level of autonomy that extends not only into content but also into difficulty will require clinicians to take up the charge. Should both groups accept these respective charges we have an opportunity to take "one giant step" on the way to improve our service for persons with degenerative diseases, those recovering from acquired brain injury, and even individuals with greater aspirations for skill development in sport, work, and daily life. Delivering dual task interference in an effort to expedite learning is a science. Ensuring that the content and dosage feel person-specific is an art, one that now calls for deeper scientific exploration.

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