Table 1. The ISC-units currently available in DaNCES (updated 15/05/2024)

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Each internal state control (ISC) unit is stand-alone and could be combined with others to create states. ISC-units are called 'actions' in the software.

ISC-unit	Function
Agent - Movement	
wiggle	Turn by a random angle (noise).
roost_attraction	Turn towards a given global position on the plane, if outside of a given radius around it.
altitude_attraction	Pitch towards a given global altitude, if further than a given distance to it, according to a smootherstep function.
level_attraction	Pitch to return to level flight (upwards or downwards).
waypoint	Move towards a given global position.
r_turn	Perform a turn of a given radius.
roosting	Turn towards a given global position (3D).
relative_roosting_transient	Move towards a global direction at a given angle relative to the flock's heading at the time of the state's entry.
relative_roosting_persistant	Move towards a global position at a given angle and distance relative to the flock's centroid at the time of the state's entry.
set	Re-assign the position, speed and heading of the agent.
set_retreat	Re-assign the position and speed of the agent at a given distance away from its current position.
hold	Circle around a given global position.
hold_current	Circle around its own position at the state's entry.
Agent - Social	
align_n	Align with a number of closest neighbors.
align_direction	Align with own past heading at the beginning of the state.
cohere_centroid	Turn towards the average position of a number of closest neighbors.
cohere_centroid_distance	Turn towards the average position of a number of closest neighbors depending on the agent's distance from it (the closer the average position the weaker the attraction, according to a smootherstep function).
cohere_accel_n_front	Accelerate, depending on the average distance to a number of closest neighbors within a frontal field of view (the further away, the higher the acceleration). Decelerate if no neighbors are within the field of view.
avoid_n_position	Turn away from the average position of a number of closest neighbors if it is within a radius of minimum separation.
avoid_n_direction	Turn parallel to the average heading of a number of closest neighbors if the future collision point with them is within a radius of minimum separation.

Continued on next page

Table 1 – continued from previous page

ISC-unit	Function
avoid_pos_or_cohere_all	Avoid as in *avoid_n_position* if a neighbor is within the radius of minimum separation. If not, cohere as in *cohere_centroid*.
avoid_dir_or_cohere_all	Avoid as in *avoid_n_direction* if a neighbor is within the radius of minimum separation. If not, cohere as in *cohere_centroid*.
Prey - Escape	
avoid_p_direction	Turn left or right, away from the relative heading of a close-by predator, if it is within a radius of minimum separation.
avoid_p_position	Turn left or right, away from the relative position of a close-by predator, if it is within a radius of minimum separation.
move_away_from_predator	Turn away from the position of a close-by predator, if it is within a radius of minimum separation.
t_turn_pred	Complete a turn of a given radius within a given time window away from the nearest predator.
random_t_turn_pred	Turn with an angular velocity sampled from a gamma distribution, with direction away from the predator.
random_t_turn_gamma_pred	Turn with an angular velocity sampled from a uniform distribution, with direction away from the predator.
dive	Pitch downwards (dive) away from a close-by predator (3D).
zig_zag	Perform a zig-zag turn (half to the left, half to the right) for a given time window.
scatter	Turn away (perpendicular) from the position of the nearest predator, if it is within a radius of minimum separation (3D).
copy_escape	Copy the state of a close-by neighbor, if the state is copyable.
Predator - Hunt	
select_flock	Choose a group as a target. If more than one, choose the nearest, smallest, largest, or a random one.
position_to_attack	Position at a given distance and bearing angle in the horizontal and vertical plane from the target (3D).
shadowing	Follow the target group from a given bearing angle and distance, with a speed scaling from the target's speed.
chase_closest_prey	Move towards the closest prey (at every instance) with a speed scaling from the target's speed.
lock_on_closest_prey	Move towards a targeted prey (constant during the state) with a speed scaling from the target's speed.
avoid_closest_prey	Turn away from the position of the closest prey.

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