Who's better at Hungry Hungry Hippos, a 3-year-old or a 30-something-year-old?

A sample statistics report

Introduction. There are many joys of being a parent, including changing diapers, being awake in the middle of the night, watching Dora the Explorer, and playing children's games. A parent can usually take solace in the fact that he/she is better at a particular game than the child, but not always. This project addresses the following question: who is better at Hungry Hungry Hippos, the author, or the author's 3-year-old daughter?

The game Hungry Hungry Hippos can be played by 2, 3, or 4 players. There are four plastic hippos around a board. Each hippo is operated by a lever, which moves the hippo and opens and closes its mouth. At the start of a game, a large number of marbles are placed on the board, and players try to capture as many as possible into the mouth(s) of their hippo(s).

Data Collection. The author and the author's daughter played a number of games of Hungry Hungry Hippos between March 2006 and July 2006. (The daughter was 3 years old during this entire time span.) For each game, the author operated the orange and yellow hippos (Henry and Harry), placed adjacently on the board. The author's daughter controlled the green and pink hippos (Homer and Happy). Also, for each game, 21 marbles were used. The number of marbles captured by the author's two hippos was recorded for each game.

Results/Discussion. The following null hypothesis was tested. The author, on average, would get half (10.5) of the marbles per game, or

$$H_0 : \mu = 10.5.$$

This was tested against the alternative hypothesis that the author, on average, would not get half (10.5) of the marbles per game, or

$$H_1 : \mu \neq 10.5.$$

A two-sided alternative hypothesis was used, because in the author's experience, there was no evidence that either the author, or the author's daughter, was much better at the game. The significance level is chosen to be $\alpha = 0.05$.

The author and the author's daughter played 22 games of Hungry Hungry Hippos. The average number of marbles captured by the author during these games was $\bar{x} = 10.727$, with a standard deviation of $s = 1.64$. A one-sample t-test was used, since the population standard deviation is unknown. The t-value was $t = 0.65$, with 21 degrees of freedom (df). For a two-sided alternative hypothesis, the p-value was found to be greater than 0.50. Since $p > \alpha$, we fail to reject the null hypothesis. We do not have evidence that the author's average number of marbles captured is different than 10.5. The difference between the sample mean, 10.727, and the proposed mean, 10.5, is so small that it could easily be due to random chance.

Summary. Based on this experiment, no statistically significant difference is found between the Hungry Hungry Hippos ability of the two players involved. One might try to increase the sample size in order to possibly conclude that either player had a significantly higher skill level. But this proved difficult, as the 3-year-old in the study had quite a lot of other games, and Hungry Hungry Hippos was played only occasionally. Also, there were several games played during the trial period that involved cheating (picking marbles up and placing them directly into a hippo's mouth). Results of these games were discarded.

The conclusion of our research (no significant difference) is not too surprising, considering the game itself. In a typical game of Hungry Hungry Hippos, there are two stages of marble capture. At first, both players try to get as many marbles as possible quickly, until only a few remain. Then the remaining marbles are taken more carefully, by timing the hippos' movements. As there is not much skill involved in the first stage, a 3-year-old has just about as much chance as an adult, provided that the 3-year-old can move his/her fingers quickly.

Future research could take any number of paths. As mentioned before, attempts to increase the sample size could be made, though they proved difficult. Different games (for example: Hi Ho! Cherry-O, Monopoly, etc.) could be used in comparing game-playing abilities of the 3-year-old and the 30-something-year-old. Also, subjects of different ages could be used in additional Hungry Hungry Hippos experiments. (One suspects that the author probably would have a statistically significant advantage over the author's 1-year-old son.)

Appendix.
March 31: 10, 8
April 20: 12, 10, 9, 13, 8
May 8: 10, 13
May 22: 9, 11
July 9: 11, 10, 13, 13, 10, 13, 11, 9, 12, 11
July 10: 10

$$t = \dfrac{\bar{x} - \mu}{\dfrac{s}{\sqrt{n}}} = \dfrac{10.727 - 10.5}{\dfrac{1.64}{\sqrt{22}}} = 0.65, \text{ so tail} > 0.25, \text{ and } p > 0.50$$