Proposed new experimental design futuro cube - roadrunner game

1. 20 children between age 6 to 7 years with a uniform distribution between gender and fine motor skill classes (delayed development or normal);
2. the actual experiments should be preceded by a training phase of around 5-10 minutes. The children should be able to get used to the game device and the roadrunner game in particular as much as possible;
3. the position of the so called cursor (indicating the top of the cube) should be visible for the player. Color of cursor and walker should be different. If cursor and walker are positioned on the same cube square, the light of the LED could be different. The idea is that the child should be able to recognize if he/she succeeded in holding the cube in the right position (kind of reward if cursor and walker are at the same position);
4. the game uses a series of three levels of increased difficulty (referred to as *degree of difficulty (DOD)* hereafter). The delay between the *walker moves* at degree 2 and 3 is 80% resp. 70% of the delay used at degree 1. A step in one of the three possible directions (forward, forward right and forward left) is chosen randomly using uniform probabilities (this is the same set up as in the previous experiments);
5. each game should last for 3 minutes and must be divided into 6 epochs (i.e. segments) of 30 seconds. Each epoch has a randomly chosen DOD using uniform probabilities except for the first epoch which always has the lowest DOD. Successive epochs can not have the same DOD;
6. during the experiments the accelerometer and gyroscope signal must be captured with a sampling frequency of at least 20 Hz (more is better but not necessary). The start of the data collection process must be synchronized with the start of the game;
7. the game should calculate the following score: each time the player manages to hold the cursor and the walker at the same position, one point is earned. The total number of points is equal to the final score. As soon as a game is finished the cube will communicate the score (standard cube functionality);
8. The following game state information must be captured in the same sampling frequency as the accelerometer and gyroscope data:
   - DOD (denoted as d) where $d \in \{1, 2, 3\}$;
   - the signed Δx and Δy values that indicate the deviation from the optimal walker trail. Note, in case the walker and the cursor are on oppsite sides of the cube Δx and Δy should be assigned a constant value of 10 (the cube will assign a value of 0 in those cases).