Creative foraging game measures:

1. **Total play time** - The total time players play the game, measured from after they finish the tutorial session until the game ends (12 min) or they push the “end game” button.
2. **Total # moves** - The total number of square moves players did during the entire game.
3. **Average Speed** - Total number of moves divided by total play time.
4. **# galleries -** Number of shapes saved to the “gallery”
5. **Self avoidance -** Number of repeated shapes in the entire game trajectories (how many times a player produced the same shape, in the graph of shapes this is pronounced as a crossing of its own path and we count the number of total crossings).
6. **Originality of rated shapes** - Uniqueness score is defined as the minus log of the inverse of the frequency of the shape being created by all players in this experiment ($Uniqueness = - Log[frequency]$). The rated shapes are the 5 shapes players choose at the end of the game as most creative.
7. **Originality of rated shapes (united)** - Uniqueness score is defined as the minus log of the inverse of the frequency of the shape being created by all players in all experiments thus far (~1200 players) ($Uniqueness = - Log[frequency]$). The rated shapes are the 5 shapes players choose at the end of the game as most creative.
8. **# clusters** - The number of exploitation bouts a player had in the game.
9. **% shapes in exploration** - The number of shapes created in the exploration phase. The benefit of this measure is that it scales out the total number of shapes created and the speed of the player.
10. **% time in exploration** - The percent of time spent in the exploration phase. This measure accounts for the speed of play in exploration and exploitation.
11. **Exploration optimality** - The median ratio between the minimal number of moves between two consecutive chosen shapes (in the exploration phase) and the number of moves the player actually took in the game. The closer this number is to 1 the more “optimal” is the search. In the original study this number for the exploration phase was around 0.5 indicating meandering exploration process.
12. **Scavenging (Exploitation) optimality** - The median ratio between the minimal number of moves between two consecutive chosen shapes (in the exploitation phase) and the number of moves the player actually took in the game. The closer this number is to 1 the more “optimal” is the search. In the original study this number had a mean of 0.8 and a median of 1 for the exploitation phase, indicating a directed search in the exploitation phase.
13. **Optimality** - The ratio between exploration and exploitation optimalities, the higher is the difference the more different the two phases are.
14. **Median # steps between shapes in exploration** - The median number of steps (moves) between chosen shapes in exploration.
15. **Median # steps between shapes in exploitation** - The median number of steps (moves) between the first and last chosen shapes in each cluster (entire exploitation phase).

16. **Speed at exploration** - The mean ratio between the number of moves divided by the time of each exploration phase.
17. **Speed at scavenging (exploitation)** - The mean ratio between the number of moves divided by the time of each exploitation phase.
18. **Originality** - The mean uniqueness score over all chosen shapes of the player. The Uniqueness score for each shape is defined as the minus log of the frequency of the shape being created by all players in the kids dataset ($Uniqueness =- Log[frequency]$).
19. **Originality (united)** - The mean uniqueness score over all chosen shapes of the player. The Uniqueness score for each shape is defined as the minus log of the frequency of the shape being created by all players over all experiments (~1200 players, $Uniqueness =- Log[frequency]$).
20. **Originality exp** - The mean uniqueness score over all chosen shapes in the exploration phase.
21. **Originality exp (united)** - The mean uniqueness score over all chosen shapes in the exploration phase, shape's frequency is assessed over all datasets.
22. **Originality scav** - The mean uniqueness score over all chosen shapes in the exploitation phase, shape's frequency is assessed over kids dataset.
23. **U scav (united)** - The mean uniqueness score over all chosen shapes in the exploitation phase, shape's frequency is assessed over all datasets.
24. **Originality trans** - The mean uniqueness score over all transition shapes (the first chosen shape in an exploitation phase that signifies the transition between exploration and exploitation), shape's frequency is assessed over kids dataset.
25. **Originality trans (united)** - The mean uniqueness score over all transition shapes (the first chosen shape in an exploitation phase that signifies the transition between exploration and exploitation), shape's frequency is assessed over all datasets.
26. **Unique Shapes** - The number of shapes only the player discovered.
27. **Trans rated** - The number of rated shapes that are transitional (transition the search from exploration to exploitation).
28. **# clusters in GC** - The number of clusters (created in exploitation bouts) that are in the giant component (for that specific player). How we create the giant component - We take all clusters created by all players (kids dataset) and connect any two clusters if they share 2 shapes. This forms a network of clusters. We then use the Girvan-Newman algorithm to find modules in the network. The giant component of the network is all the connected modules (and there are other modules that do not connect to the giant component). In the original study we had 13 modules that belonged to the giant component.
29. **% clusters in GC** - The percent of clusters that are in the giant component. This measure scales out the total number of clusters the player created (i.e., the number of exploitation bouts they had). This is a measure of "out-of-the-box" thinking, since the more clusters you have in the GC the more "common" your clusters are and they share a thematic thread with other players.

30. **max delta t (min)** - The maximal break time the player had in the game. If larger than 1.5 minutes we disqualify the game.

Interesting measures from previous studies:
# of galleries, # of clusters, % shapes in exploration, % time in exploration, Exploration/Exploitation optimality, Median # steps in the two phases (first PC - switching rate, 2nd PC - tendency to explore/exploit), Originality, % clusters in GC.