EEG for Accommodating Thick and Curly Hair

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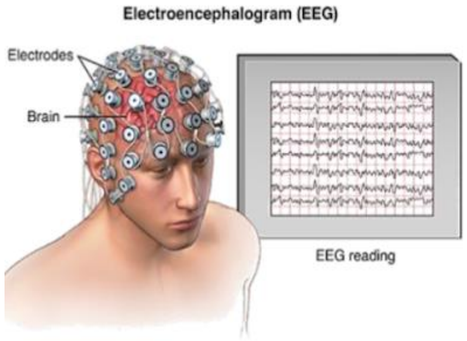
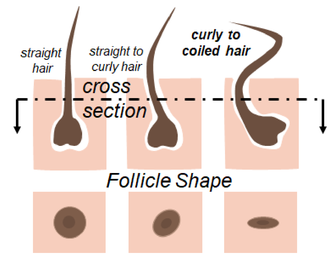
EEG does not work well with coarse, curly hair

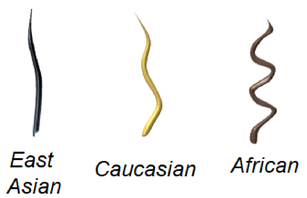


The spring like properties of the hair push electrodes away



Hair types are due to different follicle shapes

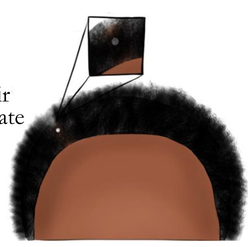
Follicle shapes can vary from person to person



Electrode can lay flat and in place when hair is straight

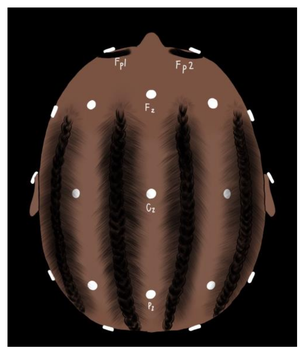
Moisture reverts hair to curly state

Electrode is moved when hair is curly



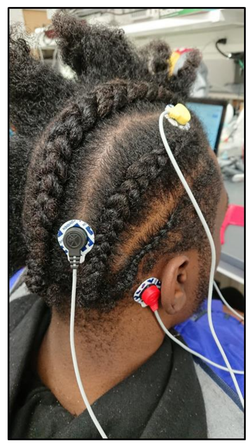
Braiding hair into cornrows provides more surface area of contact with scalp for electrodes

Braiding technique

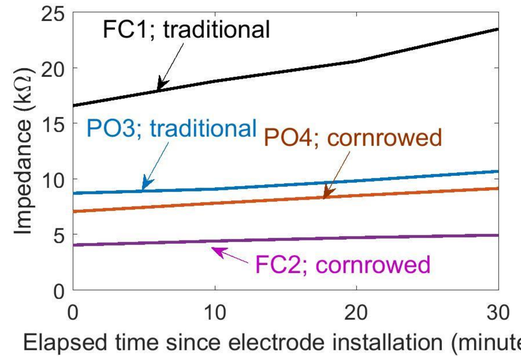


Braiding into cornrows enable EEG Electrodes to be placed in the standard 10-20 arrangement

We tested the traditional method of electrode placement against our method of braiding



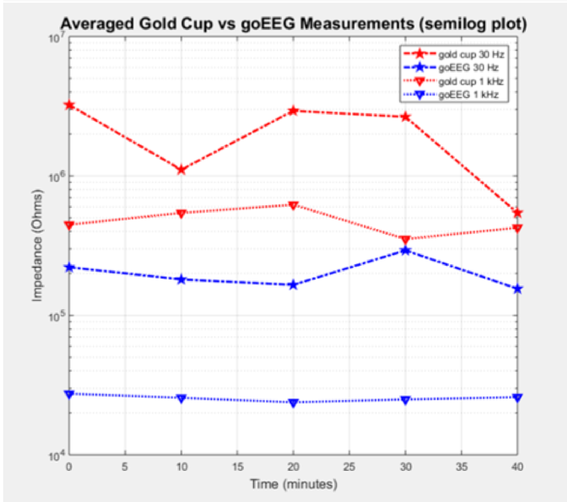
Our braiding method alone reduces impedance by up to a factor of four



Rate of increase of impedance also decreases

Good for longer term measurement

Using our goEEG electrodes compatible with coarse and curly hair and our braiding method helps maintain reliable contact



Average measured impedances over time of the Gold Cup (industry standard) electrodes and the goEEG electrodes at 30 Hz and 1k Hz, with the y axis on a logarithmic scale. Our goEEG electrodes are on average, an order of magnitude lower than the Gold Cup electrodes for each respective frequency

Conclusions and implications

- Considering hair properties when designing is important
- Increased access to healthcare for lower income populations
- Decreased time and electrode waste with less reapplications
- Easier for African Americans to participate in EEG research & diagnosis
- Better quality data & better variability of participants

Acknowledgements

Many thanks to Praveen Venkatesh for helpful discussions, Sarah Haigh for scripts for our experiments, and Momi Afelin for hand drawn hair diagrams. Addition thanks to the Chuck Noll Foundation for Brain Injury Research, CMU Innovation Fellowship, NSF REU, and CNBC Computational Neuroscience Fellowship for support.

References

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[2] P. Grover and P. Venkatesh, "An Information-Theoretic View of EEG Sensing," Proceedings of the IEEE, vol. 105, no. 2, pp. 367–384, Feb. 2017.

[3] A. Krishnan, K. Ritesh, A. Etienne, A. Robinson, S. K. Kelly, M. Behrmann, M. Tarr, and P. Grover, "Challenges and Opportunities in Instrumentation and Use of High-Density EEG for Underserved Regions," EAI International Conference on Innovations and Interdisciplinary Solutions for Underserved Areas, 2018.