

Designing Brain-computer Interfaces for Sonic Expression

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Introduction

- Brain-computer interfaces (BCIs) are beneficial for patients who are suffering from motor disabilities [1].
- BCIs provide a communication medium that is independent of muscular control.

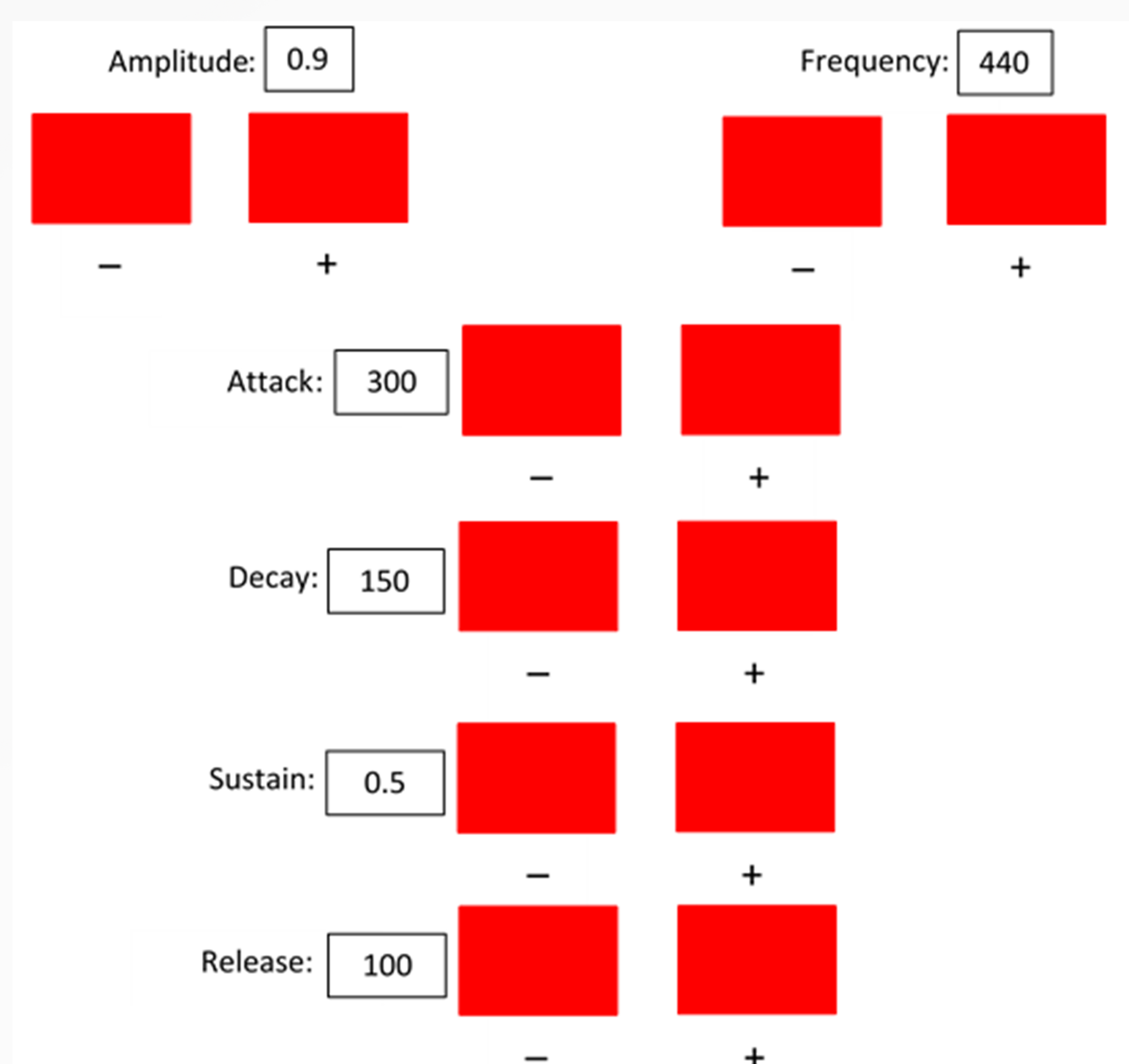
Sonic Expression

- This study proposes a new concept called sonic expression, that is to express oneself purely through the synthesis of sound.
- The degree of sonic expression is calculated by the number of spectral peaks and formant regions.

Objectives

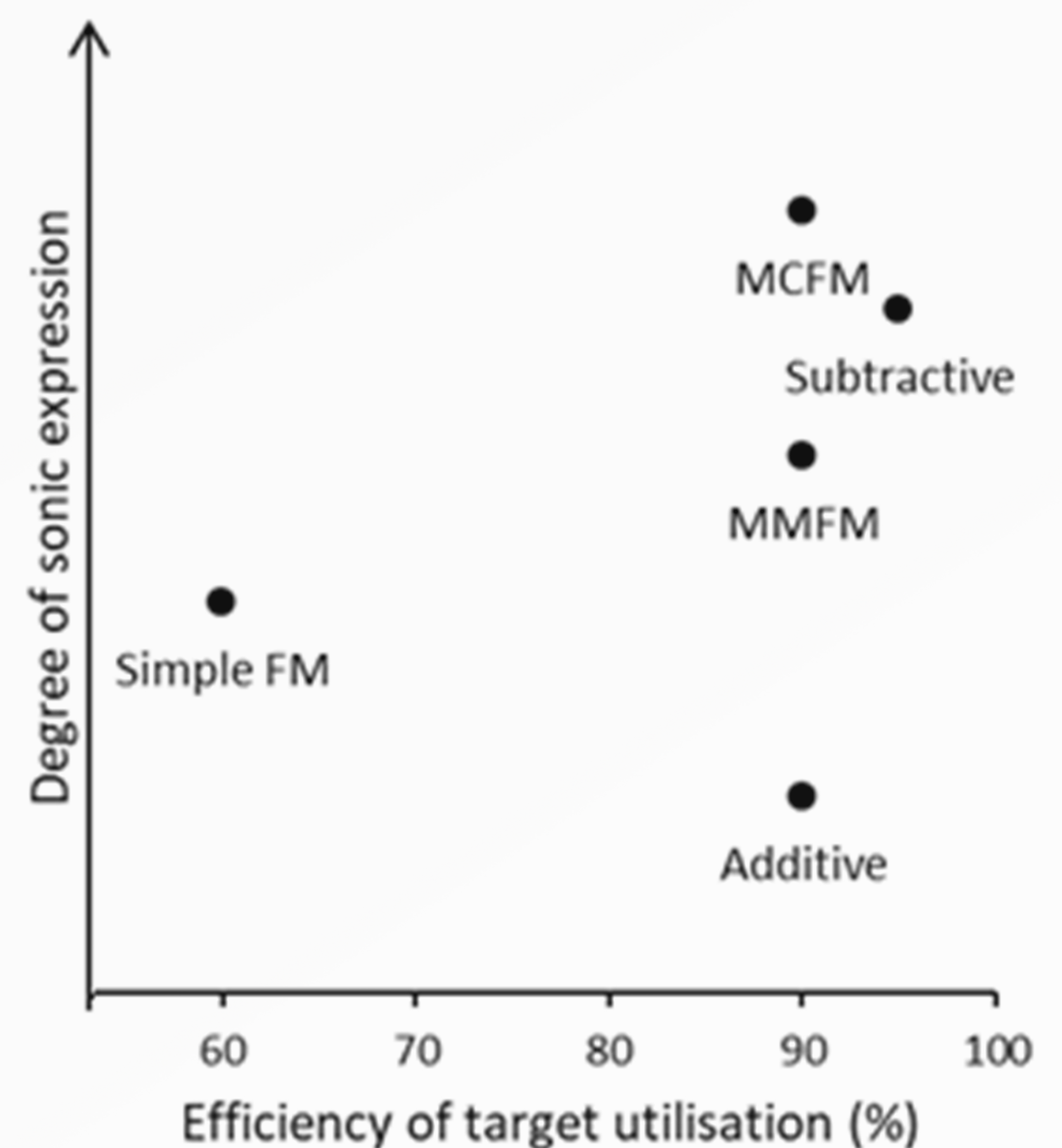
- Evaluate sound synthesis techniques to build BCI-based synthesisers based on SSVEP [2].
- Find novel ways for patients to express themselves through sound.

BCI-based Synthesisers



Evaluation

- The different synthesis techniques evaluated are additive, subtractive, simple FM, MMFM, and MCFM.
- They are evaluated based on two criteria: degree of sonic expression and efficiency of target utilisation.



[1] L. F. Nicolas-Alonso and J. Gomez-Gil. Brain-computer interfaces, a review. *Sensors*, 12(2):1211-1279, 2012.

[2] X. Chen, Y. Wang, M. Nakanishi, X. Gao, T.-P. Jung, and S. Gao. High-speed spelling with a noninvasive brain-computer interface. *Proceedings of the national academy of sciences*, 112(44):E6058-E6067, 2015.