Movement Disorders
CLINICAL PRACTICE

EDITORIAL COMMENTARY

What's in a Name? Conundrums Common to the Task-Specific Disorders

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Task specificity is a fascinating feature of a subset of movement disorders. In this issue of *Movement Disorders in Clinical Practice*, Prasad and colleagues describe a highly selective writing deficit for a single symbol in Bengali: *"Letter specific dysgraphia: A silent stutter"* bringing to the forefront a number of absorbing questions.[1]

For example, how do we define whether a disorder is task specific? Frequently, we use clinical markers as our gold standard; subjective impairment described during history taking or an abnormality of movement observed during clinical examination. However, such markers are likely to have a different sensitivity to experimentally derived markers. For example, modern motion-capture technology can record movement with a spatial accuracy and frequency beyond that consciously perceived by the human brain or witnessed by the human eye. Experimentally, task-specific dystonia is associated with abnormal neurophysiological responses (plasticity, inhibition), and these markers are sampled using experimental paradigms removed from the affected task's context. Therefore, task specificity appears to be a *relative* task specificity. That is, a particular task is preferentially affected and causes disability to the patient. A gradient of subtle abnormalities for other tasks is likely to be present and skills most similar to the affected task may be the most affected, given that their required neuronal networks are more closely related. Experimentally, we are also able to tap into more-generalized changes within the nervous system, which may be causally related to the pathophysiology or epiphenomena.

Task specificity is a feature of a range of neurological disorders. Many clinical examples can be conceptualized as an interaction between the network encoding the task and the network affected by the disorder. Occasionally, focal lesions selective for an essential feature of task performance can lead to a task-specific deficit. A task-specific presentation of a diffuse disease process is more dependent on a threshold effect; once a critical amount of dysfunction to the skill network has been induced by the disease process, a deficit will become apparent. Difficulty with more-complex motor skills with high performance requirements or unique task features subserved by an otherwise "silent" area of the brain may therefore unmask an insidious disease process because only a small burden of disease may be symptomatic. The sensitivity of the individual to the deficit may also vary depending on influences such as attentional monitoring of the task and the extent the action is required for daily living. Correspondingly, writing dystonia and writing tremor are recognized presentations of the genetic and classically generalized dystonia DYT1 dystonia,[2,3] and difficulty styling hair has been described as a presenting feature of a retired hairdresser that then developed apraxia and neuroimaging findings suggestive of a neurodegenerative process.[4]

Considering the different functions of the neuronal network required for task performance can also help guide our assessment and management. Prasad and colleagues described a deficit writing a spiral symbol common to a Bengali letter and number. It would be interesting to know whether this deficit was also present across other muscle effectors (e.g., if the symbol was still difficult to transcribe with the foot). This would suggest a higher-level problem in motor planning. If solely in the hand, the deficit of motor control is likely to be encoded at "lower" levels of motor control, which define the spatio-temporal dynamics of the arm muscles activated when writing this symbol.

For the *isolated* task-specific disorders, we then need to select the most appropriate diagnostic label. Prasad and colleagues selected the descriptor dysgraphia:

> *Upon writing the Bengali alphabet an abnormality was observed while the patient wrote the letter '* ৩*' … the abnormality was restricted to the initial segment of the letter, wherein a rapid jerky movement of the hand with increased activity of the wrist extensors and flexors was observed.*

How is this different to task-specific tremor, and is this a variant of dystonia?[5] Similarities are certainly observed given that task specificity for a single letter or number has also been described in writer's cramp, yet the etiology of the motor deficit

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is debated.[6,7] Any attempt to answer such questions will be deeply rooted in the semantics of medical terminology and drilling down into the meaning of diagnostic labels is, at times, difficult.[8] Medical language is considered an extended *natural* language, one that has emerged naturally around clinical observations.[8] The naming of clinical diseases is iteratively updated through the interaction of clinical reasoning and new findings on the underlying causes in experimental science.[8] This contrasts with *formal* languages used in computer programming, for example, which are characterized by defined semantic rules.[8] Medical language is therefore characterized by a lack of precise semantics, and we should be humble to the limitations of our classification systems constructed on such foundations. This is particularly relevant given that diagnostic labels are usually embedded within their own unique literature, and, if not mindful, we can unknowingly overlook shared disease mechanisms and treatment options. A task-specific dystonia was considered by the investigators, but excluded, because presumably no overt abnormality of posture was observed. However, broader definitions of task-specific dystonia have been proposed in which a loss of motor control (with or without abnormal posturing) for a task is the main feature. The uniting task-specificity may be the most important descriptive label given that it hints that there are shared etiological substrates. Whether the disorder is most representative of a dysgraphia, tremor, and/or dystonia can be debated.

Similarly, as so enticingly phrased in the article's title, is letter-specific motor dysfunction a silent stutter, that is, a problem with initiation and fluency of the hand sequence? Indeed, both language and skilled action are uniquely developed skills in humans. Specifically, humans have a greater capacity than nonhuman primates to learn new sequences of movement in addition to genetically preconditioned stereotypical motor programs such as walking, climbing, or swallowing. These higher motor programs involve flexibly compiled serial orders of movements for communication (e.g., speech, sign language), everyday tool use (e.g., handwriting, tying shoelaces), or artistic expression (e.g., dance, musical performance).[9] Both domains also share a common network of key neuroanatomical structures, including the premotor cortices and Broca's area.[9] These features have fueled the idea of an evolutionary link between skilled action and language in humans.[9,10] It is therefore interesting to consider whether the reported case is an example of stutter outside the speech domain.

There are therefore many reasons why we should continue to dwell on the mechanisms underlying task specificity and rationalize the language that we use. Task-specific disorders affect only a fragment of the broad repertoire of human movement, but occupy an important and intriguing part of our clinical caseload.

Author Roles

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