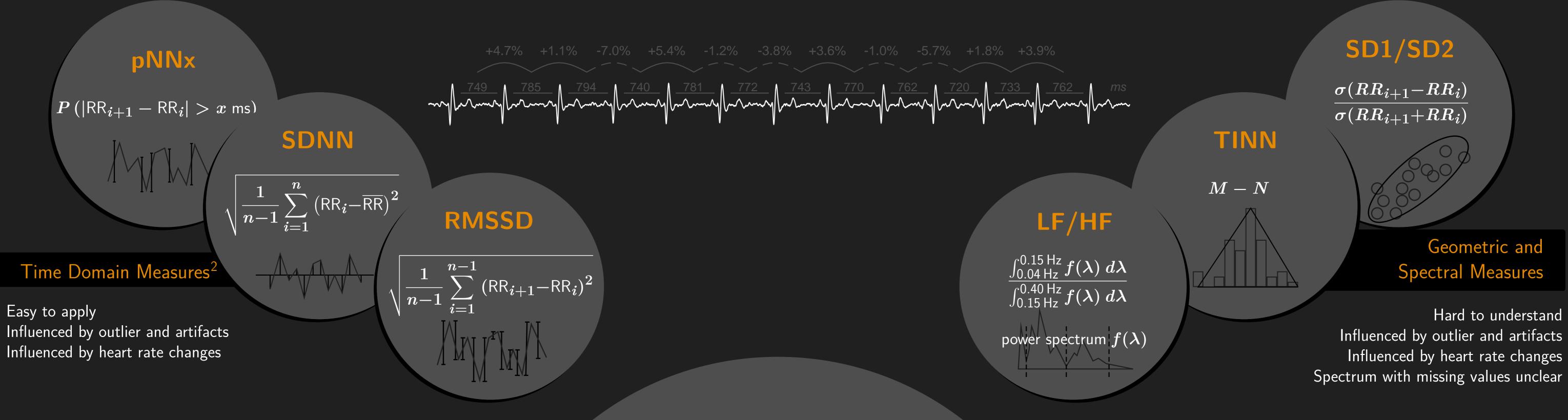
A robust, simple and reliable measure of Heart Rate Variability using relative RR intervals

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Heart Rate Variability

Heart Rate Variability (HRV) characterizes the variation of the heart rate when analyzing successive cardiac cycles over a fixed measuring period. HRV is a measurand of the neurovegetative activity and autonomic function of the heart and describes the ability of the heart to change time intervals from one heart beat to the next, continually and without overloading, and to flexibly adjust to different overloads. 1



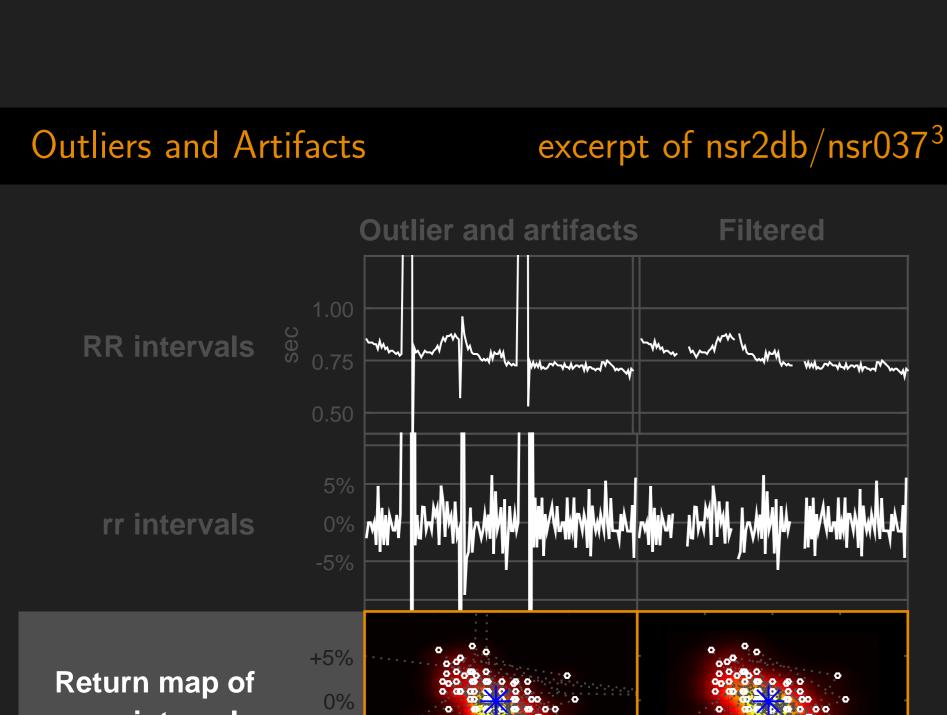
Relative RR Intervals

9) -2.5 % -5.0 % rrHRV :=

 d_i is the ${\sf euclidean}$ ${\sf distance}$ between $({\sf rr}_i, {\sf rr}_{i+1})$ and center point c, which is the average of relative RR intervals for which $|{\rm rr}_i| < 20\%$.

The interquartile range (IQR) of (d_i) provides information about the annular intensity.

Center point $oldsymbol{c}$ provides information about increasing (c>0) or decreasing heart rates (c<0).



Absolute RR intervals are influenced by heart rate

temporary heart rate.

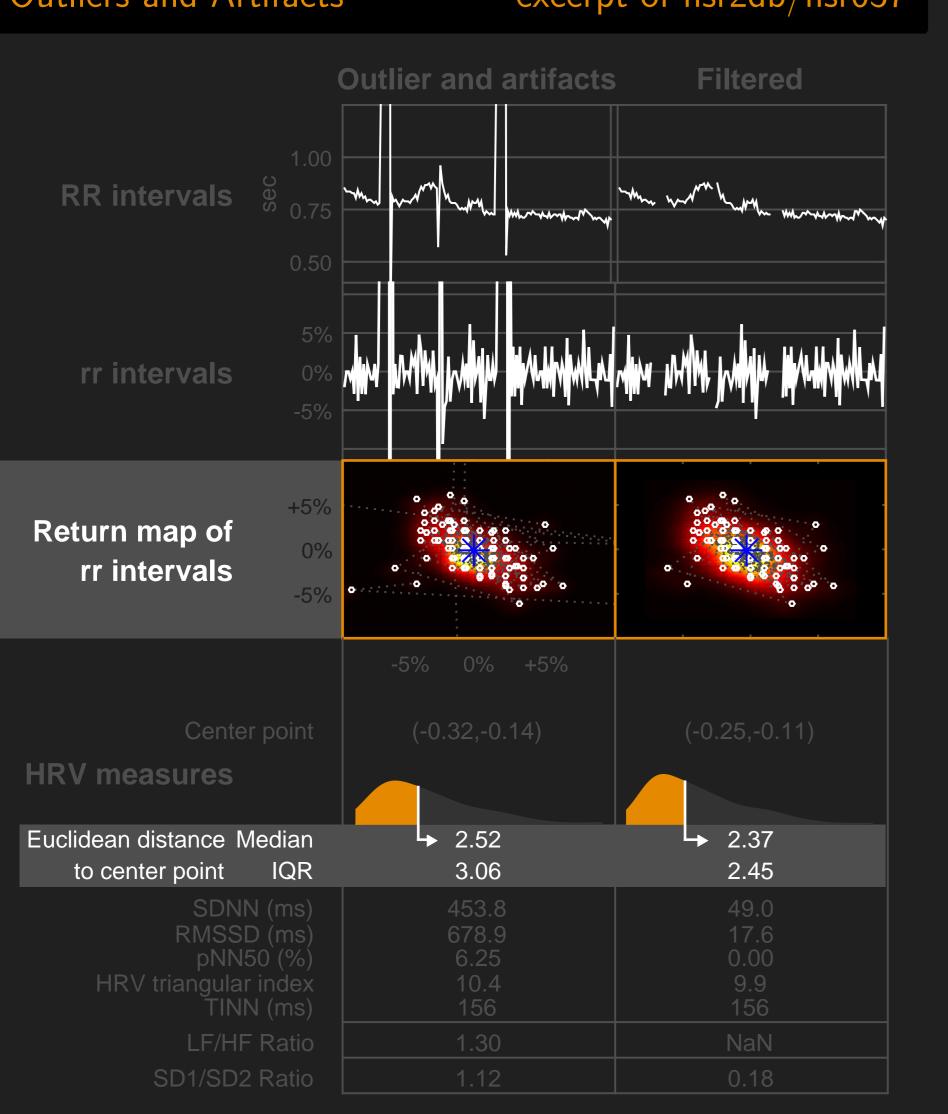
Complex dynamics of

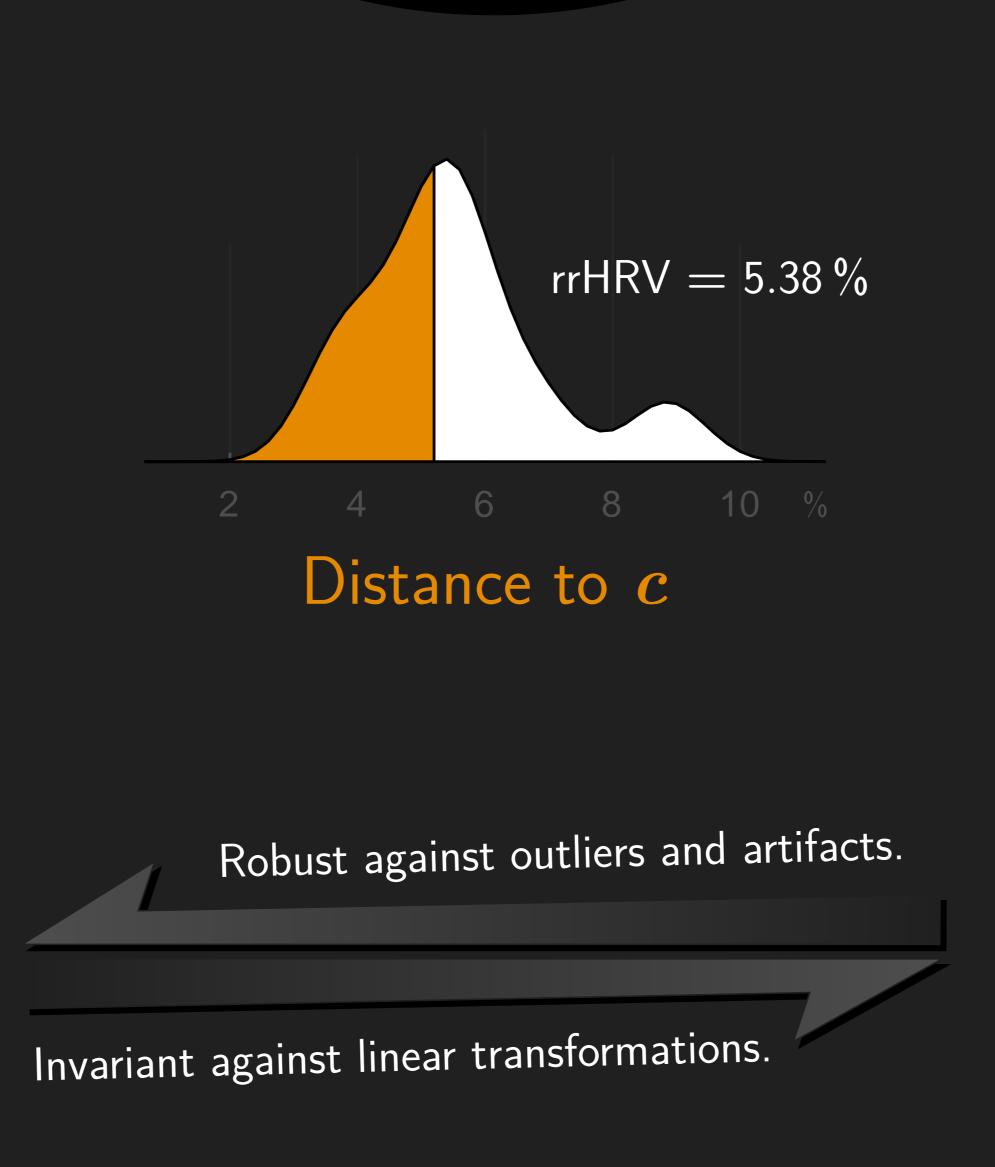
heart beat intervals

disguised in the

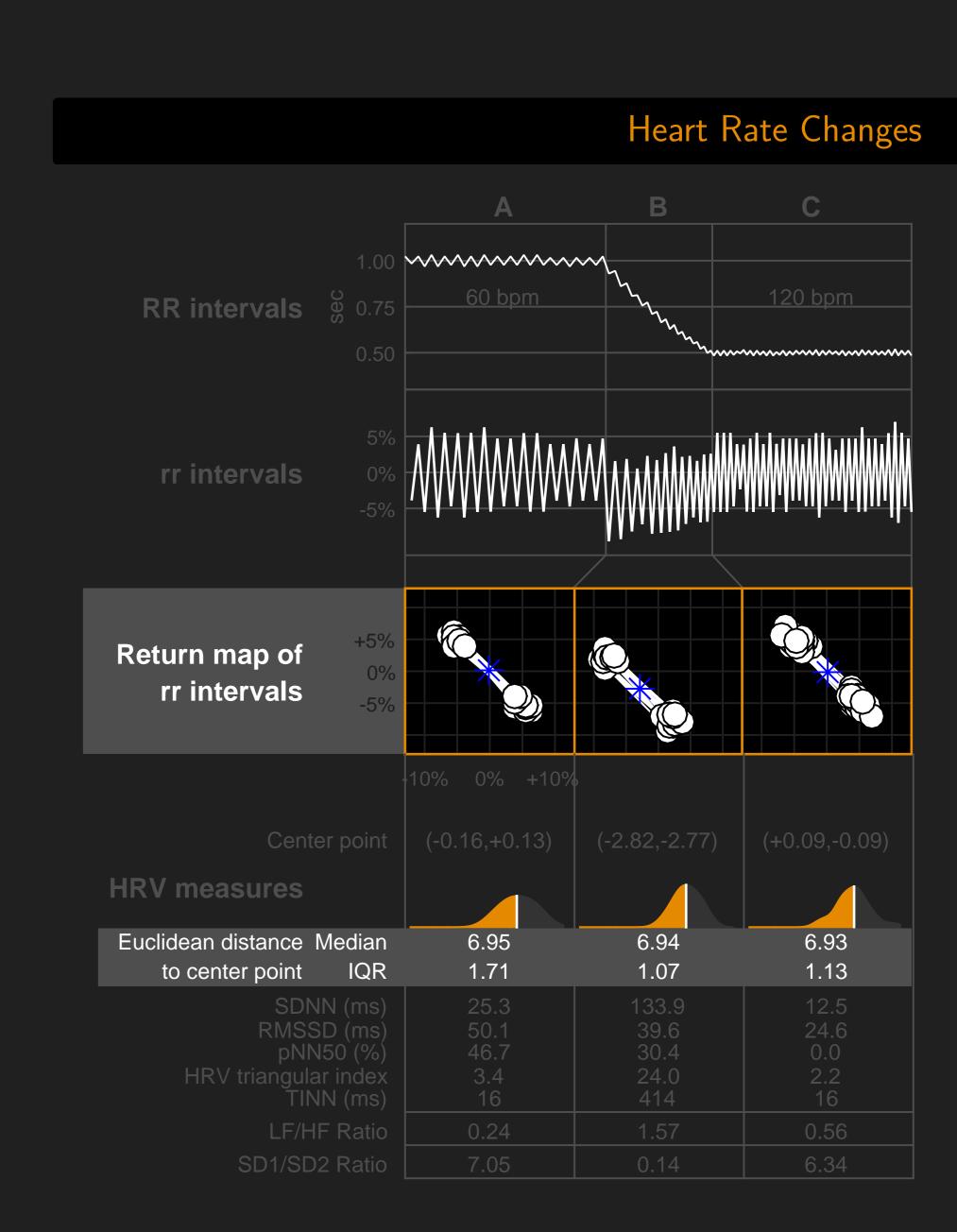
Poincaré map.

changes. A good measure should be adjusted to the





median $((d_i)_{i=1,...})$



PhysioNet: Components of a new research resource for complex physiologic signals," Circulation, vol. 101, no. 23, pp. e215–e220, 2000 (June 13)

Try yourself!

^[1] K. Hottenrott, "Grundlagen zur Herzfrequenzvariabilität und Anwendungsmöglichkeiten im Sport," in Herzfrequenzvariabilität im Sport - Prävention, Rehabilitation und Training,

vol. 129, pp. 9–26, Edition Czwalina Feldhaus Verlag Hamburg, 2002.

^[2] M. Malik, J. T. Bigger, A. J. Camm, R. E. Kleiger, A. Malliani, A. J. Moss, and P. J. Schwartz, "Heart rate variability," European Heart Journal, vol. 17, no. 3, pp. 354–381, 1996. [3] A. L. Goldberger, L. A. N. Amaral, L. Glass, J. M. Hausdorff, P. C. Ivanov, R. G. Mark, J. E. Mietus, G. B. Moody, C.-K. Peng, and H. E. Stanley, "PhysioBank, PhysioToolkit, and