

MotoTrak Analysis: "Population Data to TSV" Column Definitions

	Column Label	Cell Description	Notes
Mandatory	DATE (DD/MM/YYYY)	The date at the start of the behavioral session.	
	START TIME (HH:MM)	The time at the start of the behavioral session.	
	SUBJECT	The subject name entered by the user before starting the behavioral session.	
	STAGE	The training/testing stage that the subject was run on during that session.	
Optional for All Tasks	BOOTH		
	HITS	The total number of trials resulting in a Hit during the session.	
	HITS IN FIRST 5 MINUTES	The number of trials resulting in a Hit during the first five minutes of the session.	
	INITIATION TO HIT LATENCY (s)	The average time, in seconds, from when the subject initiated a trial, by surpassing the initiation threshold, to when they scored a Hit, by surpassing the hit threshold.	Note that this value is related to the hit threshold, so in session with adaptive hit thresholds, these values will likely fluctuate in step with the adaptation.
	MANUAL FEEDS	The total number of times the (human) experimenter pressed "Manual Feed" to initiation a free feeding during the session.	Note that the program does not keep track of manual feeds initiated by pressing the feed button on the pellet dispenser itself (yet).
	MAX HIT RATE IN ANY 5 MINUTES	The maximum Hit rate recorded during any five minutes of a session lasting longer than 5 minutes. Note that if the session duration is less than 5 minutes, this column will display a NaN.	This value is meant to give the experimenter an idea of how a subject's Hit rate may have fluctuated during the session.
	MAX HITS IN ANY 5 MINUTES	The maximum number of Hits recorded during any five minutes of a session lasting longer than 5 minutes. Note that if the session duration is less than 5 minutes, this column will display a NaN.	
	MAX TRIALS IN ANY 5 MINUTES	The maximum number of trials, resulting in a hit or miss, completed by the subject during any five minutes of a session lasting longer than 5 minutes. Note that if the session duration is less than 5 minutes, this column will display a NaN.	This value is meant to be an indicator of the fluctuation in the subject's activity level or motivation within a session.
	MIN. INTER-TRIAL INTERVAL (s)	For sessions that include more than one trial, this column value is the minimum inter-trial interval, in seconds, calculated with a moving window average across groups of ten consecutive trials.	This value is meant to be an indicator of the fluctuation in the subject's activity level or motivation within a session.
	MISSES	The total number of trials resulting in a Miss during the session.	
	NUMBER OF TRIALS	The total number of trials the subject attempted during the session.	
	POSITION	The position of the MotoTrak task manipulandum (pull handle, knob, or lever), in centimeters, measured from the inside surface of the cage wall. Positive position values indicate the manipulandum was outside the cage, negative position values indicate the manipulandum protruded into the cage (likely for task shaping).	
	TOTAL FEEDS	The total number of feedings the subject received during a session. Note that this includes both Hits and manual feeds initiated by the (human) experimenter.	
	TRIALS IN FIRST 5 MINUTES	The total number of trials, resulting in a hit or miss, completed by the subject during the first five minutes of the session.	
	FATIGUE RATIO (LAST 10/FIRST 10)	The ratio of the mean peak force averaged over the last ten trials to the mean peak force averaged over the first ten trials during a session.	This value is meant to be an indicator of how fatigued the subject may be relative to the start of the session.

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Isometric Pull Task	LATENCY TO PEAK FORCE (s)	The average time, in seconds, from when the subject initiated a trial, by surpassing the initiation threshold, to when the force on the handle reached a maximum within that trial.	Note that this value may differ from the "INITIATION TO HIT LATENCY (s)" column because the subject can score a Hit before their force signal reaches a maximum.
	MAX HIT THRESHOLD (gm)	The maximum hit threshold that the subject was required to exceed in order to score a Hit for any trial of the session.	This value is most useful for training sessions in which the hit threshold adaptively fluctuates.
	MAX PEAK FORCE (gm)	The maximum force applied to the pull handle by the subject in any trial of the session. This value is found by simply finding the maximum value of all the recorded force samples.	
	MEAN ATTEMPT FORCE (gm)	The average peak force applied to the handle during each attempt within a session. Because there can be multiple sub-threshold attempts preceding a suprathreshold attempt within a single trial, this value will typically be less than the "MEAN PEAK FORCE (gm)".	
	MEAN PEAK FORCE (gm)	The average maximum force applied during each trial to the pull handle by the subject. This value is found for each trial by simply finding the maximum force value with the hit window, and the trial values are averaged across the session to yield this column's value.	
	MEAN PEAK IMPULSE (gm/s)	Impulse is the derivative of the force signal over time, a measure of how quickly force increases or decreases. This value is the maximum impulse recorded during each trial averaged over all trials of the session.	
	MEAN PULL ATTEMPTS BETWEEN HITS	An average of a running count of the number of pull attempts, as defined above, between Hits.	
	MEAN PULL DURATION (s)	The average of all of the pull attempt durations, measured from the time the force signal exceeds the initiation threshold to when the force signal drops back down below the initiation threshold.	Small pull duration values indicate jerking-type movements, whereas large pull duration values indicate steady, consistent pull movements.
	MEAN SUB-CEILING ATTEMPT FORCE (gm)	The average peak force applied to the handle during each attempt within a session that was below the force "ceiling" for stages using a force window hit threshold.	Added to MotoTrak Analysis on 06/06/2017.
	MEAN SUB-CEILING PEAK FORCE (gm)	The average maximum force applied during each trial to the pull handle by the subject from all attempts with peaks below the force "ceiling" for stages using a force window hit threshold.	Added to MotoTrak Analysis on 06/06/2017.
	MEAN SUCCESSFUL ATTEMPT PEAK FORCE (gm)	The average peak force applied during the successful pull attempt in each trial which resulted in a Hit.	Added to MotoTrak Analysis on 06/06/2017.
	NUMBER OF ATTEMPTS	The total number of pull attempts recorded during a session.	Note that this value will likely be larger than the total trial count, because the subject can execute multiple attempts within a single trial.
	PULL ATTEMPTS PER TRIAL	The number of times the force signal exceeds the initiation threshold and then drops back below the initiation threshold, indicating a pull-and-release or a pull-and-relax motion. If the trial results in a hit, the final Hit pull is counted as an attempt.	
	SUB-CEILING PULL ATTEMPTS PER TRIAL	The number of times the force signal exceeds the initiation threshold and then drops back below the initiation threshold without exceeding the force "ceiling" for stages using a force window hit threshold, indicating a pull-and-release or a pull-and-relax motion.	Added to MotoTrak Analysis on 06/06/2017.

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Supination Task	MEAN PEAK ANGLE (degrees)	The average maximum turn angle applied during each trial to the knob by the subject. This value is found for each trial by simply finding the maximum angle value with the hit window, and the trial values are averaged across the session to yield this column's value.	
	MAX PEAK ANGLE (degrees)	The maximum turn angle applied to the knob by the subject in any trial of the session. This value is found by simply finding the maximum value of all the recorded angle samples.	
	MAX HIT THRESHOLD (degrees)	The maximum hit threshold that the subject was required to exceed in order to score a Hit for any trial of the session.	This value is most useful for training sessions in which the hit threshold adaptively fluctuates.
	LATENCY TO PEAK ANGLE (s)	The average time, in seconds, from when the subject initiated a trial, by surpassing the initiation threshold, to when the angle of the knob reached a maximum within that trial.	
	TURN ATTEMPTS PER TRIAL	The number of times the angle signal exceeds the initiation threshold and then drops back below the initiation threshold, indicate a turn-and-release or a turn-and-relax motion. If the trial results in a hit, the final Hit turn is counted as an attempt.	
	MEAN ATTEMPT ANGLE (degrees)	The average peak turn angle applied to the knob during each attempt within a session. Because there can be multiple sub-threshold attempts preceding a suprathreshold attempt within a single trial, this value will typically be less than the “MEAN PEAK ANGLE (degrees)”.	
	FATIGUE RATIO (LAST 10/FIRST 10)	The ratio of the mean peak turn angle averaged over the last ten trials to the mean peak turn angle averaged over the first ten trials during a session.	This value is meant to be an indicator of how fatigued the subject may be relative to the start of the session.
	MEAN TURN DURATION (s)	The average of all of the turn attempt durations, measured from the time the angle signal exceeds the initiation threshold to when the angle signal drops back down below the initiation threshold.	Small angle duration values indicate swiping-type movements, whereas large pull duration values indicate steady, consistent grip and turn movements.
	MEAN PEAK ROTATIONAL VELOCITY (degrees/s)	Rotational velocity is the derivative of the angle signal over time, a measure of how quickly the knob is turned. This value is the maximum rotation velocity recorded during each trial averaged over all trials of the session.	
Press Task	MEAN PEAK ANGLE (degrees)	The average maximum press angle applied during each trial to the lever by the subject. This value is found for each trial by simply finding the maximum angle value with the hit window, and the trial values are averaged across the session to yield this column's value.	
	MAX PEAK ANGLE (degrees)	The maximum press angle applied to the knob by the subject in any trial of the session. This value is found by simply finding the maximum value of all the recorded angle samples.	
	MAX HIT THRESHOLD (degrees)	The maximum hit threshold that the subject was required to exceed in order to score a Hit for any trial of the session.	This value is most useful for training sessions in which the hit threshold adaptively fluctuates.
	LATENCY TO PEAK ANGLE (s)	The average time, in seconds, from when the subject initiated a trial, by surpassing the initiation threshold, to when the angle of the lever reached a maximum within that trial.	
	PRESS ATTEMPTS PER TRIAL	The number of times the angle signal exceeds the initiation threshold and then drops back below the initiation threshold, indicate a press-and-release or a press-and-relax motion. If the trial results in a hit, the final Hit press is counted as an attempt.	

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Lever	MEAN ATTEMPT ANGLE (degrees)	The average peak press angle applied to the lever during each attempt within a session. Because there can be multiple sub-threshold attempts preceding a suprathreshold attempt within a single trial, this value will typically be less than the "MEAN PEAK ANGLE (degrees)".	
	FATIGUE RATIO (LAST 10/FIRST 10)	The ratio of the mean peak press angle averaged over the last ten trials to the mean peak press angle averaged over the first ten trials during a session.	This value is meant to be an indicator of how fatigued the subject may be relative to the start of the session.
	MEAN PRESS DURATION (s)	The average of all of the press attempt durations, measured from the time the angle signal exceeds the initiation threshold to when the angle signal drops back down below the initiation threshold.	Small press duration values indicate swiping-type movements, whereas large pull duration values indicate steady, consistent grip and press movements.
	MEAN PEAK ROTATIONAL VELOCITY (degrees/s)	Rotational velocity is the derivative of the angle signal over time, a measure of how quickly the knob is turned. This value is the maximum rotation velocity recorded during each trial averaged over all trials of the session.	