

Supplementary Material

Miguel Xochicale

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Abstract

Section 1 describes datasets and section 2 shows surface plots of 3D RQA ENTR values for 3 participants (p01, p02 and p03).

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1 Datasets

Datasets are for (a) window size of 100, 250, 500 and 750 samples (w100, w250, w500, w750); (b) smoothness: sg0, sg1 and sg2; (c) movement: Horizontal Normal (HN), Horizontal Faster (HF), Vertical Normal (VN) and Vertical Faster (VF); and (d) sensors: Sensor attached to Human (HS01), sensor attached to Robot (RS01).

The location of the dataset is shown below with the first two lines of xdatav00.dt denoting labels.

```
~/srep2020/data/dataset$ tree --si
[ 46M] xdata_v00.dt
.
.
.
"Participant" "Activity" "Sensor" "Sample" "Time"
"sg0zmuvGyroY" "sg1zmuvGyroY" "sg2zmuvGyroY"
"sg0zmuvGyroZ" "sg1zmuvGyroZ" "sg2zmuvGyroZ"
...
"p01" "HN" "HS01" 1 0
0.0110396263359954 0.00606430191548277 0.0385586376765087
0.00467559072085554 0.00509907428630649 0.168927517477539
...
```

2 3D RQA ENTR values

Location of code, data and figures for 3D RQA ENTR values is shown below

```
## Code  
$HOME/srep2020/code/rscripts/G_3Drqa  
'> source( paste( getwd(), '/C_3Drqa_plots_epsilon.R', sep=''), echo=TRUE )'  
  
## Data  
$HOME/srep2020/data/rqa$ tree -s  
  
## Figures  
$HOME/srep2020/docs/figures/rqa/src/3drqa_epsilon$ tree -s
```

For the following plots, datasets for NN participants where NN is 01, 02 and 03 are:

```
RQAs_pNNw100.dt  
RQAs_pNNw250.dt  
RQAs_pNNw500.dt  
RQAs_pNNw750.dt
```

2.1 Participant 01

Figures 1 and 2 are for a window size of 100 samples. Figures 3 and 4 are for a window size of 250 samples. Figures 5 and 6 are for a window size of 500 samples. Figures 7 and 8 are for a window size of 750 samples.

p01-w100-HS01

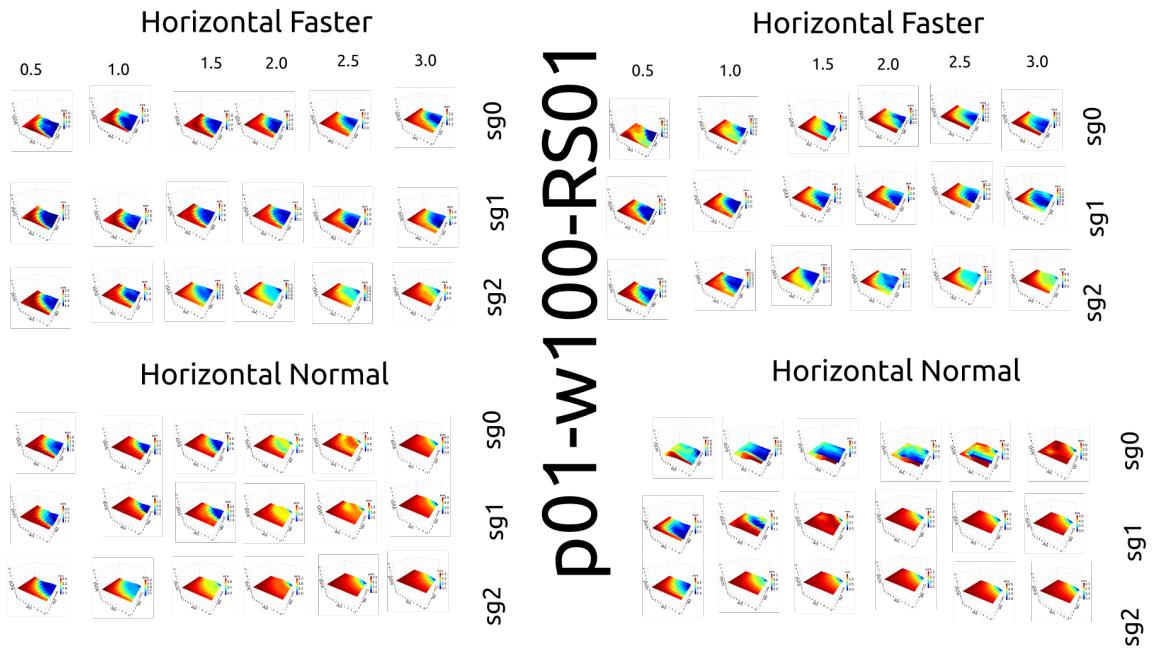


Figure 1: **RQA-Entr** for participant 01 performing horizontal movements for a window size of 100 samples. Code and data to reproduce the figure is available in [1].

p01-w100-HS01

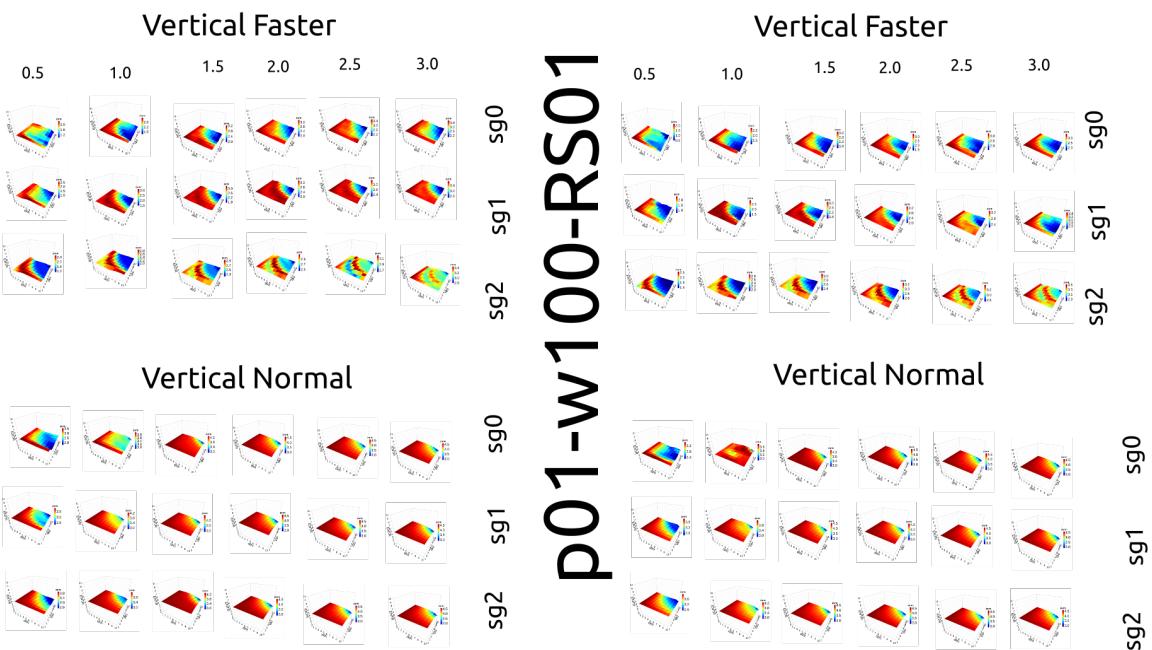


Figure 2: **RQA-Entr** for participant 01 performing vertical movements for a window size of 100 samples. Code and data to reproduce the figure is available in [1].

p01-w250-HS01

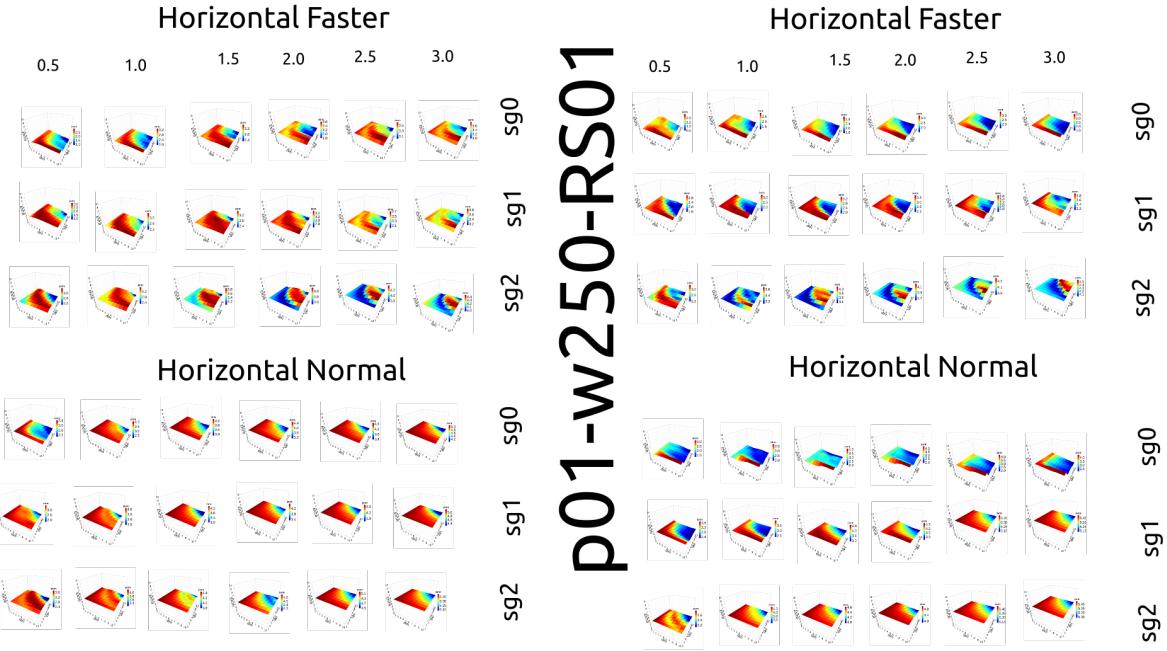


Figure 3: **RQA-Entr** for participant 01 performing horizontal movements for a window size of 250 samples. Code and data to reproduce the figure is available in [1].

p01-w250-HS01

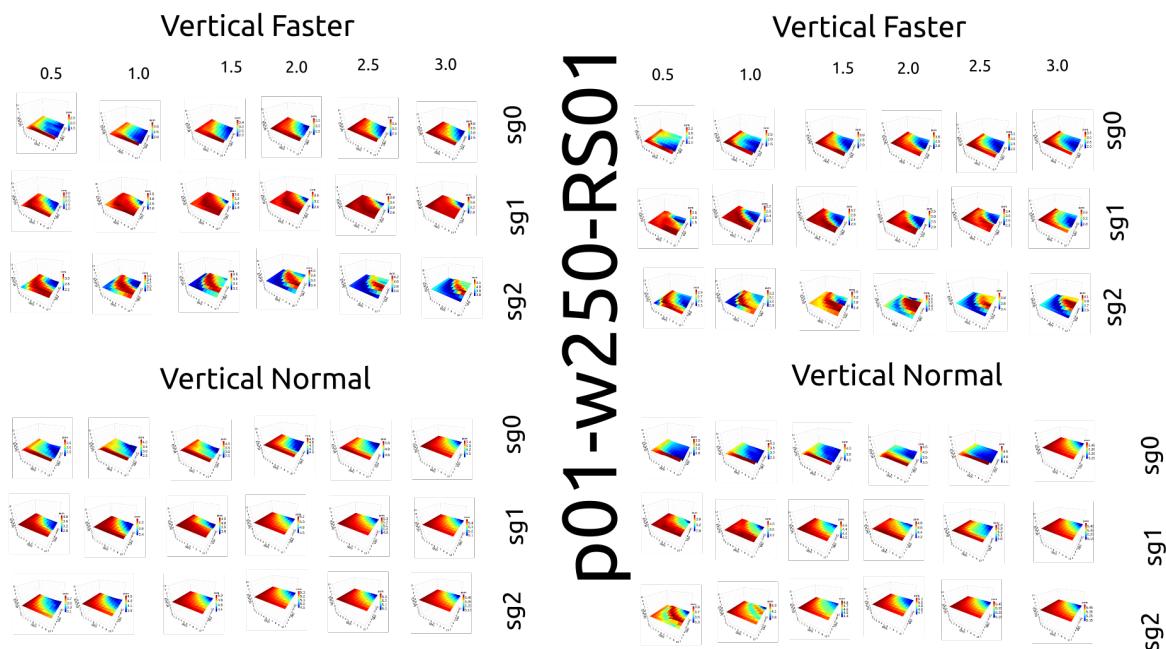
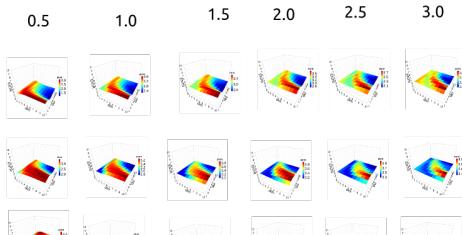


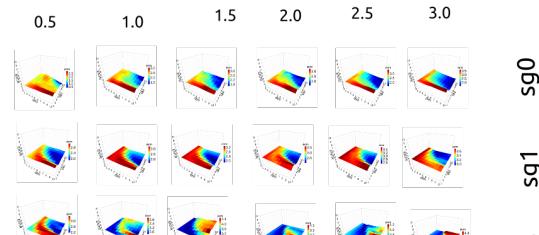
Figure 4: **RQA-Entr** for participant 01 performing vertical movements for a window size of 250 samples. Code and data to reproduce the figure is available in [1].

p01-w500-HS01

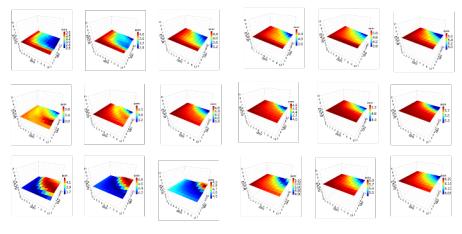
Horizontal Faster



Horizontal Faster



Horizontal Normal



Horizontal Normal

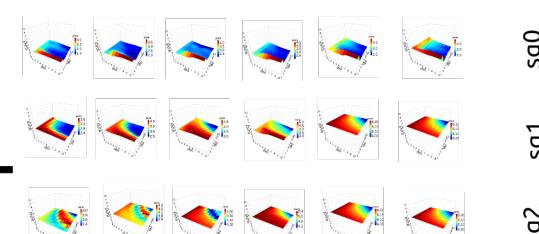
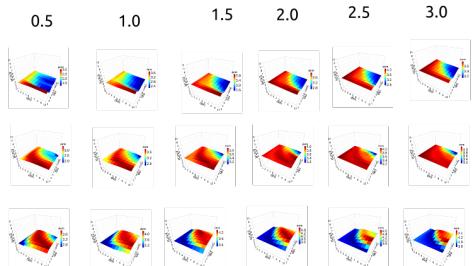


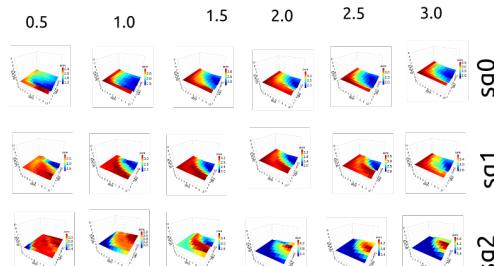
Figure 5: **RQA-Entr** for participant 01 performing horizontal movements for a window size of 500 samples. Code and data to reproduce the figure is available in [1].

p01-w500-HS01

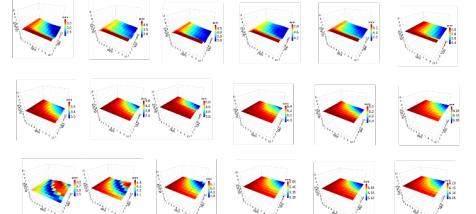
Vertical Faster



Vertical Faster



Vertical Normal



Vertical Normal

p01-w500-RS01

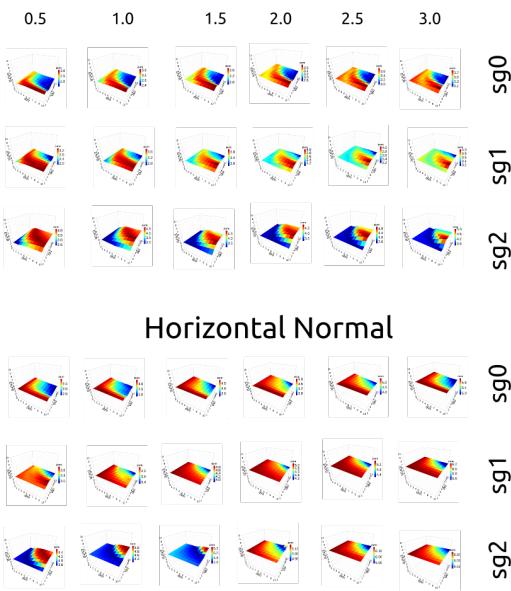
sg0
sg1
sg2
sg3
sg4
sg5

sg0
sg1
sg2
sg3
sg4
sg5

Figure 6: **RQA-Entr** for participant 01 performing vertical movements for a window size of 500 samples. Code and data to reproduce the figure is available in [1].

p01-w750-HS01

Horizontal Faster



Horizontal Faster

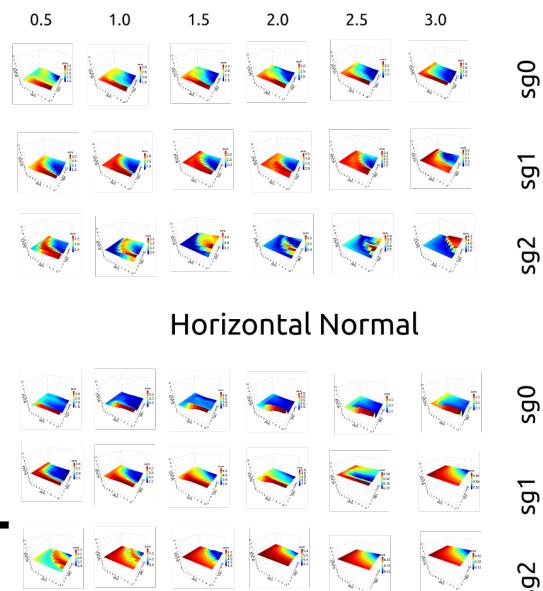
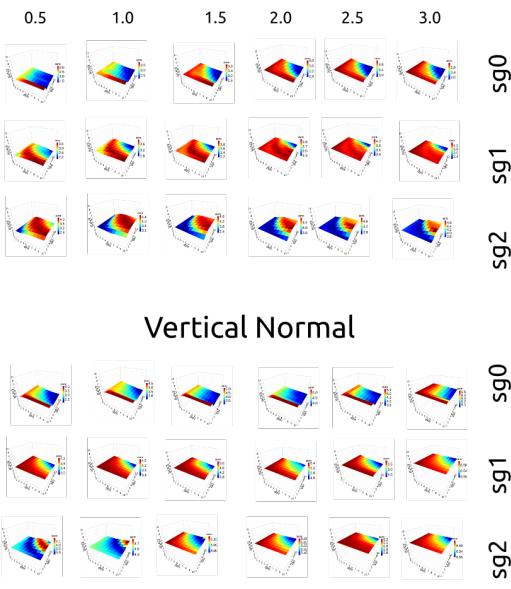


Figure 7: **RQA-Entr** for participant 01 performing horizontal movements for a window size of 750 samples. Code and data to reproduce the figure is available in [1].

p01-w750-HS01

Vertical Faster



Vertical Faster

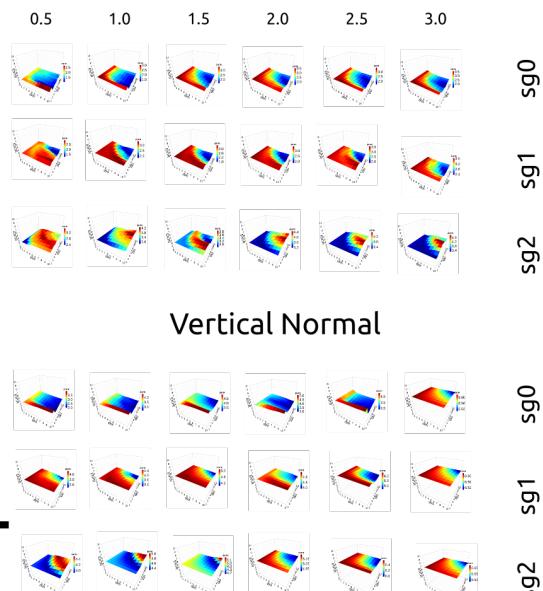


Figure 8: **RQA-Entr** for participant 01 performing vertical movements for a window size of 750 samples. Code and data to reproduce the figure is available in [1].

2.2 Participant 02

Figures 9 and 10 are for a window size of 100 samples. Figures 11 and 12 are for a window size of 250 samples. Figures 13 and 14 are for a window size of 500 samples. Figures 15 and 16 are for a window size of 750 samples.

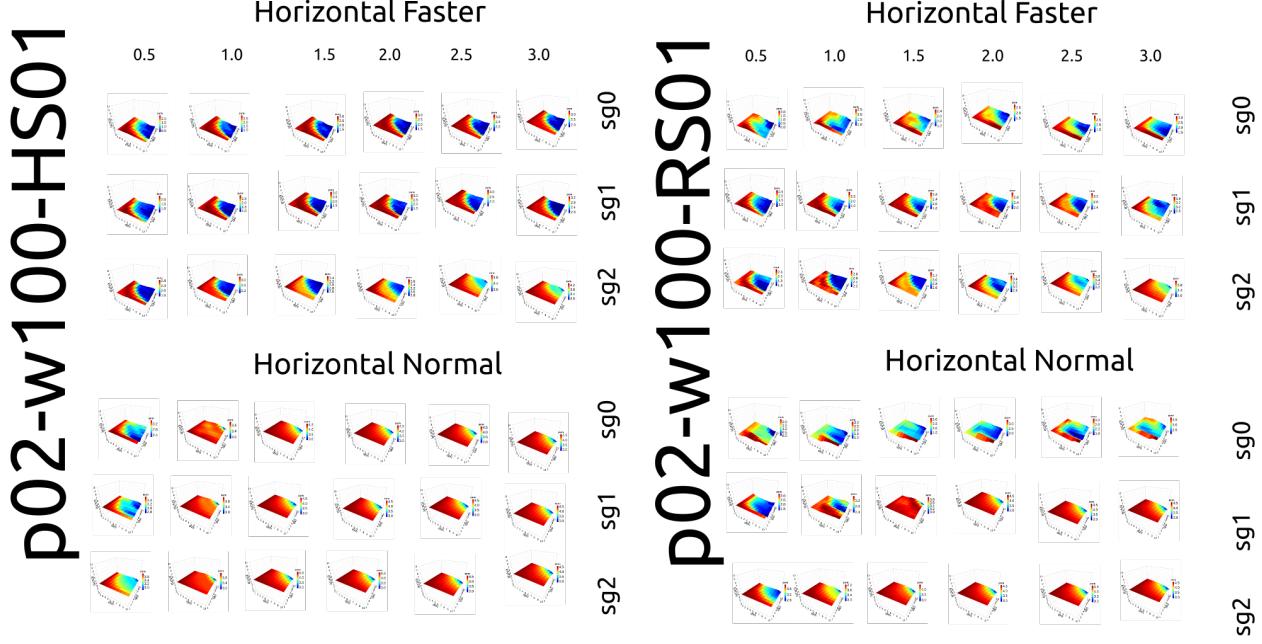


Figure 9: **RQA-Entr** for participant 02 performing horizontal movements for a window size of 100 samples. Code and data to reproduce the figure is available in [1].

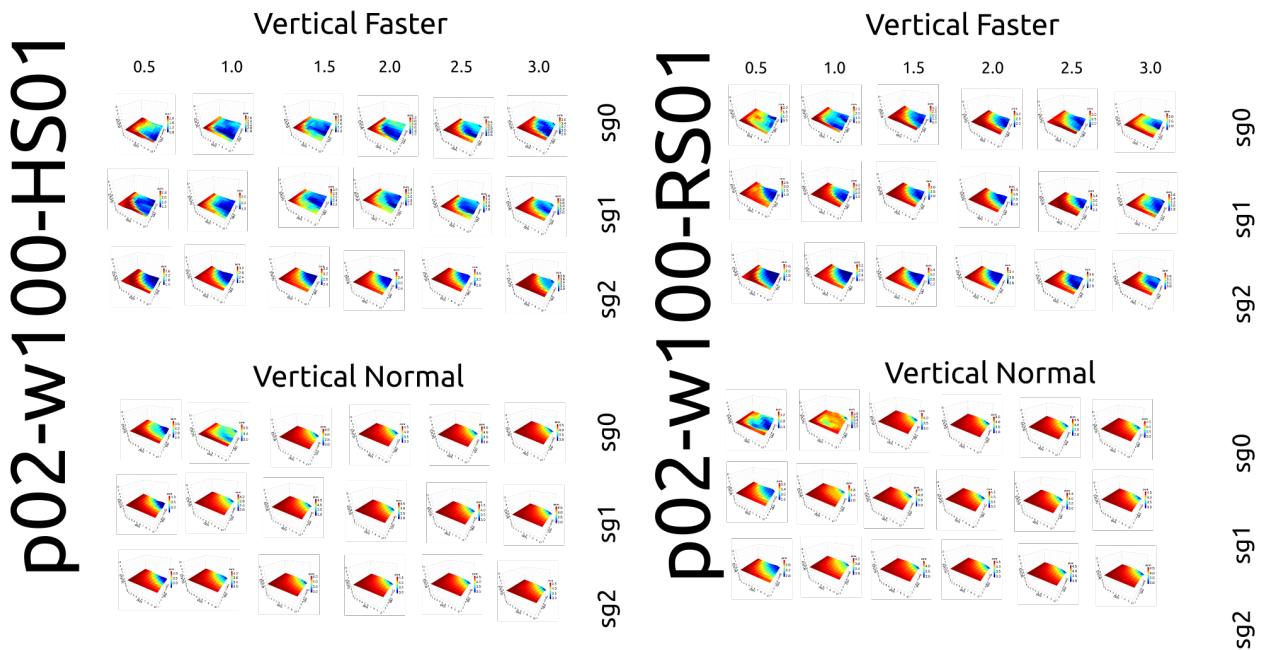
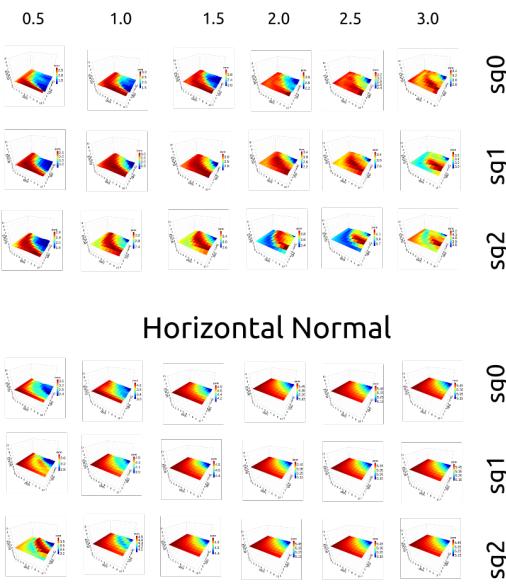


Figure 10: **RQA-Entr** for participant 02 performing vertical movements for a window size of 100 samples. Code and data to reproduce the figure is available in [1].

p02-w250-HS01

Horizontal Faster



Horizontal Faster

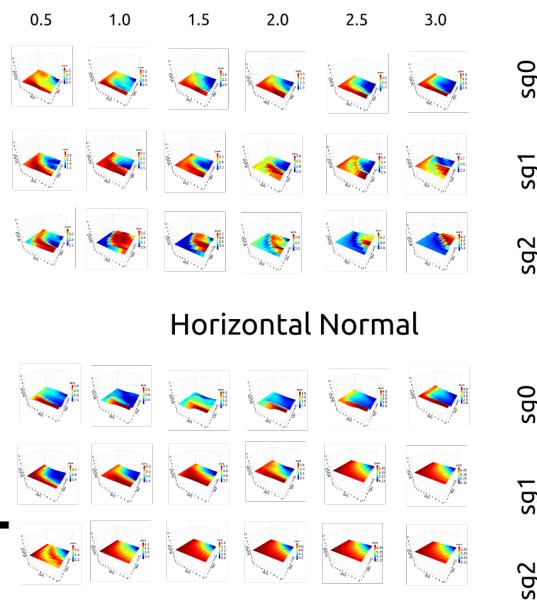
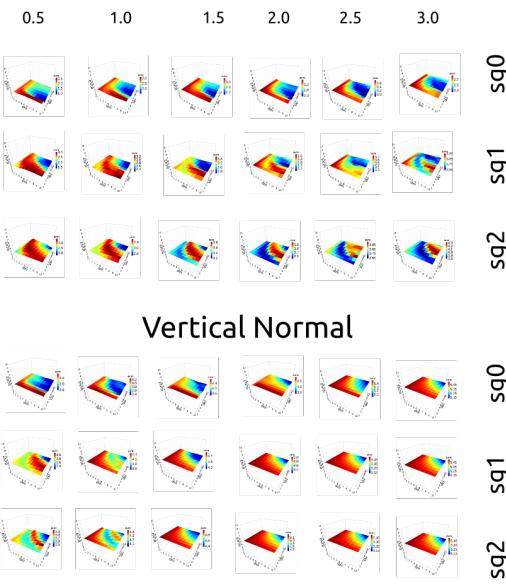


Figure 11: **RQA-Entr** for participant 02 performing horizontal movements for a window size of 250 samples. Code and data to reproduce the figure is available in [1].

p02-w250-HS01

Vertical Faster



Vertical Faster

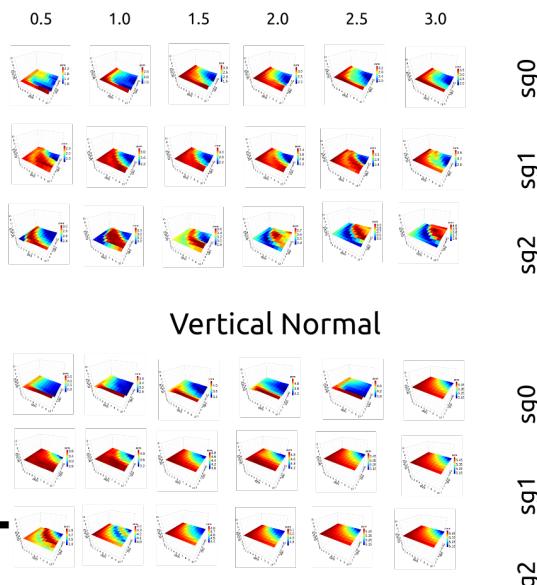


Figure 12: **RQA-Entr** for participant 02 performing vertical movements for a window size of 250 samples. Code and data to reproduce the figure is available in [1].

p02-w500-HS01

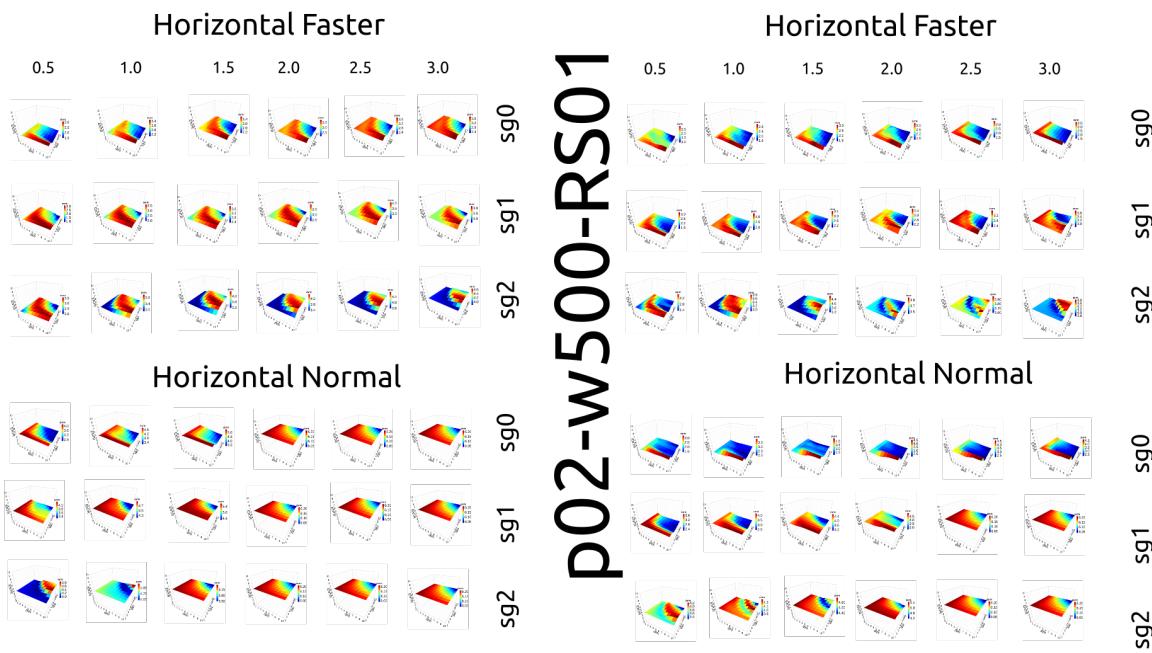


Figure 13: **RQA-Entr** for participant 02 performing horizontal movements for a window size of 500 samples. Code and data to reproduce the figure is available in [1].

p02-w500-HS01

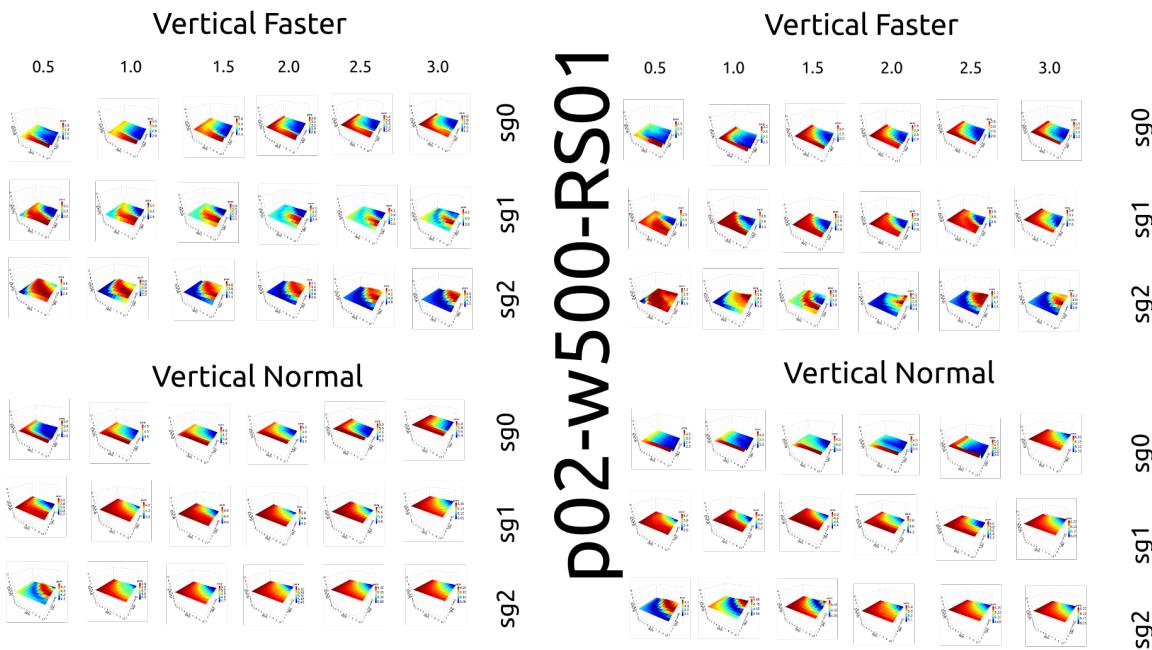
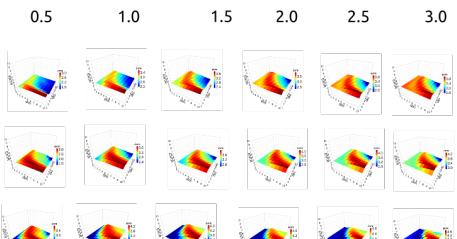


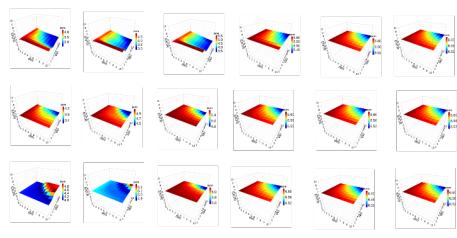
Figure 14: **RQA-Entr** for participant 02 performing vertical movements for a window size of 500 samples. Code and data to reproduce the figure is available in [1].

p02-w750-HS01

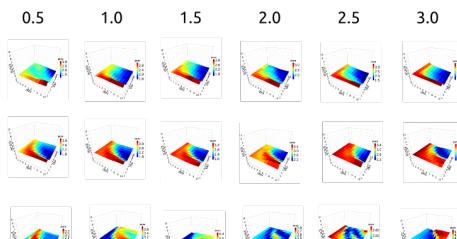
Horizontal Faster



Horizontal Normal



Horizontal Faster



Horizontal Normal

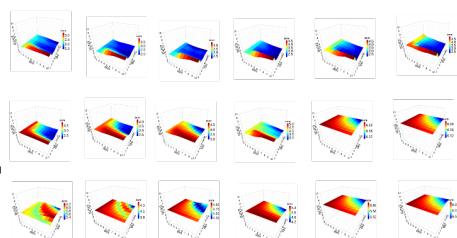
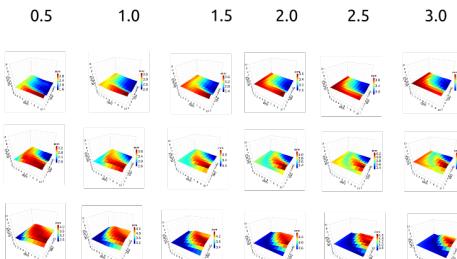


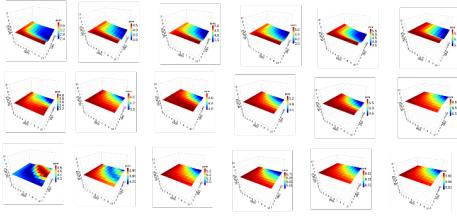
Figure 15: **RQA-Entr** for participant 02 performing horizontal movements for a window size of 750 samples. Code and data to reproduce the figure is available in [1].

p02-w750-HS01

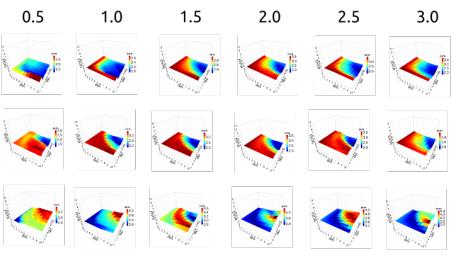
Vertical Faster



Vertical Normal



Vertical Faster



Vertical Normal

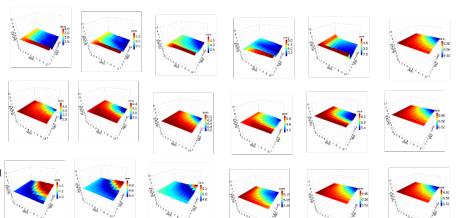


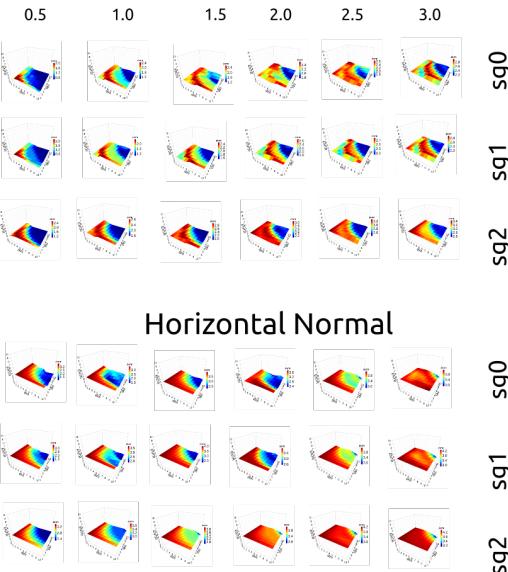
Figure 16: **RQA-Entr** for participant 02 performing vertical movements for a window size of 750 samples. Code and data to reproduce the figure is available in [1].

2.3 Participant 03

Figures 17 and 18 are for a window size of 100 samples. Figures 19 and 20 are for a window size of 250 samples. Figures 21 and 22 are for a window size of 500 samples. Figures 23 and 24 are for a window size of 750 samples.

p03-w100-HS01

Horizontal Faster



Horizontal Faster

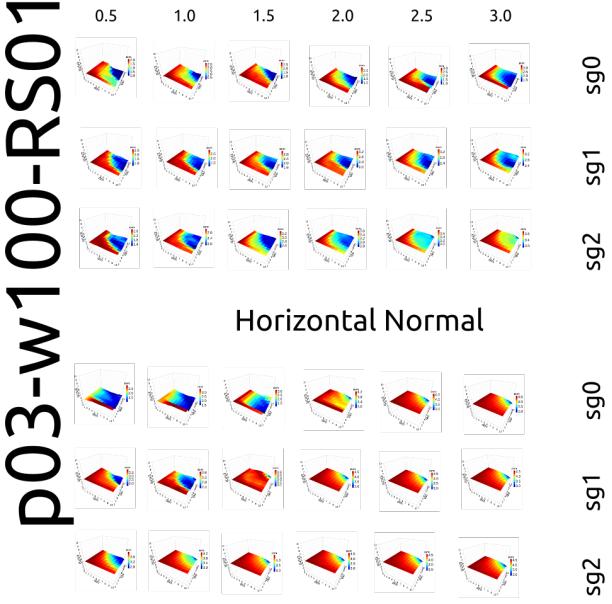
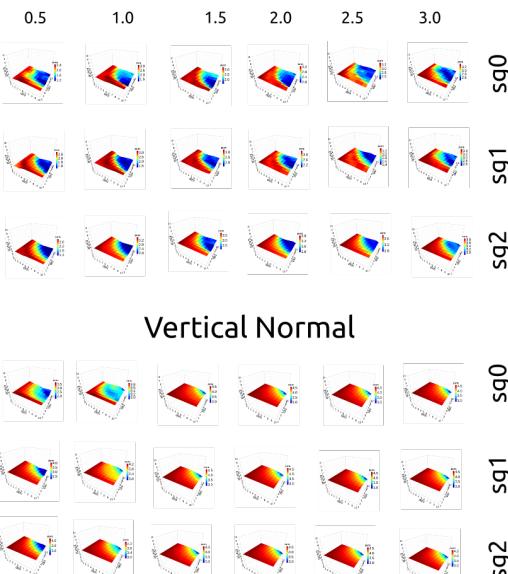


Figure 17: **RQA-Entr** for participant 03 performing horizontal movements for a window size of 100 samples. Code and data to reproduce the figure is available in [1].

p03-w100-HS01

Vertical Faster



Vertical Faster

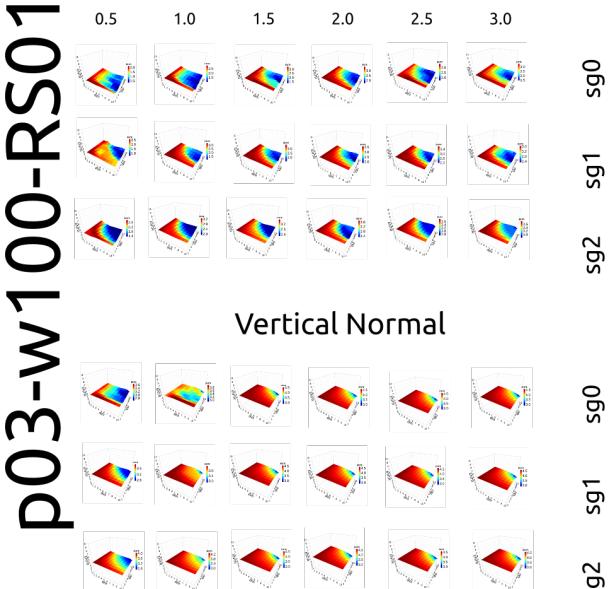
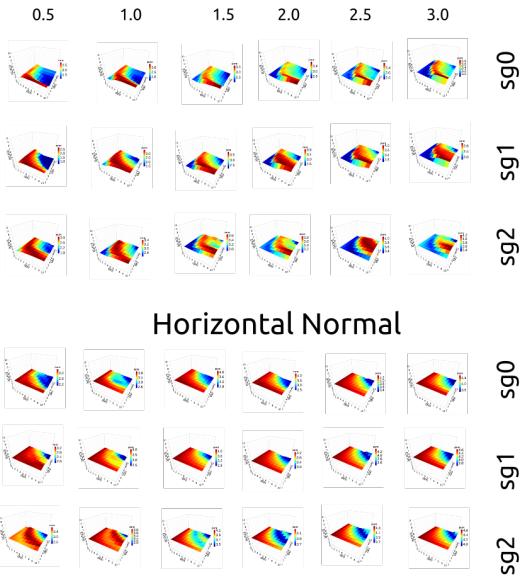


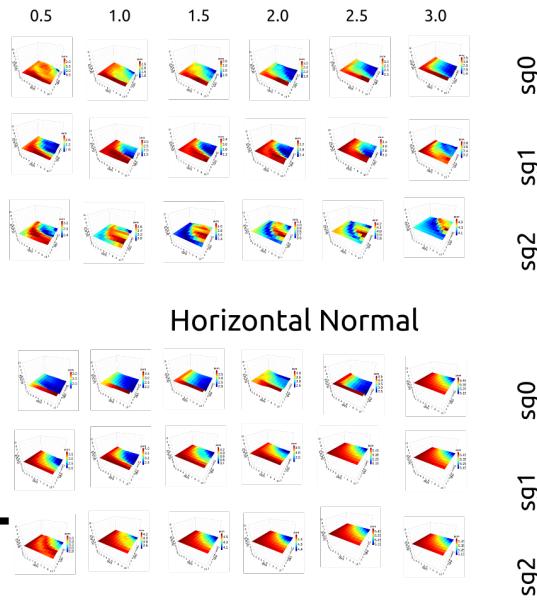
Figure 18: **RQA-Entr** for participant 03 performing vertical movements for a window size of 100 samples. Code and data to reproduce the figure is available in [1].

p03-w250-HS01

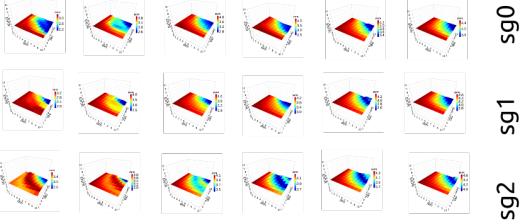
Horizontal Faster



Horizontal Faster



Horizontal Normal



Horizontal Normal

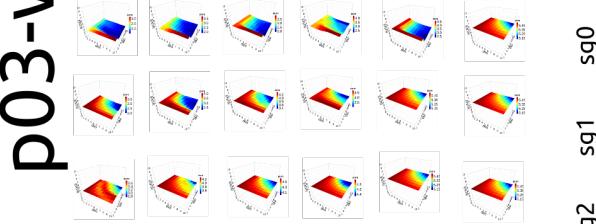
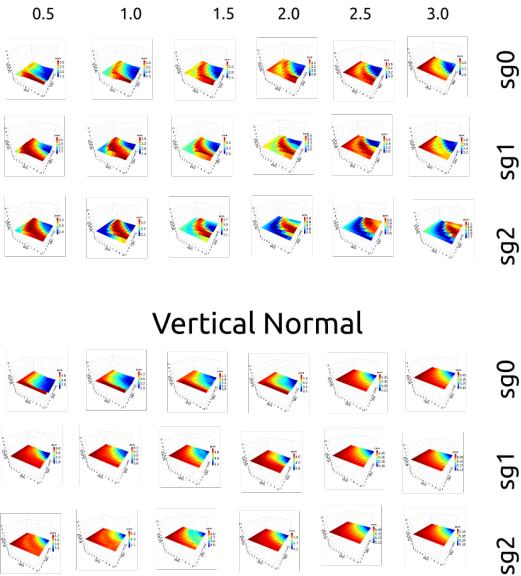


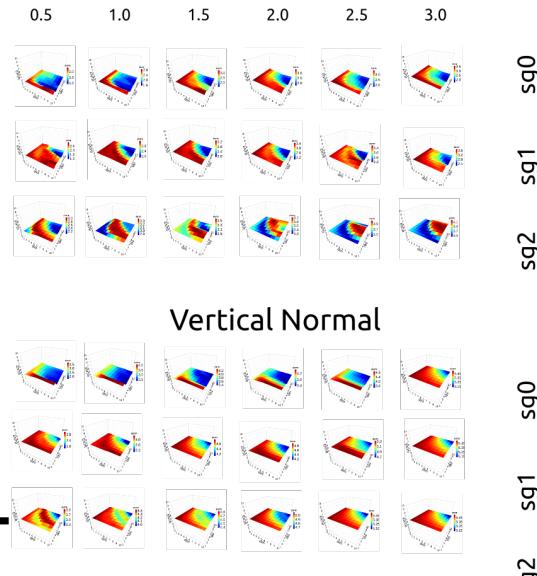
Figure 19: **RQA-Entr** for participant 03 performing horizontal movements for a window size of 250 samples. Code and data to reproduce the figure is available in [1].

p03-w250-HS01

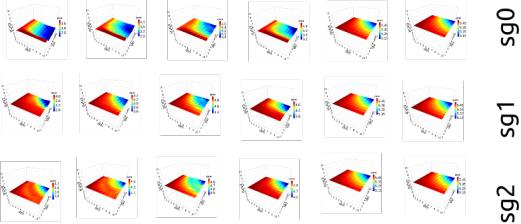
Vertical Faster



Vertical Faster



Vertical Normal



Vertical Normal



Figure 20: **RQA-Entr** for participant 03 performing vertical movements for a window size of 250 samples. Code and data to reproduce the figure is available in [1].

p03-w500-HS01

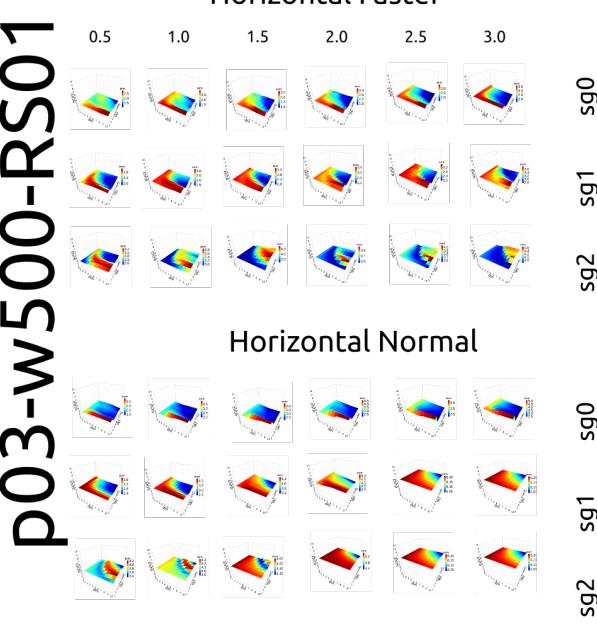
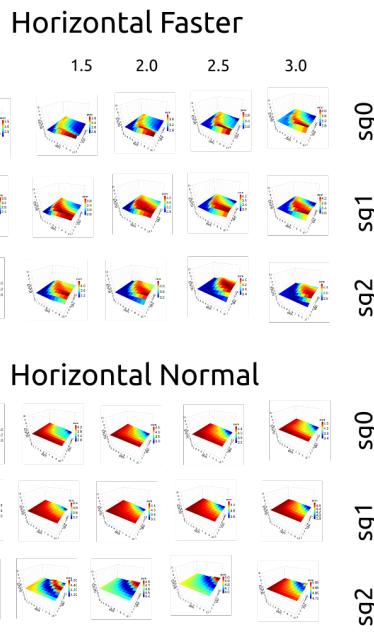


Figure 21: **RQA-Entr** for participant 03 performing horizontal movements for a window size of 500 samples. Code and data to reproduce the figure is available in [1].

p03-w500-HS01

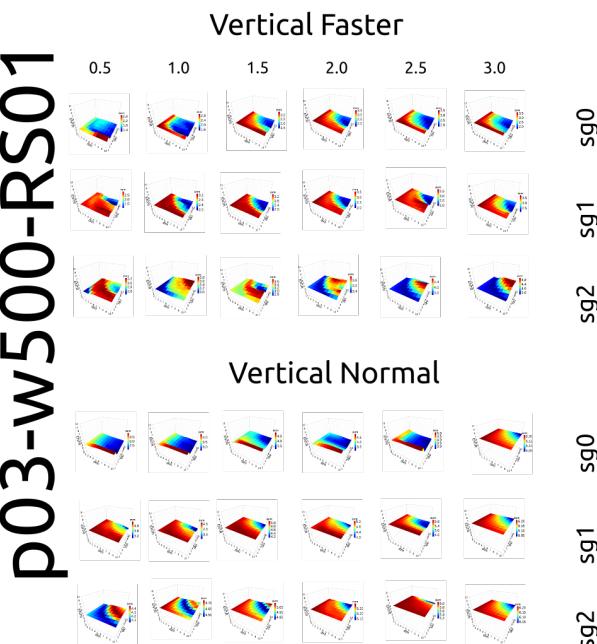
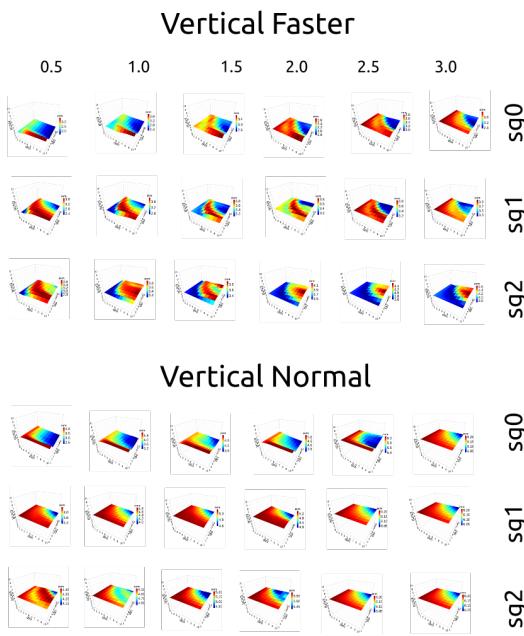


Figure 22: **RQA-Entr** for participant 03 performing vertical movements for a window size of 500 samples. Code and data to reproduce the figure is available in [1].

p03-w750-HS01

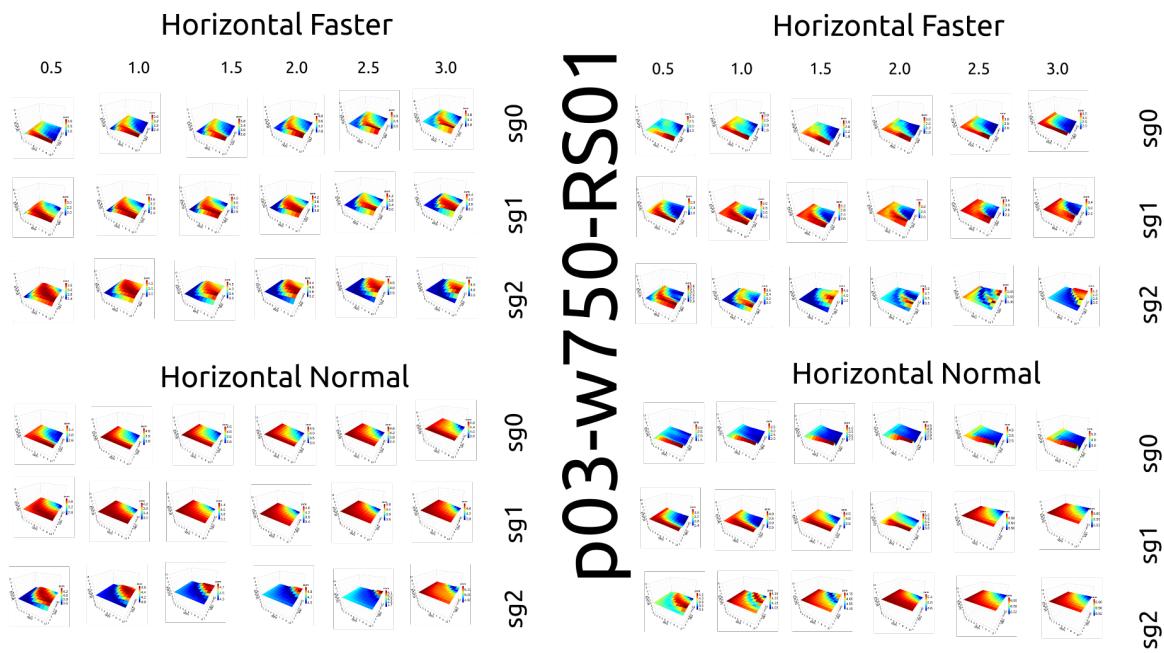


Figure 23: **RQA-Entr** for participant 03 performing horizontal movements for a window size of 750 samples. Code and data to reproduce the figure is available in [1].

p03-w250-HS01

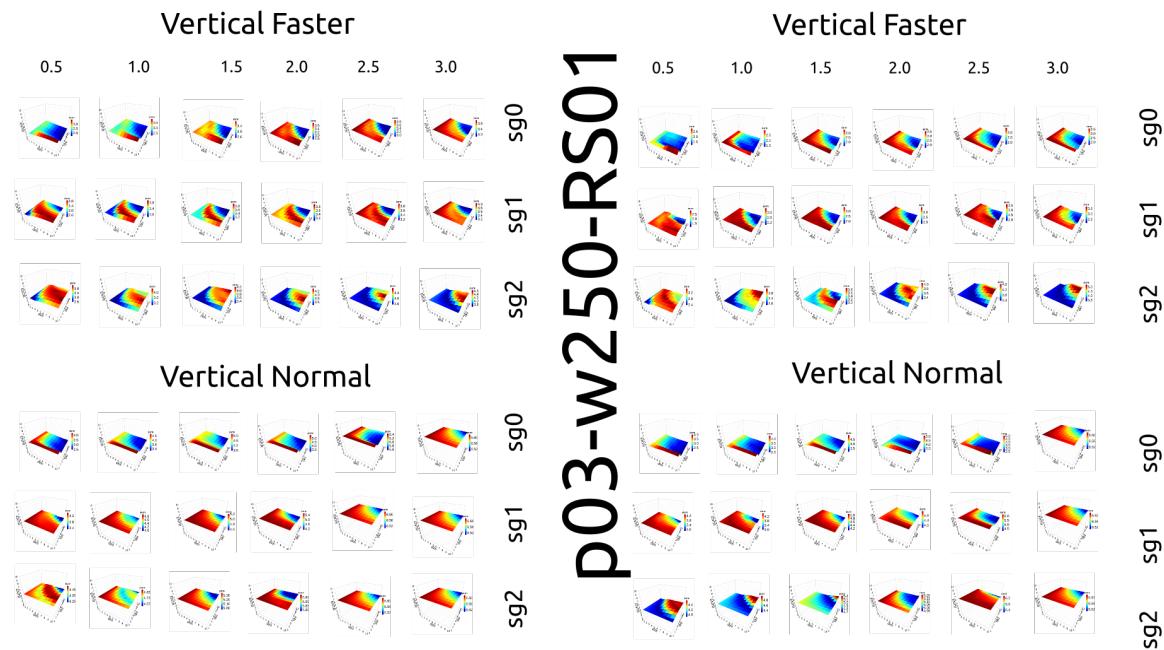


Figure 24: **RQA-Entr** for participant 03 performing vertical movements for a window size of 750 samples. Code and data to reproduce the figure is available in [1].

References

- [1] Xochicale Miguel. Github repository: Nonlinear methods to quantify movement variability in human-humanoid interaction activities. <https://github.com/mxochicale/srep2020>, 2020.