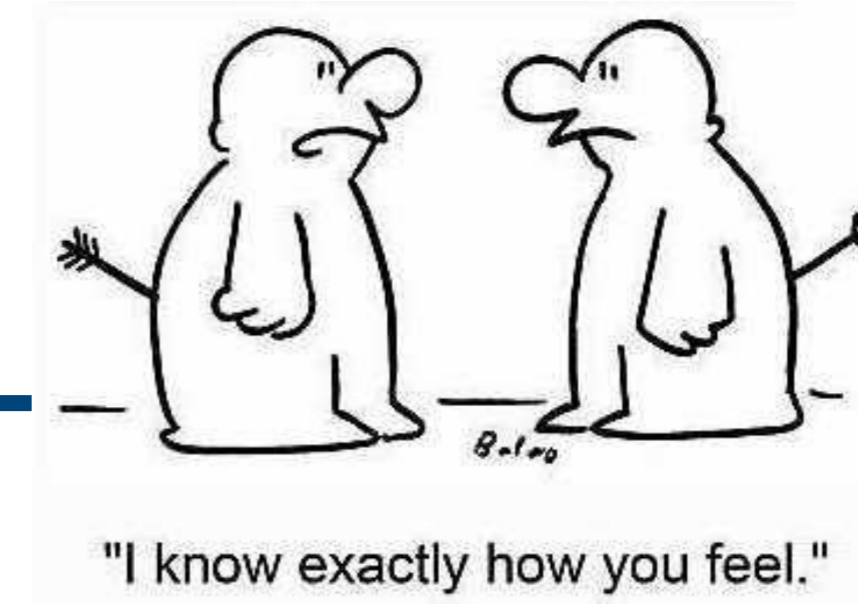


# Integrating behavioral and physiological parameters to characterize emotional contagion in pigs

FBN / Wilhelm-Stahl-Allee 2 / 18196 Dummerstorf / www.fbn-dummerstorf.de

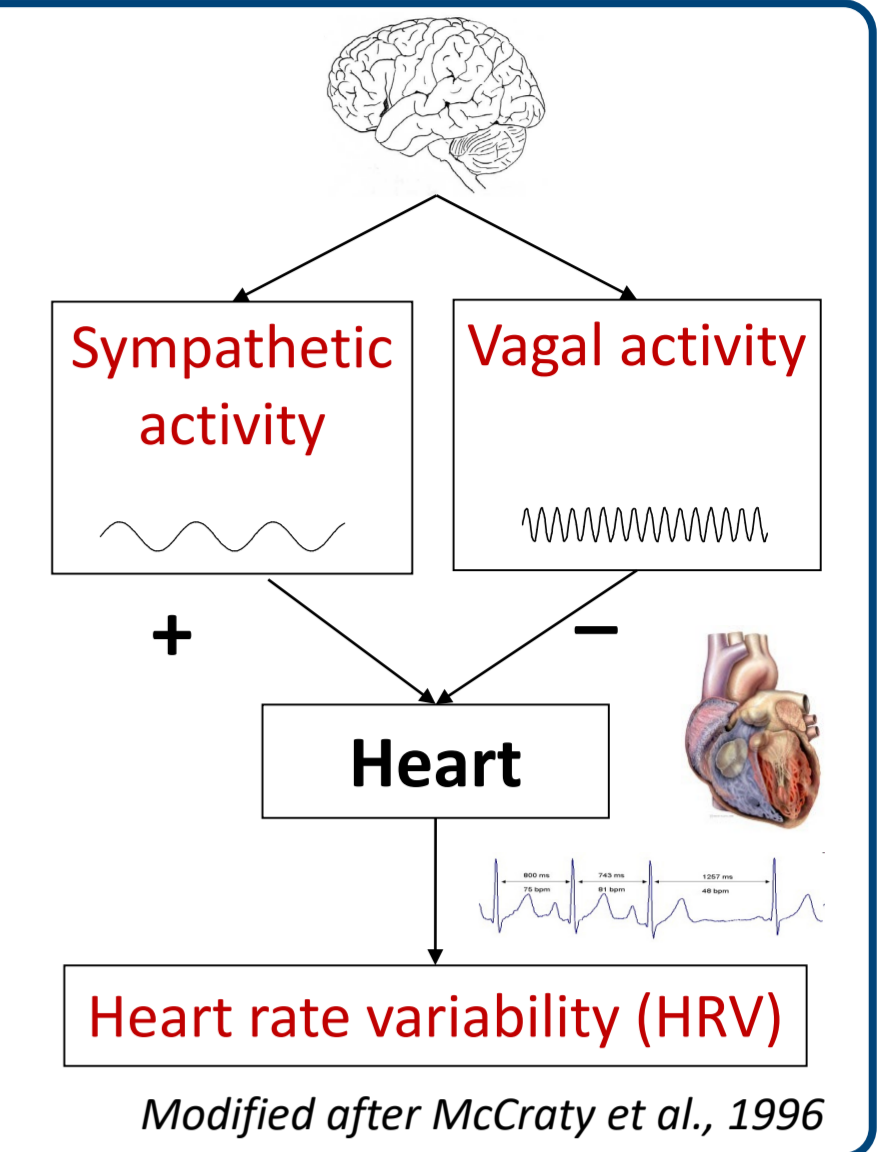
Annika Krause, Jan Langbein and Katrin Siebert

Institute of Behavioural Physiology, Research Institute for Farm Animal Biology (FBN), Dummerstorf, Germany



## Background

- To assess the welfare of social animals like pigs, it is not only relevant what an individual feels but also the extent to which its conspecifics are affected by its distress or pleasure.
- Integration of numerous behavioral and physiological parameters (e.g. autonomic activity) help to interpret the animals' affective state.
- Changes in autonomic activity are strongly influenced by physical activity of the subject. This relationship has to be taken into account when comparing autonomic activity in experimental setups.



## Aim



The goal of this methodological approach was to integrate behavioral and physiological data of pigs using an individually adjusted import profile to investigate the time-synchronized, context-related emotional response with regard to physical activity in an emotional contagion paradigm.

## Experimental setup and data analysis

### Test situations

**Agent-observer paradigm**

### Test procedure

**Fixed pairs with N=8**

Basic measurement (10 mins)

Test phase (2 mins)

### Data analysis

**Behavior**

- contact to grid
- gazing to agent
- proximity to agent
- body position
- movement

Analysis of continuous data

**Cardiac activity**

- Bioharness™ Data logger (Biopac) records Electrocardiogram (ECG)
- Analysis via @Kubios: Mean heart rate (HR) and -variability (HRV: RMSSD, SDNN)

Analysis in 1-minute intervals

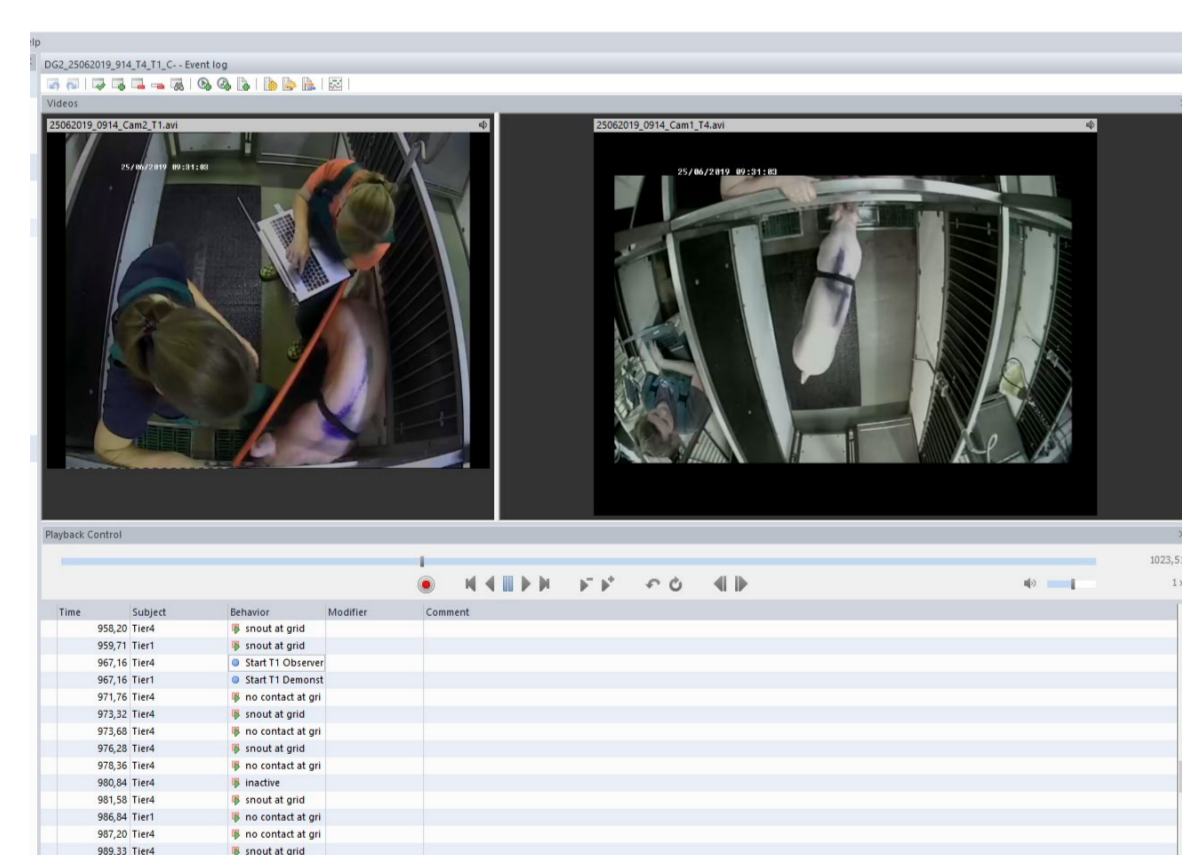
## Process to integrate behavioral and physiological data into Observer XT 15 via import profile

### 1. Behavioral analysis:

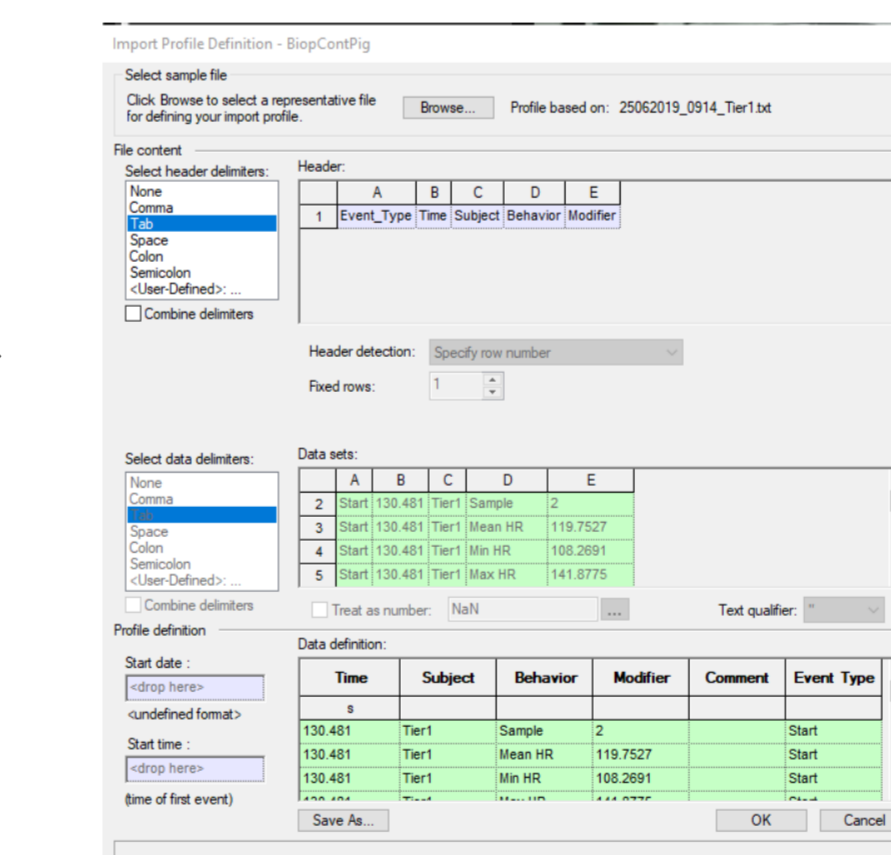
- Behavior of the pigs was analysed using The Observer

### 2. Import of cardiac data:

- The Kubios Export files of cardiac data were merged and start-stop times were transformed and added.
- HR and HRV were imported as observational data into the respective observation using an adjusted import profile.
- A new start-stop Behavior Group with values as numerical modifiers will appear within the coding scheme.



Date	Event_Type	Time	Subject	Behavior	Modifier
25062019_0914_Tier1.txt - Editor	Start	130.481	Tier1	Sample 2	
	Start	130.481	Tier1	Mean HR	119.7527
	Start	130.481	Tier1	Min HR	108.2691
	Start	130.481	Tier1	Max HR	141.8775
	Start	130.481	Tier1	STD RR	31.5254
	Start	130.481	Tier1	RMSSD	13.08
	Start	130.481	Tier1	STD/RMSSD	1.577385977
	Stop	190.481	Tier1	Sample 2	
	Stop	190.481	Tier1	Mean HR	119.7527
	Stop	190.481	Tier1	Min HR	108.2691
	Stop	190.481	Tier1	Max HR	141.8775
	Stop	190.481	Tier1	STD RR	31.5254
	Stop	190.481	Tier1	RMSSD	13.08
	Stop	190.481	Tier1	STD/RMSSD	1.577385977
	Start	250.483	Tier1	Sample 4	
	Start	250.483	Tier1	Mean HR	121.2184
	Start	250.483	Tier1	Min HR	101.4356
	Start	250.483	Tier1	Max HR	138.6067
	Start	250.483	Tier1	STD RR	34.7345
	Start	250.483	Tier1	RMSSD	11.6366
	Start	250.483	Tier1	STD/RMSSD	1.371739105
	Stop	310.483	Tier1	Sample 4	

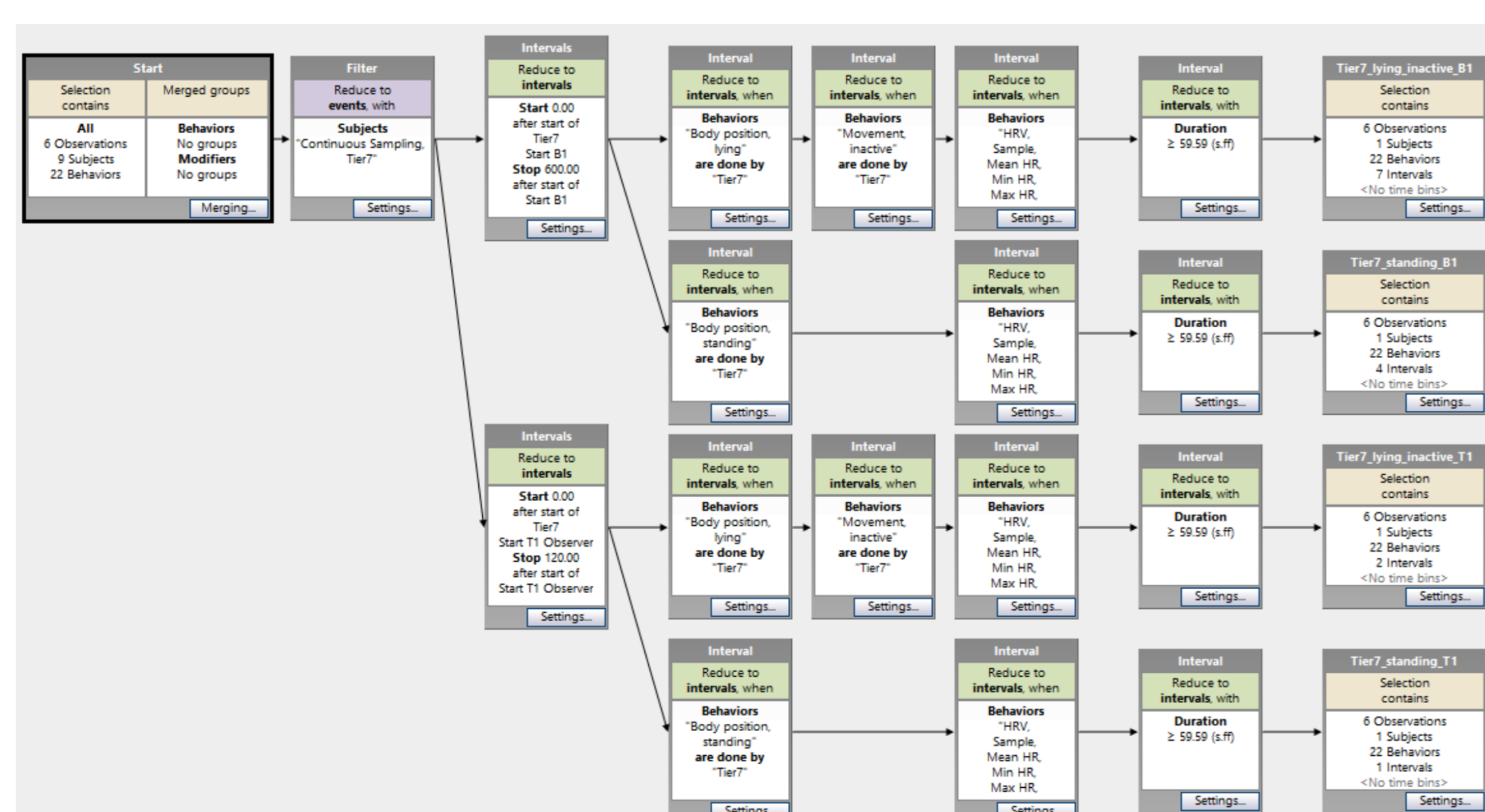


Time	Subject	Behavior	Modifier
0.00	Start		
130.48	Tier1	Sample	2.000
130.48	Tier1	Mean HR	119.753
130.48	Tier1	Min HR	108.269
130.48	Tier1	Max HR	141.878
130.48	Tier1	STD RR	31.525
130.48	Tier1	RMSSD	13.080
130.48	Tier1	STD/RMSSD	1.577
190.48	Tier1	STD/RMSSD	1.577
190.48	Tier1	RMSSD	13.080
190.48	Tier1	STD RR	31.525
190.48	Tier1	Max HR	141.878
190.48	Tier1	Min HR	108.269

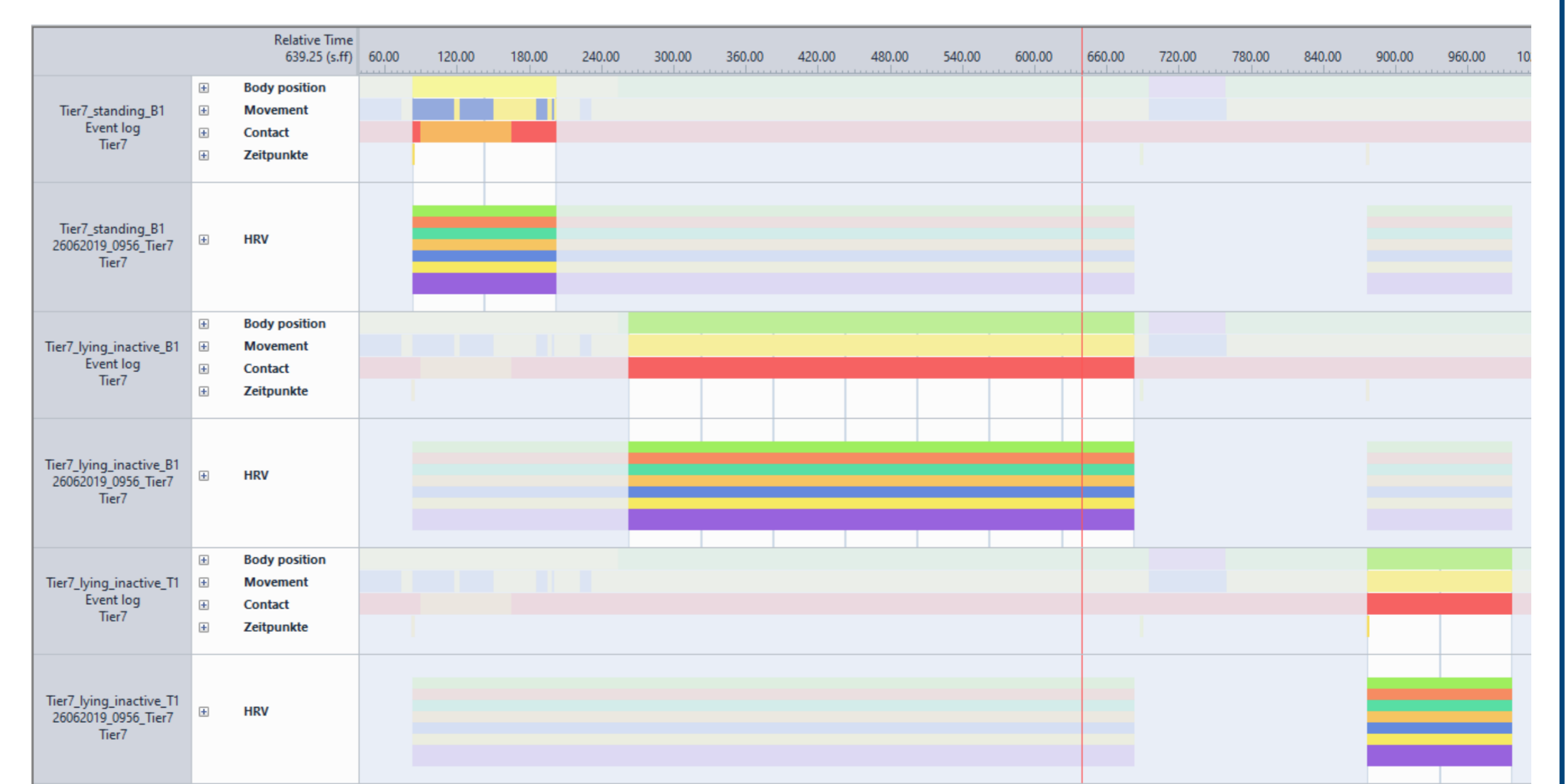
### 3. Connecting behavior and physiology in the final analysis: Select specific behaviors or intervals

For example:

- Use only intervals of active behavior
- Use only intervals of the desired behavior lasting for at least 60 secs



Data profile



Visualization of the data

## Conclusions

This methodological approach enabled the time-synchronized, context-related integration of externally recorded physiological data into The Observer XT.

The combination with behavioral measures will facilitate the characterization of subtle changes in emotional responses of pigs with regard to physical activity.

