

TRACK Dimensions

| Name | Description |
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| Larva size | The area of a larva in pixel |
| Larva size variance | "" |
| Average grey value | The average grey value of all pixels of a larva |
| Grey value variance | "" |
| Body length | The length of a larva along the spine |
| Body length variance | "" |
| Width | The width of a larva at its widest spot. |
| Width variance | "" |
| Perimeter | The perimeter of a larva in pixel |
| Perimeter variance | "" |
| Number of collisions | The number of collisions detected for a given larva. |

TS Dimensions

| Name | Description |
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| Bending angle | The angle between the larva's tail vector, and a vector from the middle of the larva to its head. Positive values indicate the larva bending to the left, negative values bending to the right. |
| Bending angle variance | "" |
| Absolute bending angle | "" |
| Absolute bending angle variance | "" |
| CV Absolute bending angle | "" |
| Bending angle bias | The angle between the larva's tail vector, and a vector from the middle of the larva to its head. The bias is set to be positive, and indicates whether the larva was bent more to any direction. |
| HV angular speed | The angular speed of the head vector (HV). Positive values indicate movement of the head to the right, negative values to the left. |
| HV angular speed variance | "" |
| Absolute HV angular speed | The absolute angular speed of the head vector (HV). |
| Absolute HV angular speed variance | "" |
| CV Absolute HV angular speed | The absolute angular speed variance of the head vector (HV). |
| HV angular speed bias | The angular speed of the head vector (HV). The bias is set to be positive, and indicates whether the larva made more movement to any direction. |
| HV angular acceleration | The angular acceleration of the head vector (HV). Positive values indicate movement of the head to the right, negative values to the left. |
| HV angular acceleration variance | "" |
| Absolute HV angular acceleration | The absolute angular acceleration of the head vector (HV). |
| Absolute HV angular acceleration variance | "" |
| CV Absolute HV angular acceleration | "" |
| HV angular acceleration bias | The angular acceleration of the head vector (HV). The bias is set to be positive, and indicates whether the larva made more movement to any direction. |
| TV angular speed | The angular speed of the tail vector (TV). Positive values indicate movement to the right, negative values to the left. |

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| TV angular speed variance | The angular speed of the tail vector (TV). Positive values indicate movement to the right, negative values to the left. |
| Absolute TV angular speed | The absolute angular speed of the tail vector (TV). |
| Absolute TV angular speed variance | The absolute angular speed variance of the tail vector (TV). |
| CV Absolute TV angular speed | The absolute angular speed variance of the tail vector (TV). |
| TV angular speed bias | The angular speed of the tail vector (TV). The bias is set to be positive, and indicates whether the larva made more movement to any direction. |
| TV angular acceleration | The angular acceleration of the tail vector (TV). Positive values indicate movement to the right, negative values to the left. |
| TV angular acceleration variance | |
| Absolute TV angular acceleration | The absolute angular acceleration of the tail vector (TV). |
| Absolute TV angular acceleration variance | "" |
| CV Absolute TV angular acceleration | "" |
| TV angular acceleration bias | The angular acceleration of the tail vector (TV). The bias is set to be positive, and indicates whether the larva made more movement to any direction. |
| Head forward velocity | The velocity of the larva's head point in forward direction, that is, in direction of the head vector. Any lateral speed component is ignored. |
| Head forward velocity variance | "" |
| Head forward acceleration | The acceleration of the larva's head point in forward direction, that is, in direction of the head vector. Any lateral speed component is ignored. |
| Head forward acceleration variance | "" |
| Absolute head forward acceleration | The absolute acceleration of the larva's head point in forward direction, that is, in direction of the head vector. Any lateral speed component is ignored. |
| Absolute head forward acceleration variance | "" |
| Head forward velocity (body length) | The velocity in body lengths of the larva's head point in forward direction, that is, in direction of the head vector. Any lateral velocity component is ignored. |
| Head forward velocity (bl) variance | "" |
| Head forward acceleration (bl) | The acceleration of the larva's head point in forward direction, that is, in direction of the head vector. Any lateral speed component is ignored. |
| Head forward acceleration (bl) variance | "" |
| Absolute head forward acceleration (bl) | The absolute acceleration of the larva's head point in forward direction, that is, in direction of the head vector. Any lateral speed component is ignored. |
| Absolute head forward acceleration (bl) variance | "" |
| CV Absolute head forward acceleration (bl) | The absolute acceleration of the larva's head point in forward direction, that is, in direction of the head vector. Any lateral speed component is ignored. |
| Tail forward velocity | The velocity of the larva's tail point in forward direction, that is, in direction of the tail vector. Any lateral speed component is ignored. |
| Tail forward velocity variance | "" |
| Tail forward acceleration | The acceleration of the larva's tail point in forward direction, that is, in direction of the tail vector. Any lateral speed component is ignored. |
| Tail forward acceleration variance | "" |

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| Absolute tail forward acceleration | The absolute acceleration of the larva's tail point in forward direction, that is, in direction of the tail vector. Any lateral speed component is ignored. |
| "" | |
| Tail forward velocity (body length) | The velocity in body lengths of the larva's tail point in forward direction, that is, in direction of the tail vector. Any lateral velocity component is ignored. |
| Tail forward velocity (bl) variance | "" |
| Tail forward acceleration (bl) | The acceleration of the larva's tail point in forward direction, that is, in direction of the tail vector. Any lateral speed component is ignored. |
| Tail forward acceleration (bl) variance | "" |
| Absolute tail forward acceleration (bl) | The absolute acceleration of the larva's tail point in forward direction, that is, in direction of the tail vector. Any lateral speed component is ignored. |
| Absolute tail forward acceleration (bl) variance | "" |
| CV Absolute tail forward acceleration (bl) | "" |
| Midpoint speed | The speed of the larva's midpoint, independent of direction. |
| Midpoint speed variance | "" |
| Midpoint acceleration | The acceleration of the larva's midpoint, independent of direction. |
| Midpoint acceleration variance | The acceleration of the larva's midpoint, independent of direction. |
| Abs midpoint acceleration | The absolute acceleration of the larva's midpoint, independent of direction. |
| Abs midpoint acceleration variance | "" |
| Midpoint speed (body length) | The speed of the larva's midpoint, independent of direction, measured in body lengths. |
| Midpoint speed (bl) variance | "" |
| CV Midpoint speed (bl) | "" |
| Midpoint acceleration (bl) | The acceleration of the larva's midpoint, independent of direction. |
| Midpoint acceleration (bl) variance | "" |
| Abs midpoint acceleration (bl) | The absolute acceleration of the larva's midpoint, independent of direction. |
| Abs midpoint acceleration (bl) variance | "" |
| CV Abs midpoint acceleration (bl) | The absolute acceleration of the larva's midpoint, independent of direction. |
| Distance traveled | The distance a larva has traveled while it was tracked. |
| Distance traveled (body length) | The distance a larva has traveled while it was tracked in larvae lengths. |
| Distance to SP (mean) | The average distance of an animal from its starting point. |
| Distance to SP (max) | The maximum distance of an animal from its starting point. |
| Transitions to odour side | The number of transitions to the primary side (defined as the side with the previously reinforced odour). |
| Transitions from odour side | The number of transitions from the primary side (defined as the side with the previously reinforced odour) to the other side of the dish. |
| Time before transition (to odour) | The average time an animal spent on the other side before it enters the primary side (defined as the side with the previously reinforced odour). |
| Time before transition (from odour) | The average time an animal spent on the primary side (defined as the side with the previously reinforced odour) before it enters the other side of the dish. |

RUN Dimensions

| Name | Description |
|------------------------------------|---|
| IS speed | The speed of the midpoint, measured only during runs. |
| IS speed variance | "" |
| IS speed (body length) | The speed of a larva's midpoint, measured only during runs in body lengths. |
| IS speed (body length) variance | "" |
| CV IS speed (body length) | "" |
| IS angle | The inter-step (IS) angle indicates how much the orientation of the animal changes within one cycle of peristaltic forward movement. It is defined as the angle between a larva's head vector at one step minus the head vector at the previous step. A step is defined as the local maximum of the tail forward velocity during runs. Positive values indicate that the larva changes its orientation to the left, negative values that it changes its orientation to the right. |
| IS angle variance | "" |
| Absolute IS angle | "" |
| Absolute IS angle variance | "" |
| CV Absolute IS angle | "" |
| IS angle bias | The inter-step (IS) angle indicates how much the orientation of the animal changes within one cycle of peristaltic forward movement. It is defined as the angle between a larva's head vector at one step minus the head vector at the previous step. A step is defined as the local maximum of the tail forward velocity during runs. The bias is set to positive, indicating more movement into any direction. |
| IS distance | The inter-step (IS) distance measures the distance of the larva's midpoint between two steps. A step is defined as the local maximum of the tail forward velocity during runs. |
| IS distance variance | The inter-step (IS) distance measures the distance of the larva's midpoint between two steps. A step is defined as the local maximum of the tail forward velocity during runs. |
| IS distance (body length) | The inter-step (IS) distance measures the distance of the larva's midpoint between two steps in body lengths. A step is defined as the local maximum of the tail forward velocity during runs. |
| IS distance (bl) variance | "" |
| CV IS distance (bl) | "" |
| IS interval | The inter-step (IS) interval measures the time between two steps. A step is defined as the local maximum of the tail forward velocity during runs. |
| IS interval variance | "" |
| CV IS interval | "" |
| Number of Tail vel minima | The average number of minima points of tail forward velocity within each step |
| Ratio of 1-Minimum Steps | The ratio of steps with only one minimum in it. |
| Number of Head vel maxima | The average number of maxima points of head forward velocity within each interstep interval |
| Relative head vel peak | The maximal head forward velocity within each interstep interval relative to the peak in tail forward velocity at the step. |
| Relative interval of head vel peak | The interval between the maximal head forward velocity within an interstep interval and the step divided by the interstep interval. |

HC Dimensions

| Name | Description |
|---------------------|---|
| Number of HCs | The number of head casts (HCs) a larva makes |
| Number of left HCs | The number of head casts (HCs) a larva makes towards the left. |
| Number of right HCs | The number of head casts (HCs) a larva makes towards the right. |

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| HC angle | The HC angle is calculated as the bending angle after minus before a HC. Positive values indicate that the HC was to the left, negative values that it was to the right. |
| HC angle variance | "" |
| Absolute HC angle | "" |
| Absolute HC angle variance | "" |
| CV Absolute HC angle | "" |
| HC rate | The number of head casts (HCs) a larva makes per second. |
| HC rate (directed) | The number of head casts (HCs) a larva makes per second towards the left minus to the right. |

PREF Dimensions

| Name | Description |
|---|--|
| Bearing angle | The bearing angle is the angle between the tail vector and the vector from the animal towards the odour. 0° indicates that larvae are oriented directly towards the odour, 180° that they are oriented directly away from the odour. Positive values indicate the odour is to the right, negative values that the odour is to the left. |
| Bearing angle variance | "" |
| Absolute bearing angle | "" |
| Absolute bearing angle variance | "" |
| CV Absolute bearing angle | "" |
| Heading angle | The heading angle is the angle between the head vector and the vector from the animal towards the odour. 0° indicates that the larva's head is oriented directly towards the odour, 180° that it are oriented directly away from the odour. Positive values indicate the odour is to the right, negative values that the odour is to the left. |
| Heading angle variance | "" |
| Absolute heading angle | "" |
| Absolute heading angle variance | "" |
| CV Absolute heading angle | "" |
| Direction relative to Y | The angle between the tail vector and a vector in y-direction. 0° indicates that larvae are oriented directly upwards, 180° that they are oriented directly downwards. Positive values indicate the top of the Petri dish is to the right, negative values that it is to the left. |
| Direction relative to Y variance | "" |
| Absolute direction relative to Y | "" |
| Absolute direction relative to Y variance | "" |
| CV Absolute direction relative to Y | "" |
| HC reorientation | The absolute heading angle before a HC minus the absolute heading angle after the HC. Positive values indicate that the larva is oriented more towards the odour after the HC, negative values that the larva is oriented more away. |
| HC reorientation variance | "" |
| Number of HCs towards | The number of head casts (HCs) a larva makes while being oriented towards the odour source, this means while having an absolute bearing angle $<90^\circ$ |

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| Number of HCs away | The number of head casts (HCs) a larva makes while being oriented away from the odour source, this means while having an absolute bearing angle $> 90^\circ$ |
| HC rate-modulation | The HC rate-modulation indicates whether the HC rate is modulated by the animal's orientation with respect to the odour, with positive values indicating that a larva has a lower HC rate while being oriented towards the odour (absolute bearing angle $< 90^\circ$) than while being oriented away from the odour (bearing angle $> 90^\circ$). It calculates as $(\text{HC rate away} - \text{HC rate towards}) / (\text{HC rate away} + \text{HC rate towards})$. |
| Run speed-modulation | The Run speed-modulation indicates whether the run speed is modulated by the animal's orientation with respect to the odour, with positive values indicating that a larva has a higher speed while being oriented towards the odour (absolute bearing angle $< 90^\circ$) than while being oriented away from the odour (bearing angle $> 90^\circ$). It calculates as $(\text{Run speed towards} - \text{Run speed away}) / (\text{Run speed towards} + \text{Run speed away})$. |
| IS reorientation | The inter-step (IS) reorientation indicates how much the orientation of the animal with respect to the odour changes within one cycle of peristaltic forward movement. It is calculated as the larva's heading angle at one step minus the heading angle at the previous step. A step is defined as the local maximum of the tail forward velocity during runs. Positive values indicate that the larva changes its orientation towards the odour, negative values that it changes its orientation away from the odour. |
| IS reorientation variance | "" |
| Preference (time) | The preference is the time an animal spent on the half of the Petri dish that contained the odour minus the time spent on the other half, divided by the total time. |
| Preference (distance) | The average distance of an animal from the odour source, transformed to a $[-1;1]$ interval. A value of 1 indicates the animal is directly at the odour source, a value of -1 indicates it is at the maximal distance from the odour source, and a value of 0 indicates it is at the half-maximal distance from the odour source. |
| Time ratio towards odour source | The proportion of time a larva spent oriented towards the odour source, that is, with an absolute bearing angle $< 90^\circ$. |
| Time ratio upwards | The proportion of time a larva spent oriented upwards the Petri dish (that is with an absolute direction relative to Y of $< 45^\circ$) - the time a larva spent oriented downwards (that is with an absolute direction relative to Y of $> 135^\circ$). |
| Velocity towards odour source | The velocity of the larva's midpoint in direction of the odour. Positive values indicate that the animal is moving toward the odour, negative values that the animal is moving away. |
| Changed distance to odour | The distance of an animal from the odour source at the end of the track minus the distance at the beginning of the track. Positive values indicate the larva ends closer to the odour than it started, negative values that it ends further away. |
| Distance to odour source | The average distance of an animal from the odour source. |