

Depression, HRV, and CAD Pilot Study

Comparison of RR Peak Detection Methods and Dyx

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Overview

Background

- ▶ *Dyx* is seen to be a potentially powerful marker for ANS dysfunction [Shah et al., 2020]
- ▶ Generated by the ratio of kurtosis of x-axis to y-axis on Poincare plot
- ▶ Why is it more robust than other HRV measures at signaling ANS dysfunction?
 - ▶ Potentially due to capturing ectopy and the SA response to ectopy

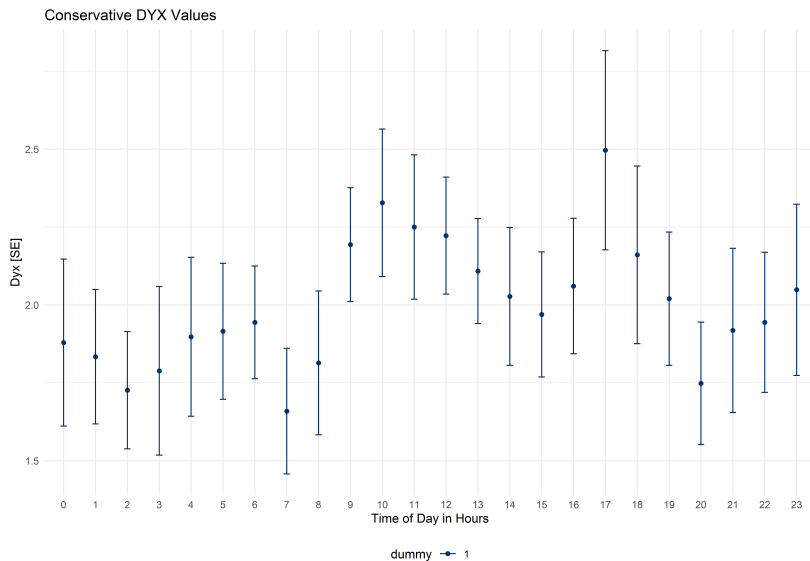
Approach

1. Compare HRV toolbox output for RR intervals using conservative and relaxed definitions for R-peak detection [Vest et al., 2018]
2. Generate D_{yx} values for both types of methods
3. Compare findings

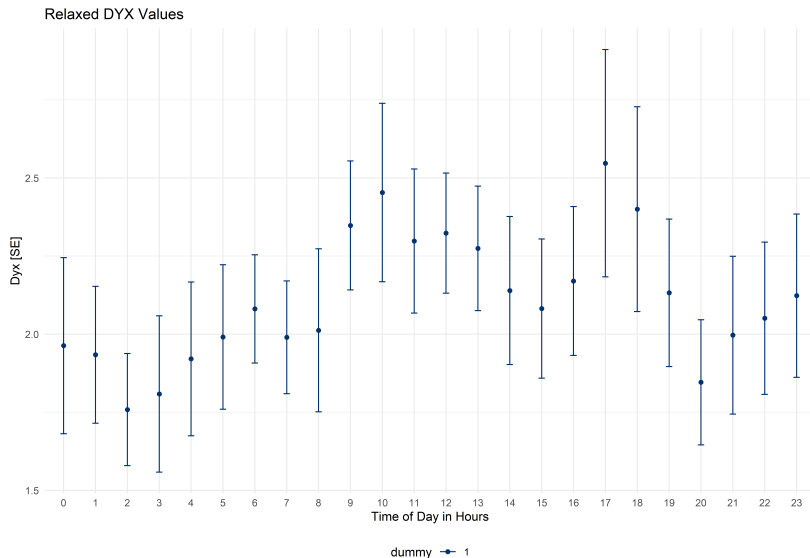
Relaxed definitions decrease the threshold needed for R peak detection, discard less **unusable windows**, and limits interpolation of data, and allows for more ectopic beats (broadened definitions for *unphysiologic beats*).

Dyx Comparison

Conservative approach

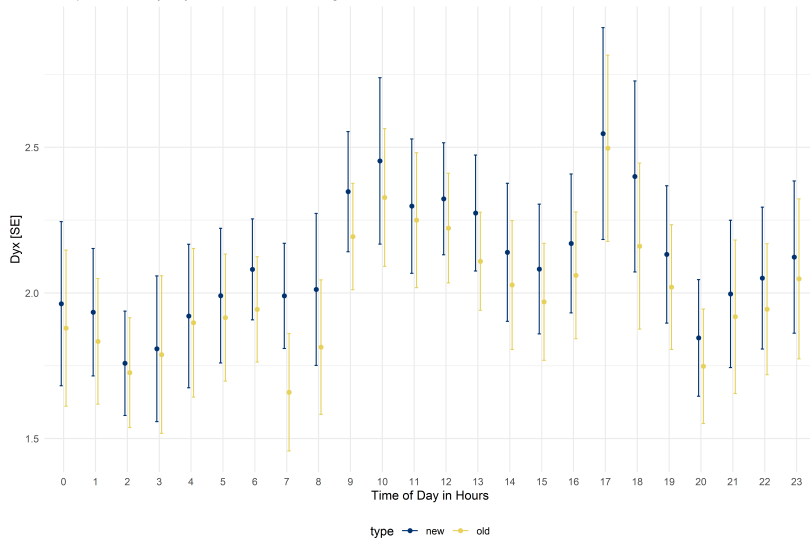


Relaxed approach



Comparison of Dyx measures

Comparison of Dyx by R-Peak Detection Rigor



Statistical approach

Table 1: Paired t-test by patient

statistic	t_df	p_value	alternative	lower_ci	upper_ci
4	29	0	two.sided	0.042	0.131

Table 2: Paired t-test by hour

statistic	t_df	p_value	alternative	lower_ci	upper_ci
7.98	23	0	two.sided	0.086	0.147

Conclusion

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- ▶ Comparison of original 30 patients with “conservative” HRV generation and the “relaxed” HRV generation
- ▶ *Dyx* is slightly higher in the relaxed compared to conservative settings
- ▶ No statistical significant difference in methods (issues of power however)

References I

- Anish S. Amit J. Shah, Rachel Lampert, Jack Goldberg, J. Douglas Bremner, Lian Li, Marc D. Thames, Viola Vaccarino, and Anish S. Amit J. Shah. Alterations in heart rate variability are associated with abnormal myocardial perfusion. *International journal of cardiology*, 305:99–105, apr 2020. ISSN 1874-1754. doi: 10.1016/j.ijcard.2020.01.069. URL <https://linkinghub.elsevier.com/retrieve/pii/S0167527319355214><http://www.ncbi.nlm.nih.gov/pubmed/32024598>.
- Adriana N. Vest, Giulia Da Poian, Qiao Li, Chengyu Liu, Shamim Nemati, Amit J. Shah, and Gari D. Clifford. An open source benchmarked toolbox for cardiovascular waveform and interval analysis. *Physiological Measurement*, 39(10):105004, oct 2018. ISSN 1361-6579. doi: 10.1088/1361-6579/aae021. URL <http://www.ncbi.nlm.nih.gov/pubmed/30199376><http://stacks.iop.org/0967-3334/39/i=10/a=105004?key=crossref.2d9731857ae3ed429d35fce67e8ffe19>.