Questioning the definition of Tourette syndrome – evidence from machine learning

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Background
The clinical diagnosis of Tourette syndrome (TS) is not always clear and straightforward because motor and vocal tics in TS are often difficult to discern from single spontaneous movements or vocalizations in healthy people.

Objective
To identify aspects of TS phenomenology that are most useful in diagnosing an individual with TS using machine learning to independent video ratings of motor and vocal tics.

Methods
A standardized video of patients with TS and healthy controls was taken using the Modified Rush Videotape Rating Scale (MRVRS). 1 Five categories (number of body areas, frequency of motor and vocal tics, severity of motor and vocal tics) were scored (from 0-4) yielding a total score ranging from 0-20. In addition, motor tic count per minute was computed.

Spontaneous movements that could not reliably be distinguished from tics were counted as tics.

N= 101 patients with TS and n= 109 healthy controls were included in a support vector machine (SVM) based analysis to examine the impact of each category of the MRVRS, the motor tic count per minute, as well as age and gender for the classification of individuals into the groups „TS“ and „no TS“.

Results
Demographical data, MRVRS variables, and motor tic count per minute for the patient and control group are given in Figure 1 and Table 1. The results of the SVM analysis (Figure 2) show that only a single feature, the severity of motor tics is sufficient to identify an individual as having TS with an accuracy of 91.4%. Adding more features to the analysis does not significantly improve predictability.

Conclusion
The results of the SVM analysis presented here are of great relevance for the conceptualization of TS because it questions the validity of current diagnostic criteria for TS requiring the presence of both motor and vocal tics. 3 This has implications for medical practice because current recommendations for TS would then also apply to the group of chronic motor tic disorders. 4

Sources

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