

1. Time series data

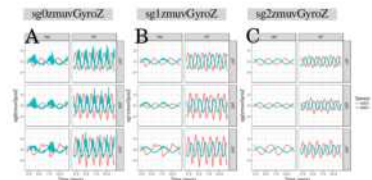


Fig. 6.1 Time series for horizontal arm movements. (A) raw-normalised (sg0rmvGyroZ), (B) normalised-smoothed 1 (sg1rmvGyroZ) and (C) normalised-smoothed 2 (sg2rmvGyroZ). Time series are only for three participants (p01, p02, and p03) for horizontal movements in normal and faster velocity (HN, HF) with the normalised GyroZ axis (rmvGyroZ) and with one sensor attached to the participant (HS01) and other sensor attached to the robot (RS01). R code to reproduce the figure is available at [1].

2. Embedding parameters

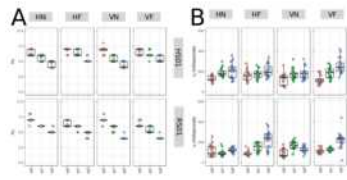


Fig. 6.3 Box plots of minimum embedding parameters. Box plots of (A) minimum embedding dimensions and (B) first minimum AMI values for Horizontal Normal (HN), Horizontal Faster (HF), Vertical Normal (VN) and Vertical Faster (VF) with sensors attached to participants (HS01) and sensor attached to robot (RS01). Minimum embedding dimensions (m_0 and n_0) are for twenty participants (p01 to p20) with three smoothed signals (sg0rmvGyroZ (sg0), sg1rmvGyroZ (sg1) and sg2rmvGyroZ (sg2)) and window length of 10-sec (500 samples). R code to reproduce the figure is available at [2].

5. Recurrence Quantification Analysis

4. Recurrence Plots

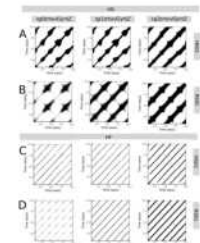


Fig. 6.4 RQA for horizontal arm movements. Recurrence plots of participant p01 for horizontal movements in normal and faster velocity (HN, HF) with one sensor of raw-normalised (sg0rmvGyroZ), normalised-smoothed 1 (sg1rmvGyroZ) and normalised-smoothed 2 (sg2rmvGyroZ), and sensor attached to the participant (HS01) and to the robot (RS01). Recurrence plots were computed with embedding parameters $m_0 = 6$, $n_0 = 1$ and parameter Diagonal = 1. R code to reproduce the figure is available at [3].

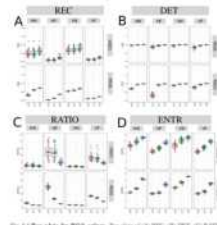


Fig. 6.5 Box plots for RQA values. Box plots of (A) REC, (B) DET, (C) RATIO and (D) ENTR values for 20 participants performing HN, HF, VN and VF movements with sensor HS01. RQA was then computed for time series sg0 and sg1 (RQA values were computed only embedding parameters $m_0 = 6$, $n_0 = 1$ and window threshold = 0.1). R code to reproduce the figure is available at [4].

3. Taken's Theorem

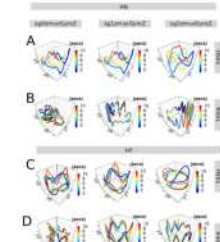


Fig. 6.6 RQA for horizontal arm movements. Recurrence plots of participant p01 for horizontal movements in normal and faster velocity (HN, HF) with one sensor of raw-normalised (sg0rmvGyroZ), normalised-smoothed 1 (sg1rmvGyroZ) and normalised-smoothed 2 (sg2rmvGyroZ), and sensor attached to the participant (HS01) and to the robot (RS01). Recurrence plots were computed with embedding parameters $m_0 = 6$, $n_0 = 1$ and window threshold = 0.1. R code to reproduce the figure is available at [5].

6. 3D surface plots of RQA

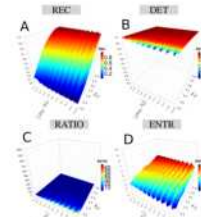
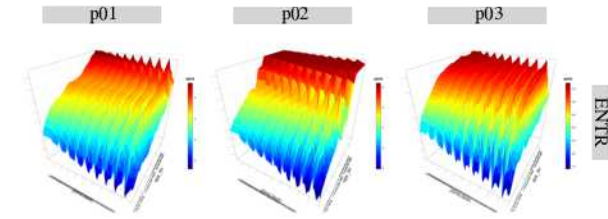
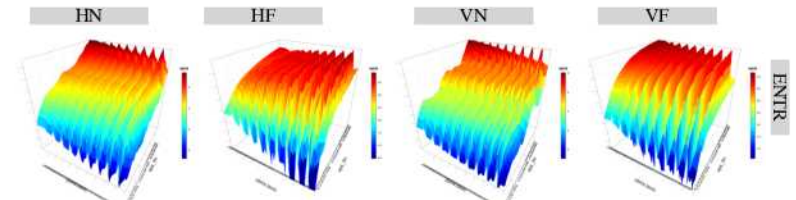


Fig. 6.7 3D surface plots for RQA metrics. (A) REC, (B) DET, (C) RATIO and (D) ENTR values with increasing size of embedding parameter (0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20). RQA values were computed for time series of participant p01 with HS01 sensor. R code to reproduce the figure is available at [6].

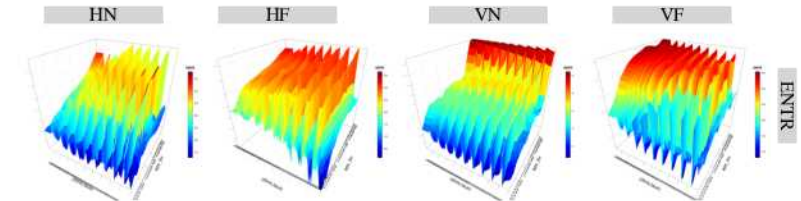
PARTICIPANTS



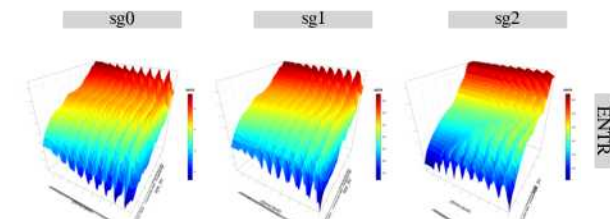
HS01



RS01



SMOOTHNESS



WINDOW SIZE

