

## **#3079 Investigating the feasibility of automating the differential diagnosis of Transient Loss of Consciousness**

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### **Background**

There are three common causes of Transient Loss of Consciousness (TLOC), syncope, epileptic and psychogenic nonepileptic seizures (PNES). Many individuals who have experienced TLOC initially receive an incorrect diagnosis and inappropriate treatment. Whereas syncope can be distinguished from the other two causes relatively easily with a small number of "yes"/"no" questions, the differentiation of the other two causes of TLOC is more challenging. Previous qualitative research based on the methodology of Conversation Analysis has demonstrated that epileptic and nonepileptic seizures are described differently when patients talk to clinicians about their TLOC experiences. One particularly prominent difference is that epileptic seizure descriptions are characterised by more formulation effort than accounts of nonepileptic seizures.

### **Aim**

This research investigates whether features likely to reflect the level of formulation effort can be automatically elicited from audio recordings and transcripts of speech and used to differentiate between epileptic and nonepileptic seizures.

### **Method**

Verbatim transcripts of conversations between patients and neurologists were manually produced from video and audio recordings of interactions with 45 patients (21 epilepsy and 24 PNES). The subsection of each transcript containing the patient's account of their first seizure was manually extracted for the analysis. Seven automatically detectable features were designed as markers of formulation effort. These features were used to train a Random Forest machine learning classifier.

### **Results**

There were significantly more hesitations and repetitions in descriptions of first epileptic than nonepileptic seizures. Using a nested leave-one-out cross validation approach, 71% of seizures were correctly classified by the Random Forest classifier.

### **Conclusions**

This pilot study provides proof of principle that linguistic features that have been automatically extracted from audio recordings and transcripts could be used to distinguish between epileptic seizures and PNES and thereby contribute to the differential diagnosis of TLOC. Future research should explore whether additional observations can be incorporated into a diagnostic stratification tool. Moreover, future research should explore the performance of these features when they have been extracted from transcripts produced by automatic speech recognition and when they are combined with additional information provided by patients and witnesses about seizure manifestations and medical history.