

# Supplement to "Accounting for Object Weight in Interaction Design for Virtual Reality" at WSCG 2019

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## A TPI QUESTIONNAIRE

The following questions shall be rated on this scale from 1 - 7. The text in the scale does not always fit the question, but it shows the basic idea.

1. Not at all
2. To a very small degree
3. A little
4. To some degree
5. To a larger degree
6. Quite much
7. Very much

### A.1 Ball interaction test

This questionnaire only regards the ball throwing game.

1. How real did the Basic Ball (purple) feel regarding size and weight?  
[ ]
2. How real did the Wood Ball feel regarding weight, size and overall texture?  
[ ]
3. How real did the Fabric Ball feel regarding weight, size and overall texture?  
[ ]
4. How real did the Iron Ball feel regarding weight, size and overall texture?  
[ ]
5. How real did the Steel Ball feel regarding weight, size and overall texture?  
[ ]
6. How real did the Granite Ball feel regarding weight, size and overall texture?  
[ ]
7. How real did it feel to throw the balls?  
[ ]
8. How well was the perceived weight of the balls in accordance with the amount of force you had to apply?  
[ ]

## **A.2 Weapon interaction test**

This questionnaire only regards the weapon swinging game.

1. How real did it feel to swing the hammer?  
[ ]
2. How real did it feel to swing the sword?  
[ ]
3. How heavy did the hammer feel in the virtual world compared to the sword? [1. light. 7. heavy.]  
[ ]
4. How heavy did the hammer look? [1. light. 7. heavy.]  
[ ]
5. How heavy did the sword look?[1. light. 7. heavy.]  
[ ]

## **A.3 Spatiel Presence**

1. How much did it seem as if the objects you saw was in the same room as you?  
[ ]
2. How much did it seem like you could reach out and touch the objects?  
[ ]
3. How much did you experience a sense of being inside the environment?  
[ ]
4. How often did you want to interact with the objects you saw?  
[ ]
5. Did the experience seem more like looking at the events on a movie screen or more like looking at the events through a window? [1. = movie screen. 7. window.]  
[ ]

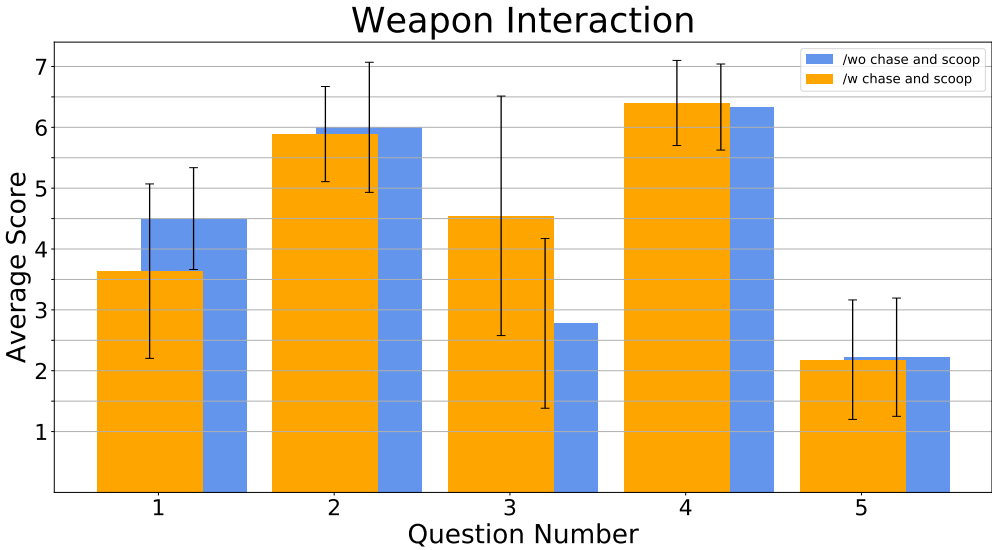
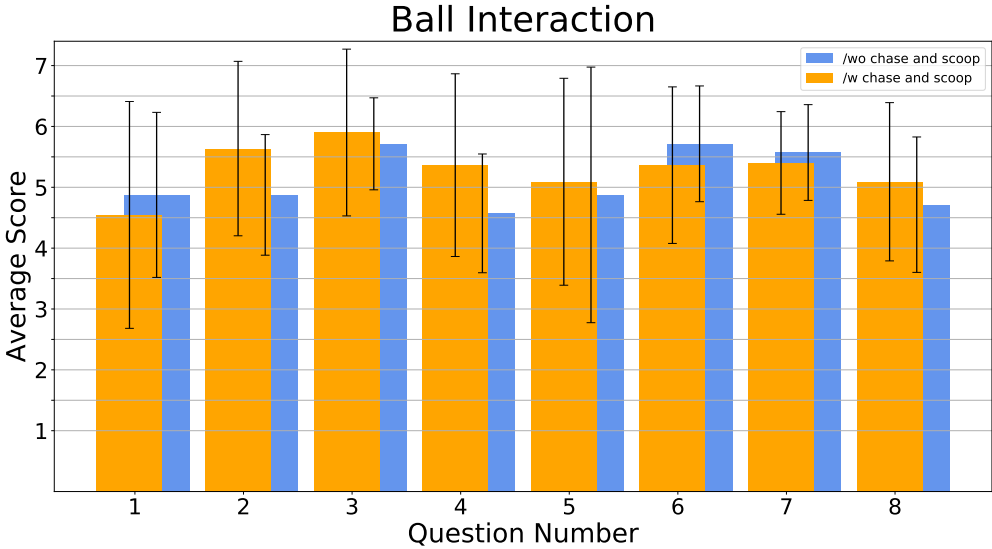
## **A.4 Engagement**

1. To what extent did you feel mentally immersed in the experience?  
[ ]
2. How completely were your senses engaged?  
[ ]
3. To what extent did you experience a sensation of reality?  
[ ]
4. How relaxing[1] or exciting[7] was the experience?  
[ ]

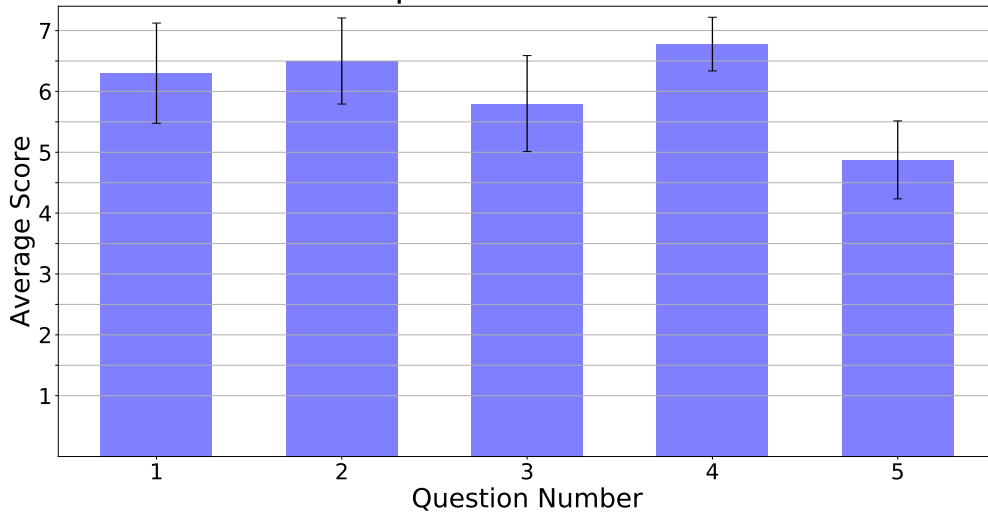
## **A.5 Perceptual Realism**

1. Overall how much did touching the things in the environment you saw feel like it would if you had experienced them directly?  
[ ]
2. How much did the heat or coolness (temperature) of the environment you saw feel like it would if you had experience it directly?  
[ ]
3. Overall, how much did the things in the environment you saw look like they would if you had experienced them directly?  
[ ]
4. Regarding motion sickness, how nauseating was your experience [1 = no nausea, 7 = very nauseating]?  
[ ]

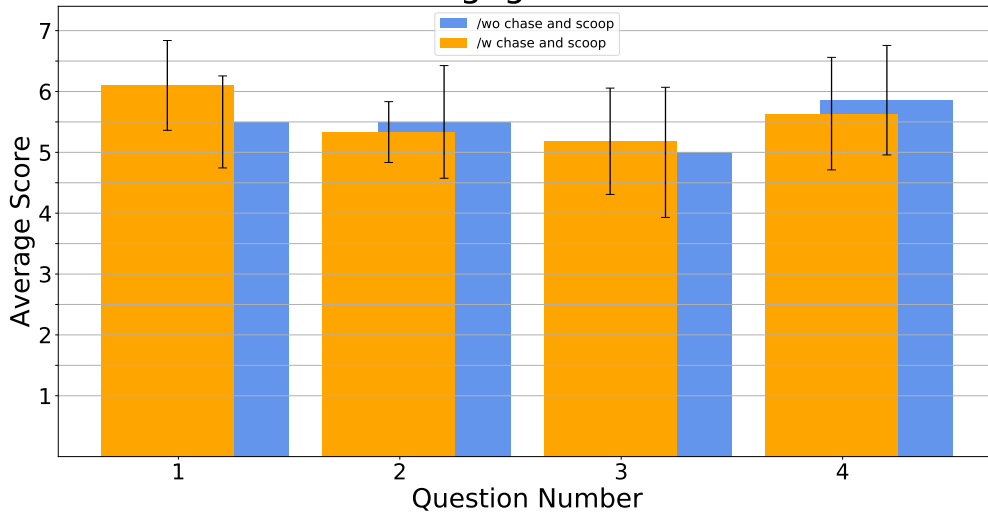
# B TPI RESULTS



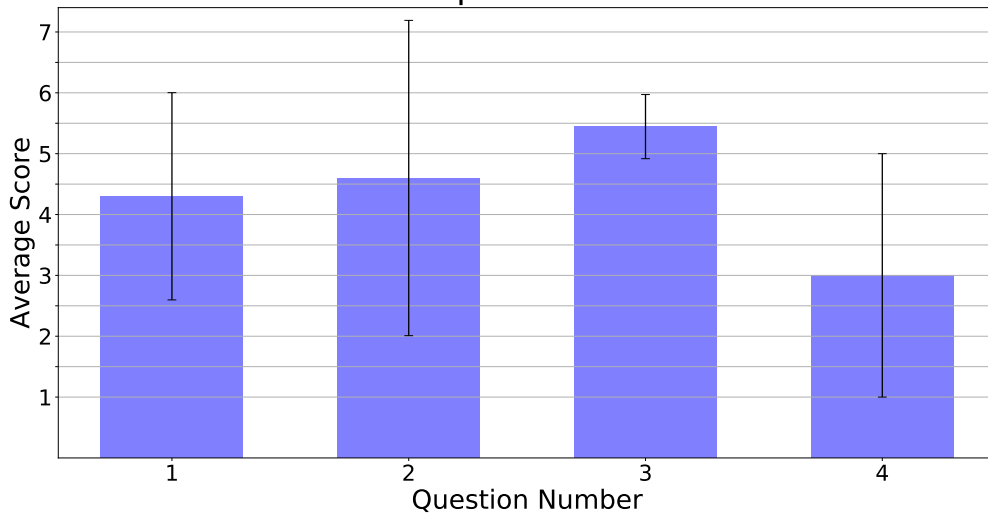
### Spatial Presence



### Engagement

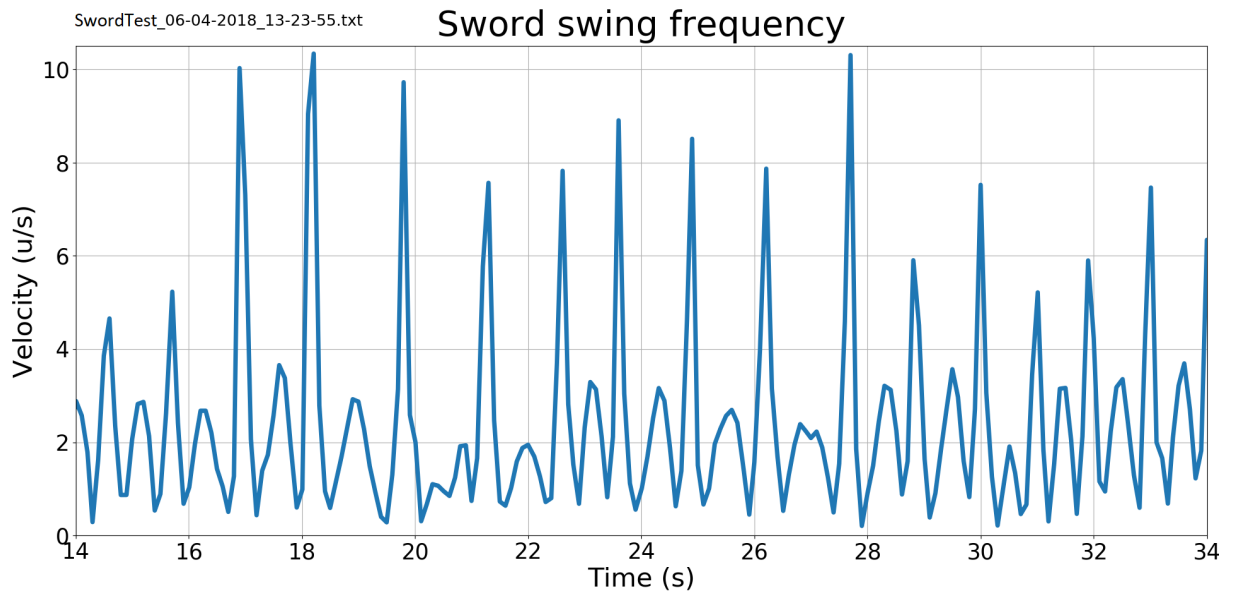
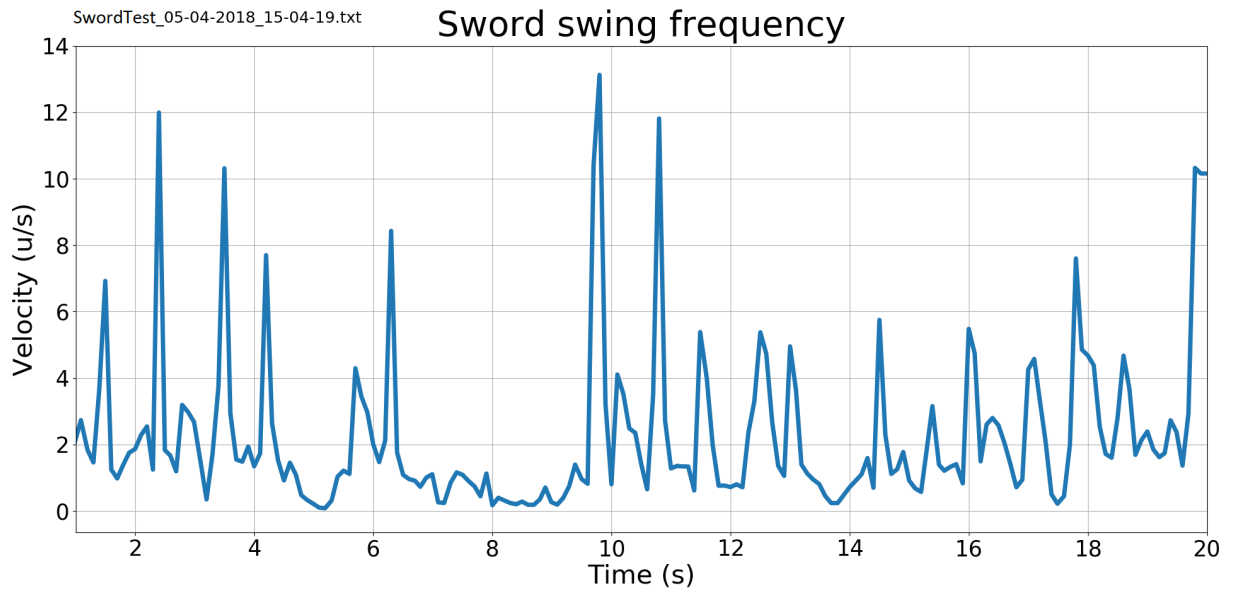


### Perceptual Realism



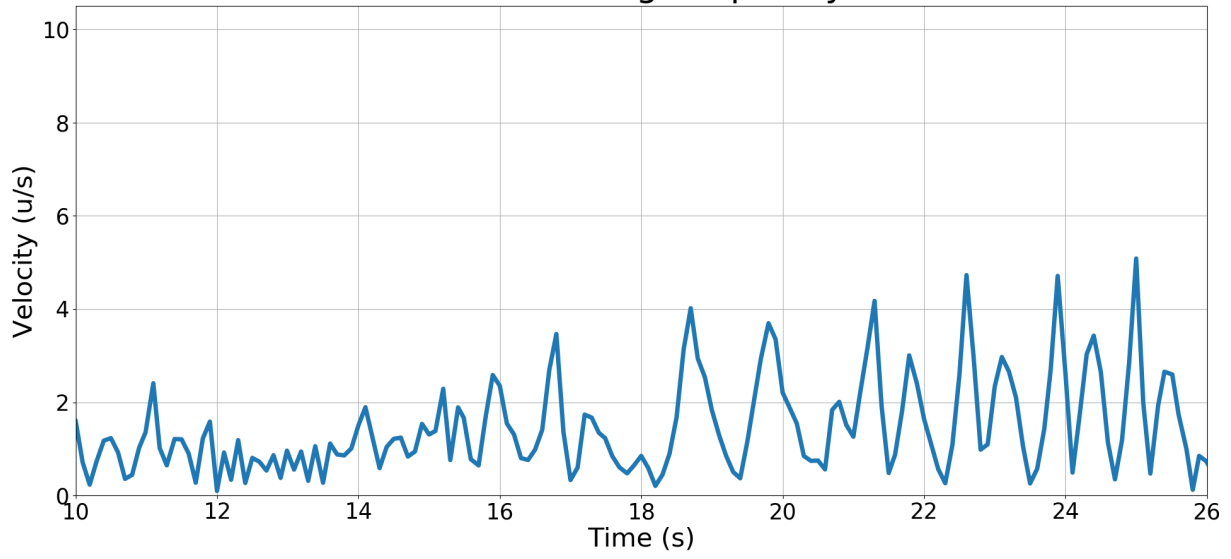
### C SWING FREQUENCY PLOTS

Swing velocity is measured in Unity Engine units (approx. 1m) per second. Blue graphs represent tests performed before the implementation of *chasing*; orange graphs represent those performed after the implementation.



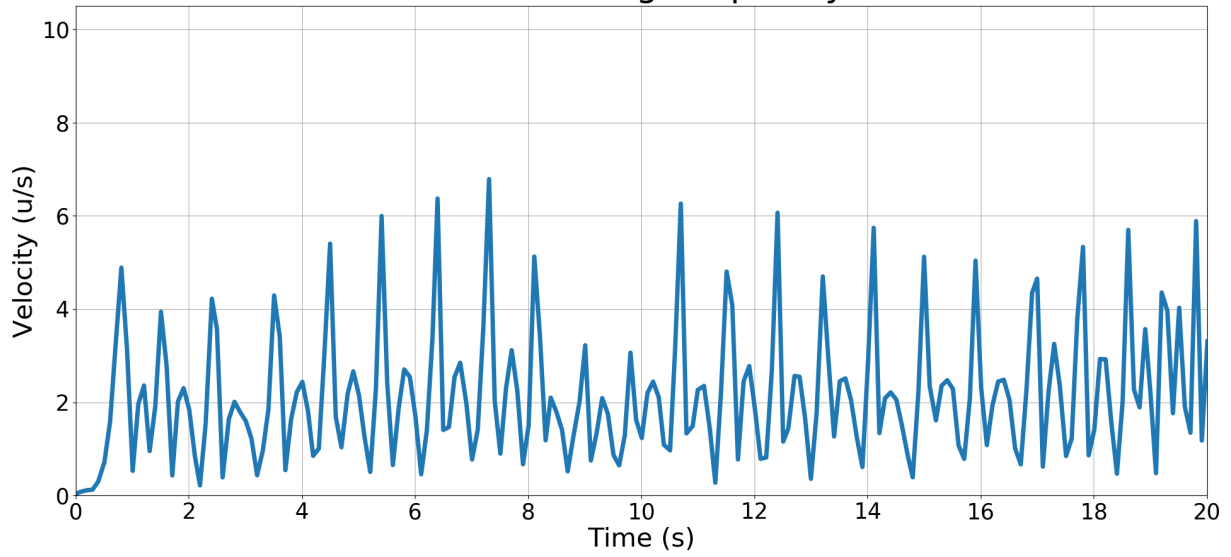
SwordTest\_06-04-2018\_14-08-25.txt

### Sword swing frequency



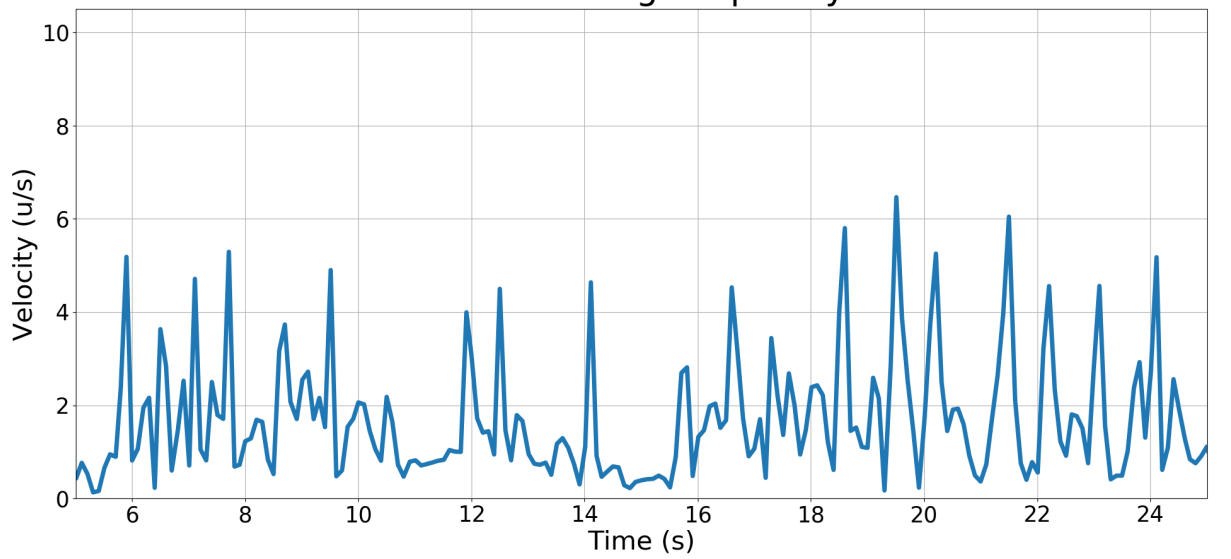
SwordTest\_06-04-2018\_14-32-19.txt

### Sword swing frequency



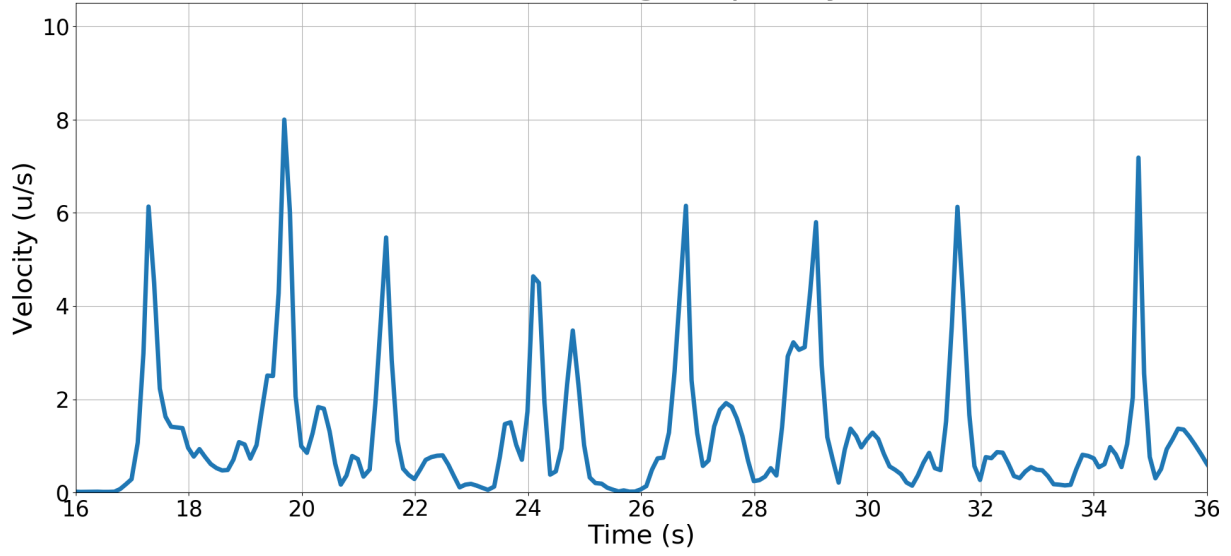
SwordTest\_06-04-2018\_15-26-31.txt

### Sword swing frequency



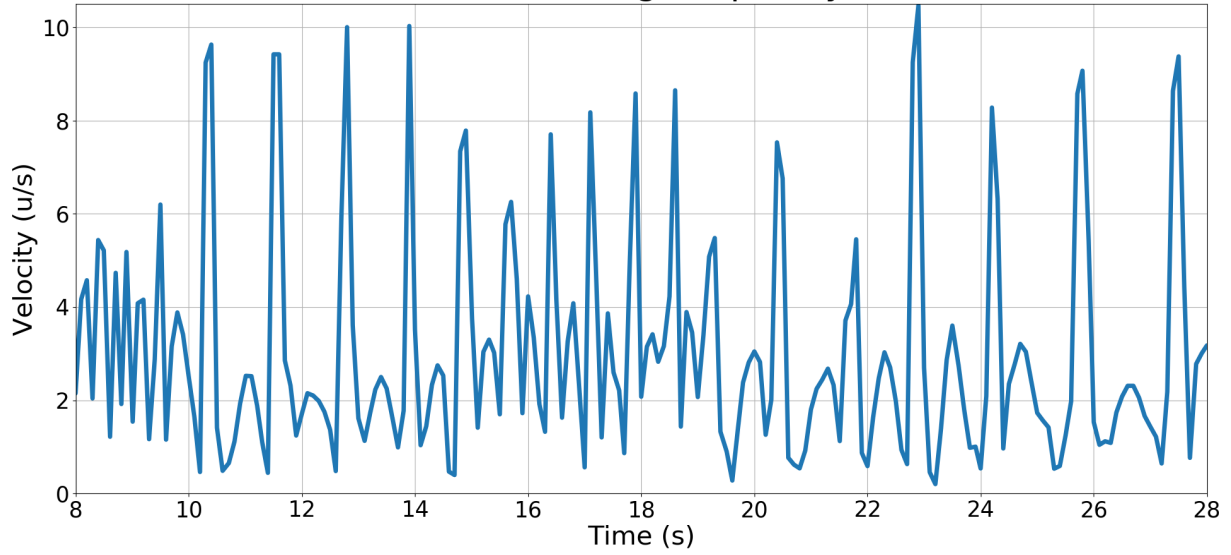
SwordTest\_06-04-2018\_17-06-49.txt

### Sword swing frequency



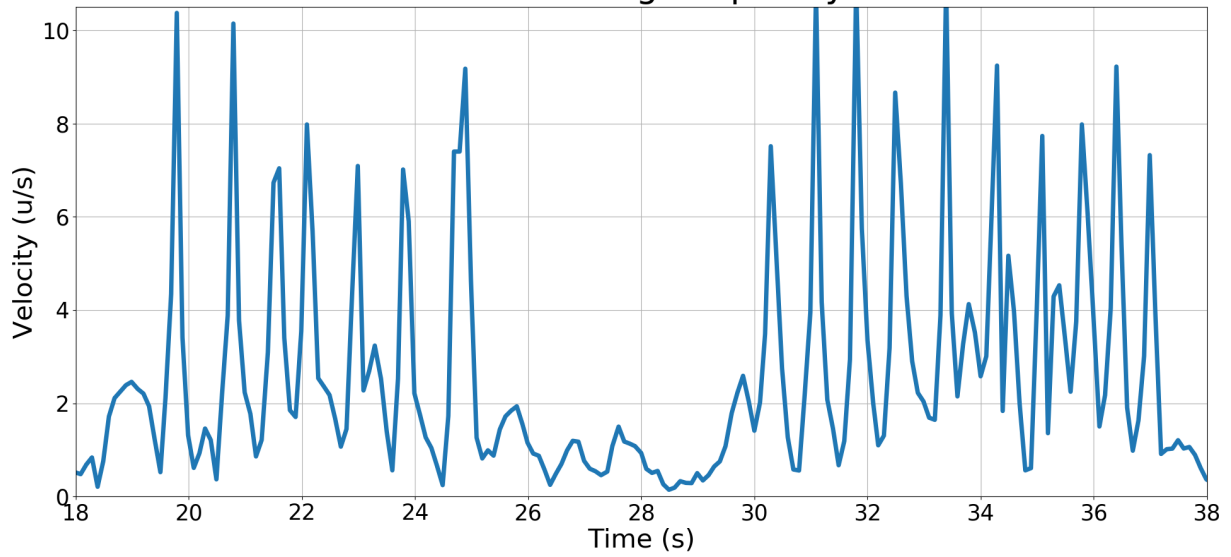
SwordTest\_06-04-2018\_16-20-45.txt

### Sword swing frequency



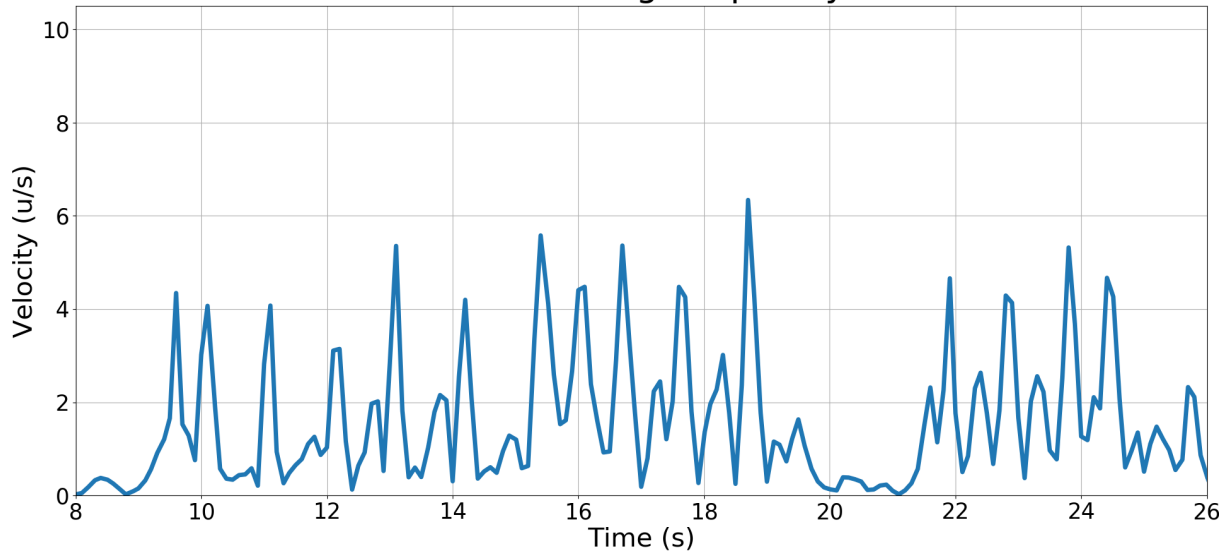
SwordTest\_06-04-2018\_16-44-08.txt

### Sword swing frequency



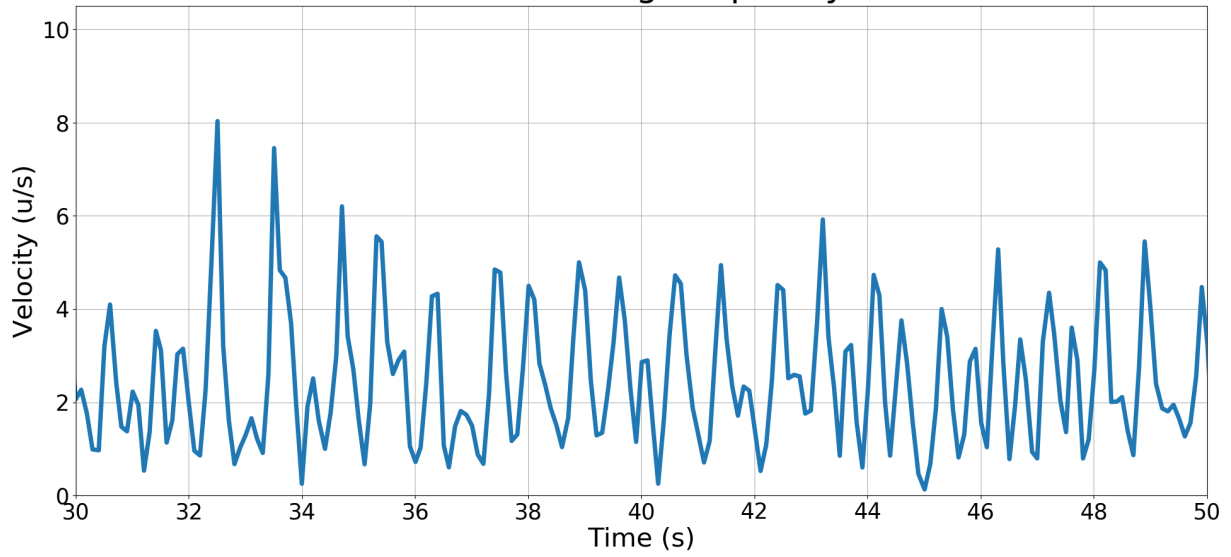
SwordTest\_17-05-2018\_16-15-07.txt

### Sword swing frequency



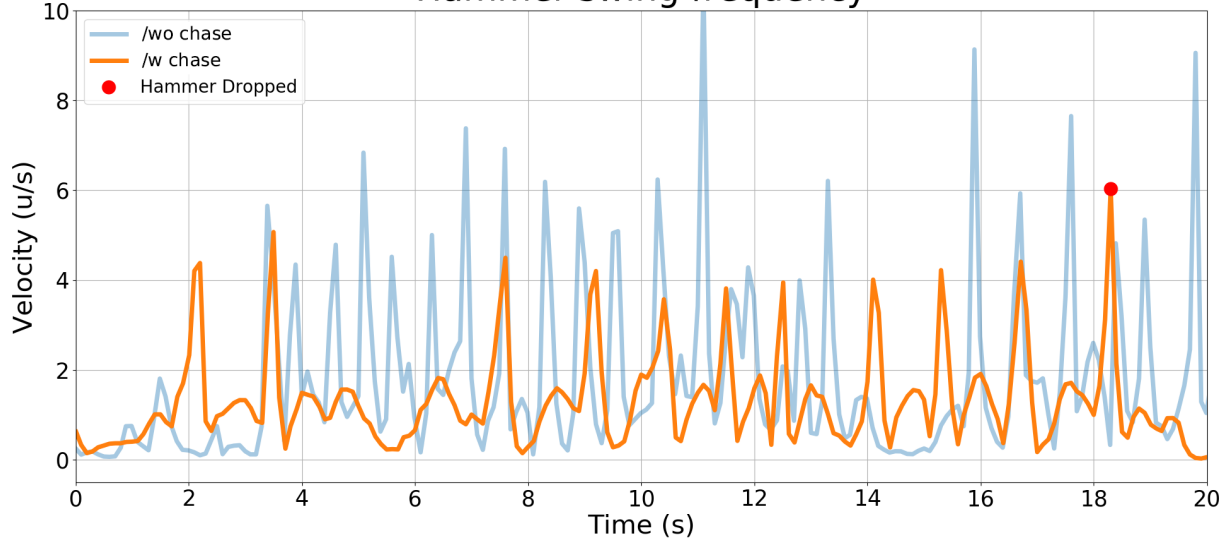
SwordTest\_16-05-2018\_15-59-53.txt

### Sword swing frequency



HammerTest\_05-04-2018\_15-04-19.txt  
HammerTest\_15-05-2018\_15-15-30.txt

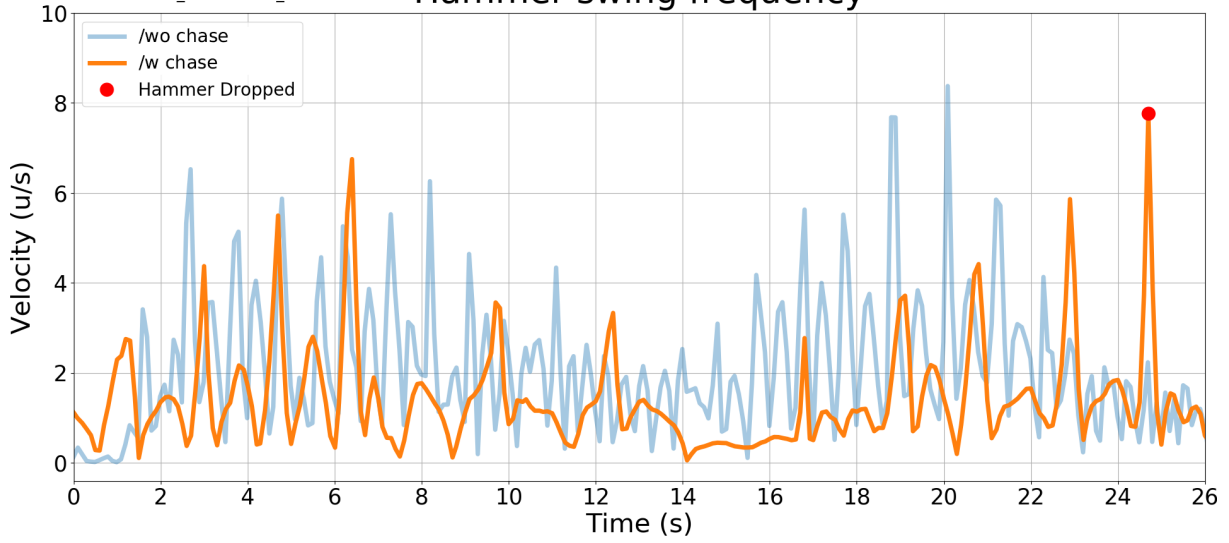
### Hammer swing frequency





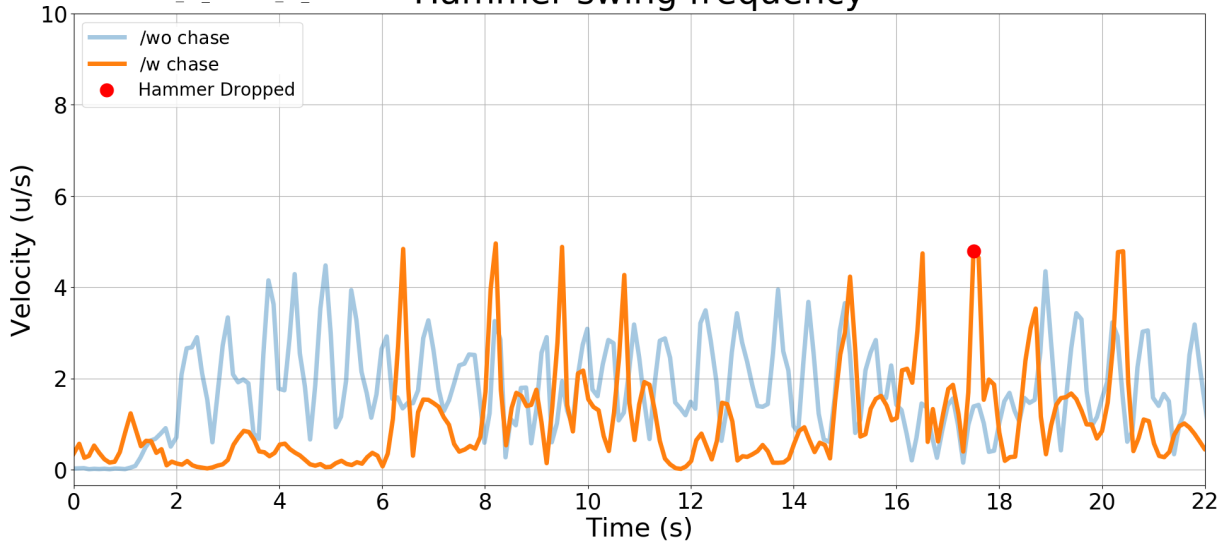
HammerTest\_06-04-2018\_13-23-55.txt  
HammerTest\_17-05-2018\_13-09-49.txt

### Hammer swing frequency



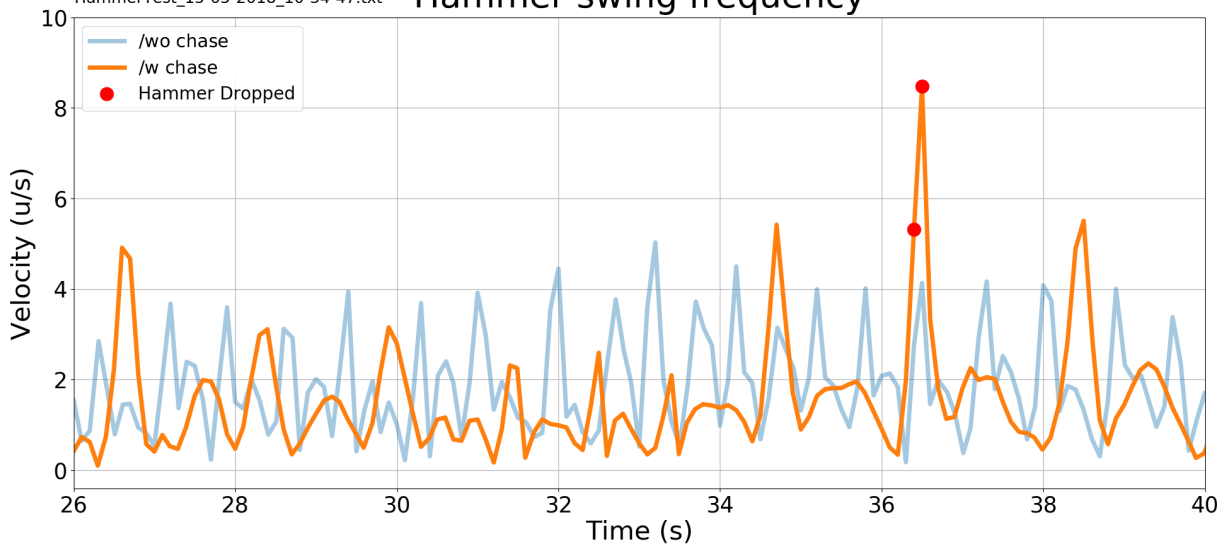
HammerTest\_06-04-2018\_14-08-25.txt  
HammerTest\_17-05-2018\_14-49-53.txt

### Hammer swing frequency



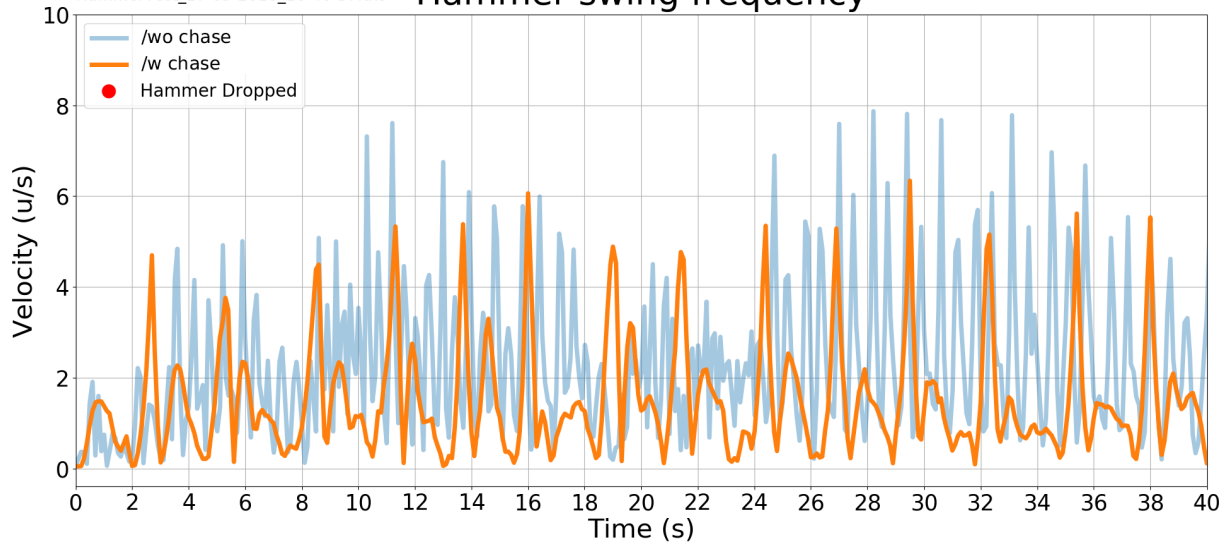
HammerTest\_06-04-2018\_14-32-19.txt  
HammerTest\_15-05-2018\_10-34-47.txt

### Hammer swing frequency



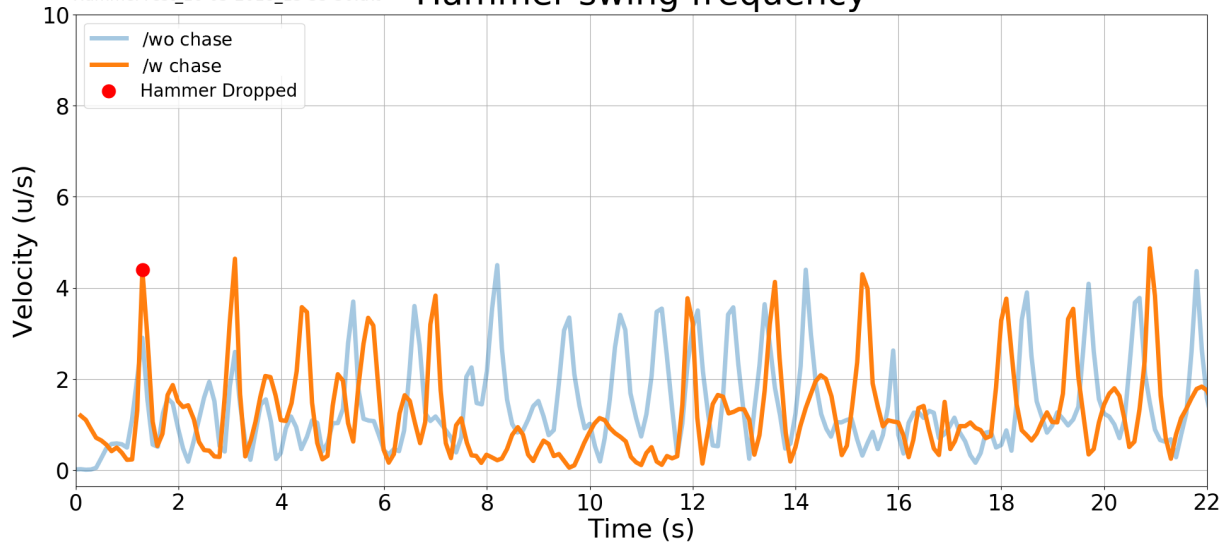
HammerTest\_06-04-2018\_15-26-31.txt  
HammerTest\_17-05-2018\_16-46-57.txt

### Hammer swing frequency



HammerTest\_06-04-2018\_17-06-49.txt  
HammerTest\_16-05-2018\_13-55-30.txt

### Hammer swing frequency



HammerTest\_06-04-2018\_16-20-45.txt

### Hammer swing frequency

