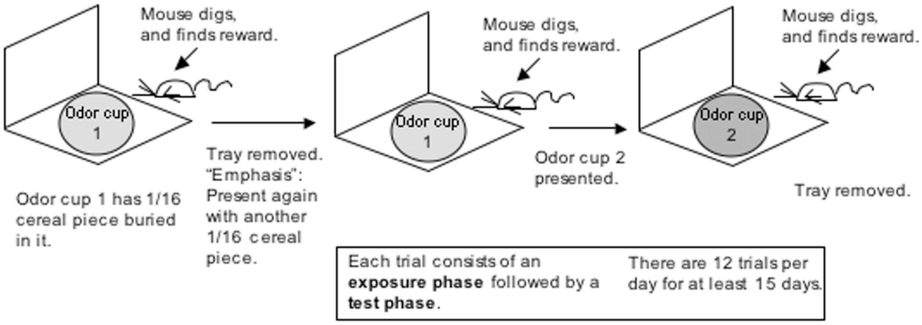
A

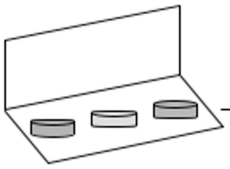
Exposure Phase



Each trial consists of an **exposure phase** followed by a **test phase**.

There are 12 trials per day for at least 15 days.

Test Phase



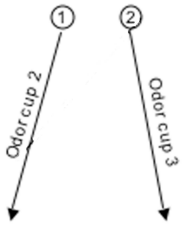
•Tray presented with odor cups 1, 2, and novel odor 3.
•No cereal in any of the cups.

Odor cups are ordered pseudorandomly from left to right for successive trials:
Trial 1: cup 3,1,2 (312)
2: 123
3: 231
4: 321
5: 132
6: 213
7: 231
8: 123
9: 312
10: 132
11: 321
12: 213

Mouse has 3 options:
1. Dig in odor 1
2. Dig in odor 2
3. Dig in odor 3

Trial ends.
•Mouse gets immediate pinch threat (or actual pinch if nonresponsive) with a padded hemostat clamp
•1 min timeout
•Move to next trial

•1/8th cereal piece immediately dropped onto cup.
•Odor cup 1 removed.
•Mouse has 2 options:

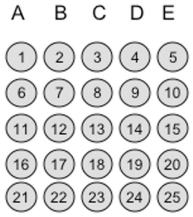


Mouse gets everything correct:
•1/8 cereal reward immediately dropped onto cup
•Odor tray removed.
•Go to next trial's exposure phase

Mouse gets immediate pinch threat/pinch.
•Trial ends, remove tray
•1 minute time out
•Go to next trial

B

Odor cups are used in triplets. A new triplet is used for each trial, moving from left to right and top to bottom.

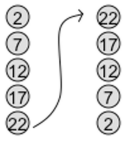


• Second trial uses odor cups 4-5-6 as odors 1, 2, 3 respectively.
• Return to the top left
•with a frame shift for trial 9, i.e. 25-1-2.

Each day prior to starting the trials, odor cups are shuffled, with some of the columns being inverted ("f") as follows:

ABCDE -> Bf, C, Ef, D, Af

To flip:

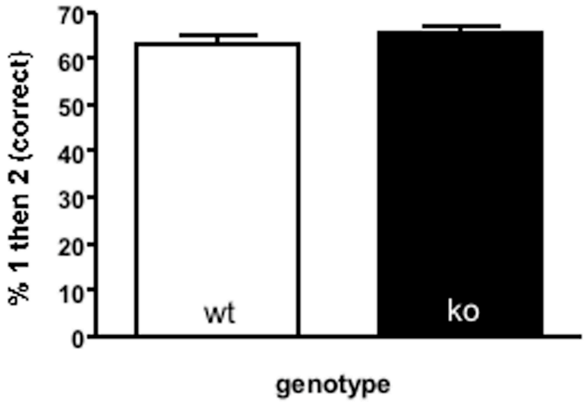


B flipped ("Bf") is the new column A

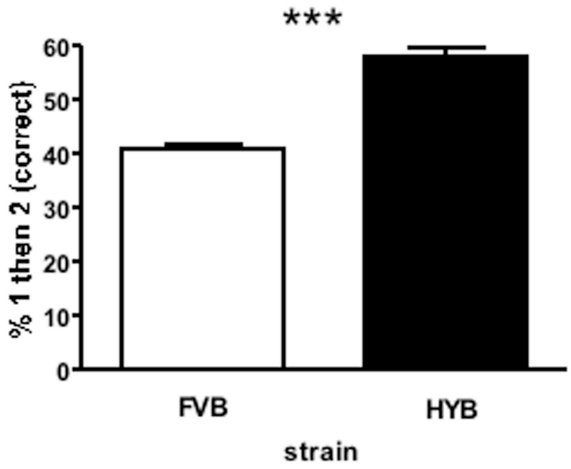
Cup sequence after first shuffle, just prior to day 2 trials:

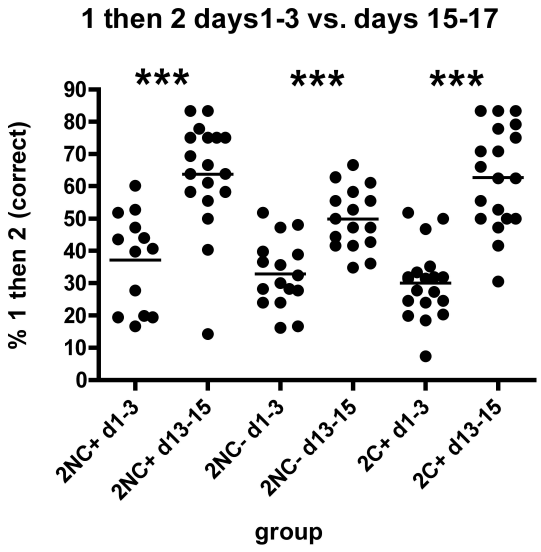
First trial uses odor cups 22-3-25 as odors 1, 2, 3 respectively.

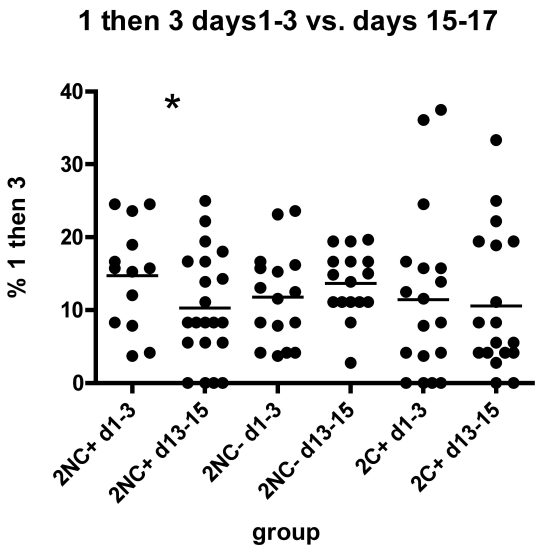
A

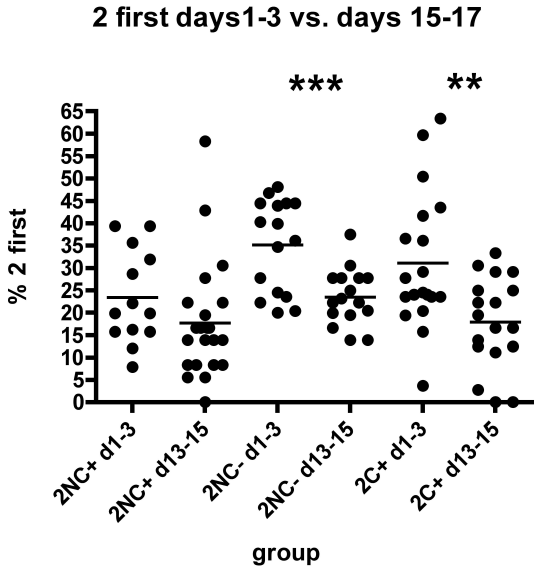

70
60
50
40
30
20
10
0
% 1 then 2 (correct)
wt
ko
genotype

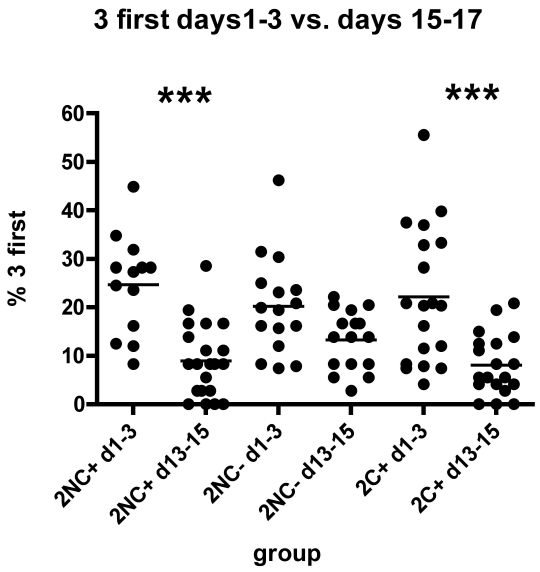
B

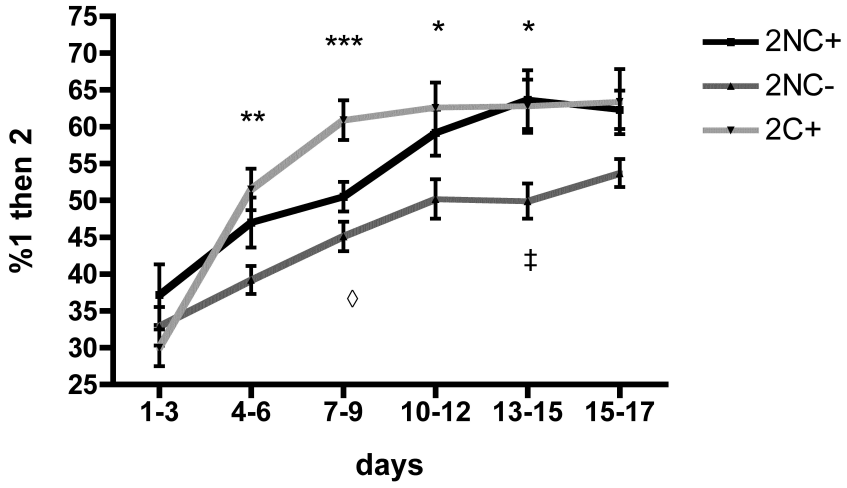

***
60
50
40
30
20
10
0
% 1 then 2 (correct)
FVB
HYB
strain

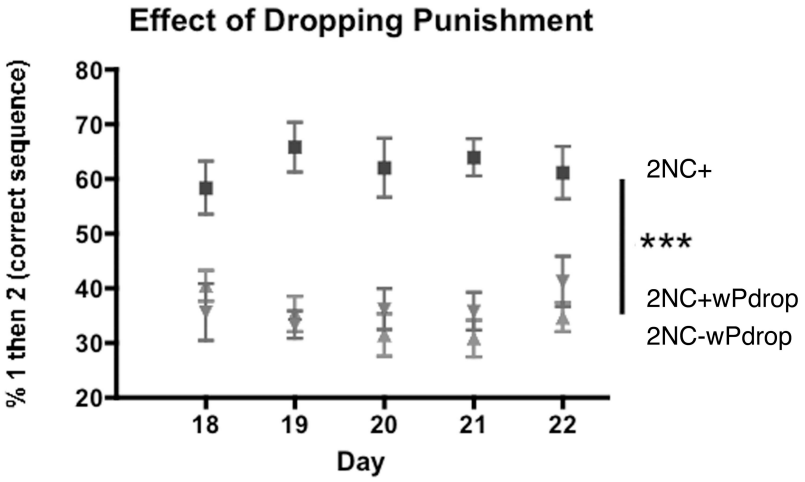

1 then 2 days1-3 vs. days 15-17
% 1 then 2 (correct)
***
***
***
90
80
70
60
50
40
30
20
10
0
2NC+ d1-3
2NC+ d13-15
2NC- d1-3
2NC- d13-15
2C+ d1-3
2C+ d13-15
group

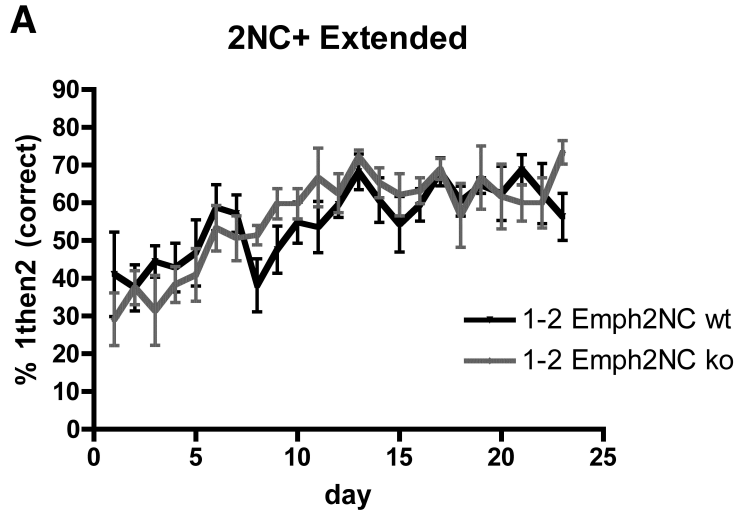

1 then 3 days1-3 vs. days 15-17
% 1 then 3
*
40
30
20
10
0
2NC+ d1-3
2NC+ d13-15
2NC- d1-3
2NC- d13-15
2C+ d1-3
2C+ d13-15
group

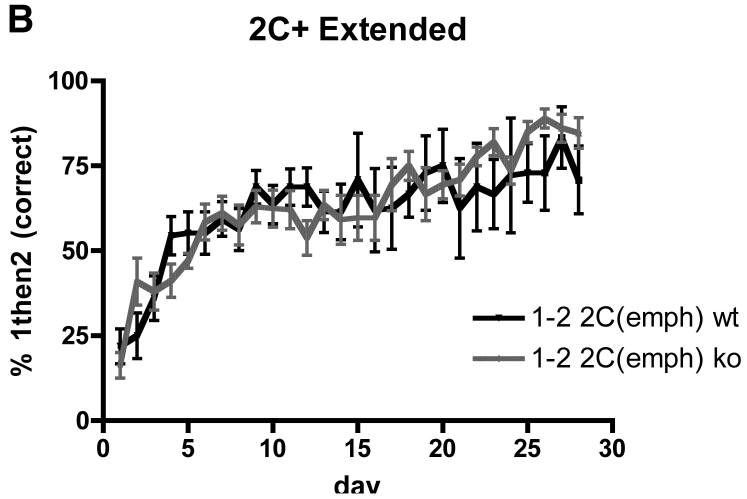

2 first days1-3 vs. days 15-17
% 2 first
***
**
65
60
55
50
45
40
35
30
25
20
15
10
5
0
2NC+ d1-3
2NC+ d13-15
2NC- d1-3
2NC- d13-15
2C+ d1-3
2C+ d13-15
group

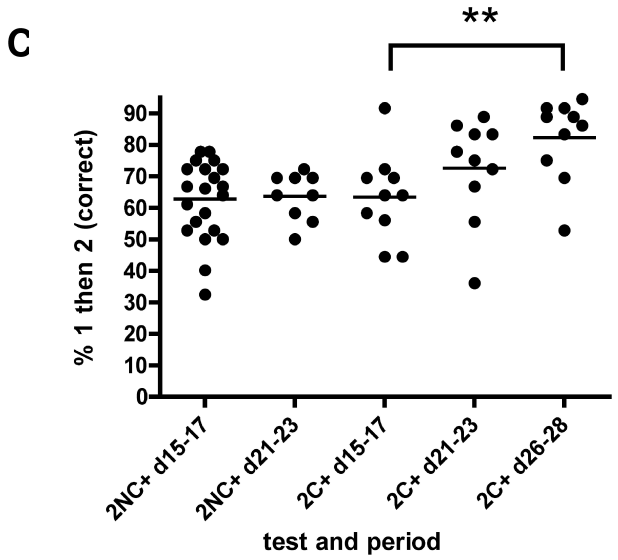

3 first days1-3 vs. days 15-17
% 3 first
***
***
60
50
40
30
20
10
0
2NC+ d1-3
2NC+ d13-15
2NC- d1-3
2NC- d13-15
2C+ d1-3
2C+ d13-15
group

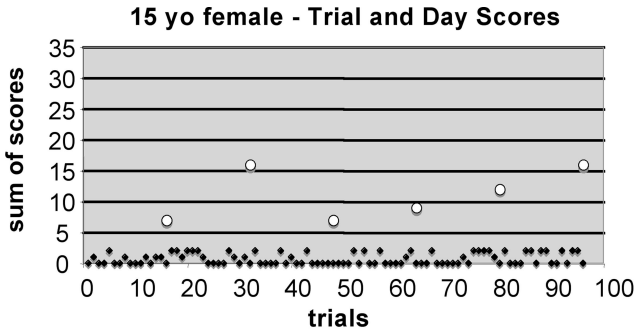

75
70
65
60
55
50
45
40
35
30
25
%1 then 2
**
***
*
*
◊
‡
1-3
4-6
7-9
10-12
13-15
15-17
days
2NC+
2NC-
2C+

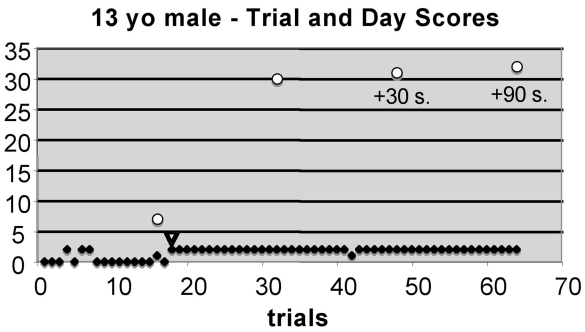

Effect of Dropping Punishment
% 1 then 2 (correct sequence)
80
70
60
50
40
30
20
18
19
20
21
22
Day
2NC+
***
2NC+wPdrop
2NC-wPdrop

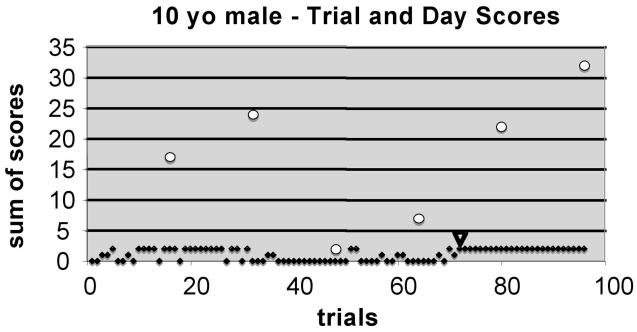

A
2NC+ Extended
% 1then2 (correct)
day
1-2 Emph2NC wt
1-2 Emph2NC ko

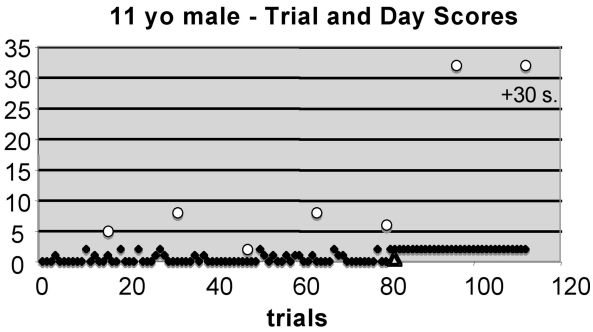

B
2C+ Extended
% 1then2 (correct)
day
1-2 2C(emph) wt
1-2 2C(emph) ko

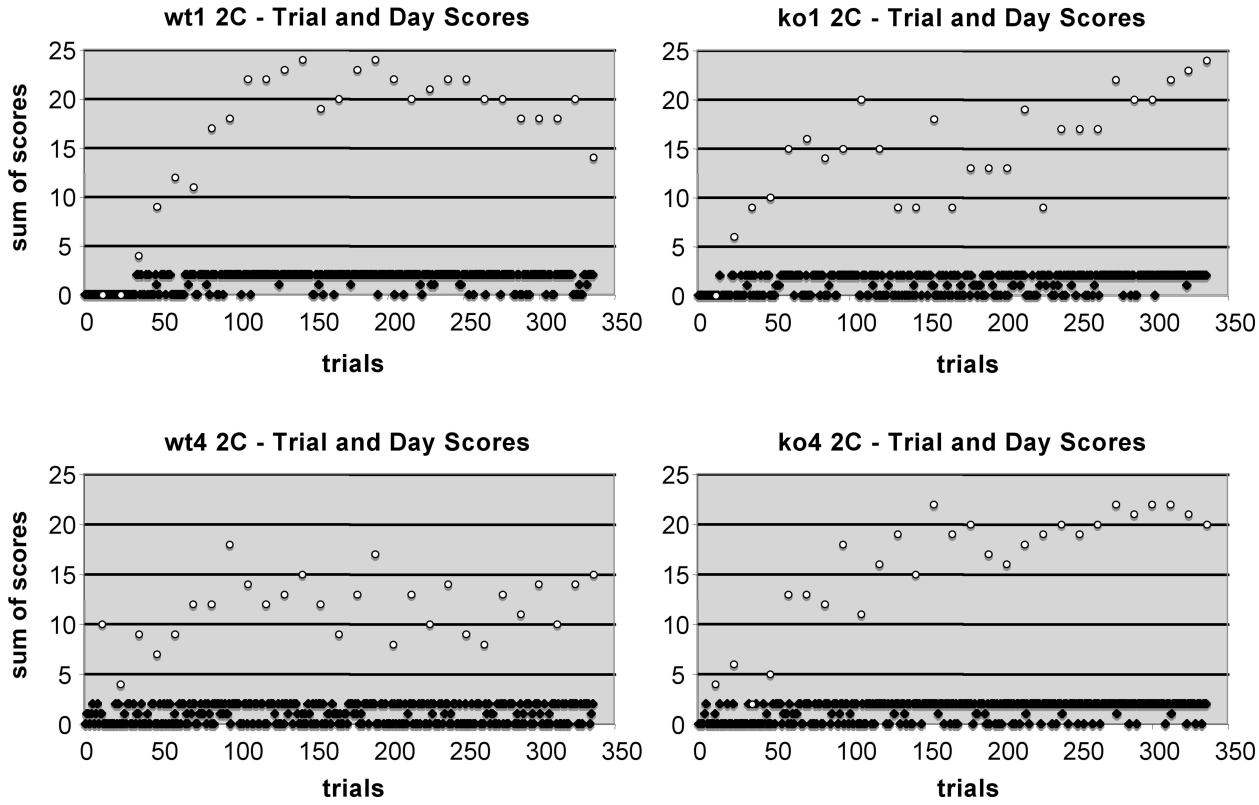

C
**
% 1 then 2 (correct)
2NC+ d15-17
2NC+ d21-23
2C+ d15-17
2C+ d21-23
2C+ d26-28
test and period

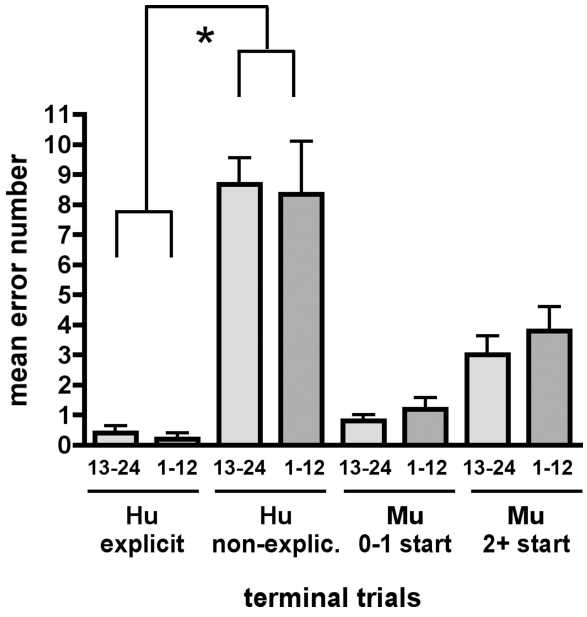

15 yo female - Trial and Day Scores
sum of scores
trials

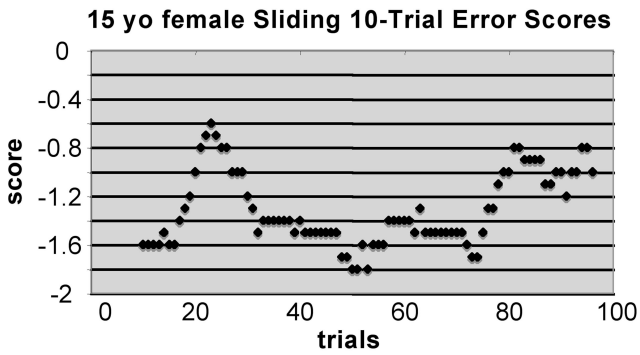

13 yo male - Trial and Day Scores
+30 s.
+90 s.
trials


10 yo male - Trial and Day Scores
sum of scores
trials

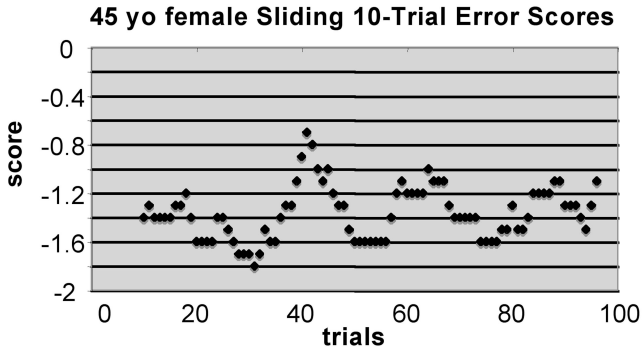

11 yo male - Trial and Day Scores
+30 s.
trials

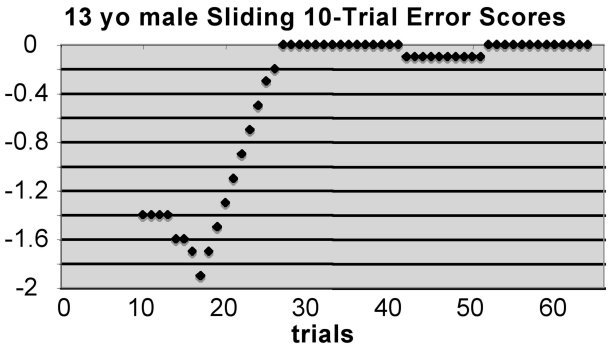

wt1 2C - Trial and Day Scores
ko1 2C - Trial and Day Scores
wt4 2C - Trial and Day Scores
ko4 2C - Trial and Day Scores
sum of scores
trials
0
5
10
15
20
25
0
50
100
150
200
250
300
350

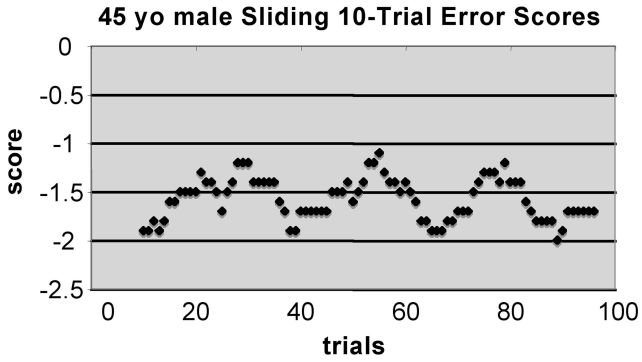

*
mean error number
11
10
9
8
7
6
5
4
3
2
1
0
13-24
1-12
13-24
1-12
13-24
1-12
13-24
1-12
Hu
explicit
Hu
non-explic.
Mu
0-1 start
Mu
2+ start
terminal trials

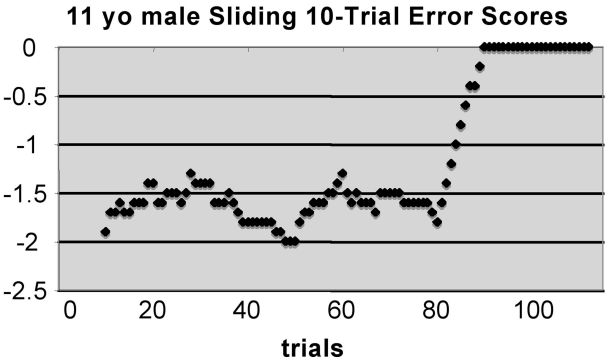

15 yo female Sliding 10-Trial Error Scores
score
0
-0.4
-0.8
-1.2
-1.6
-2
0
20
40
60
80
100
trials

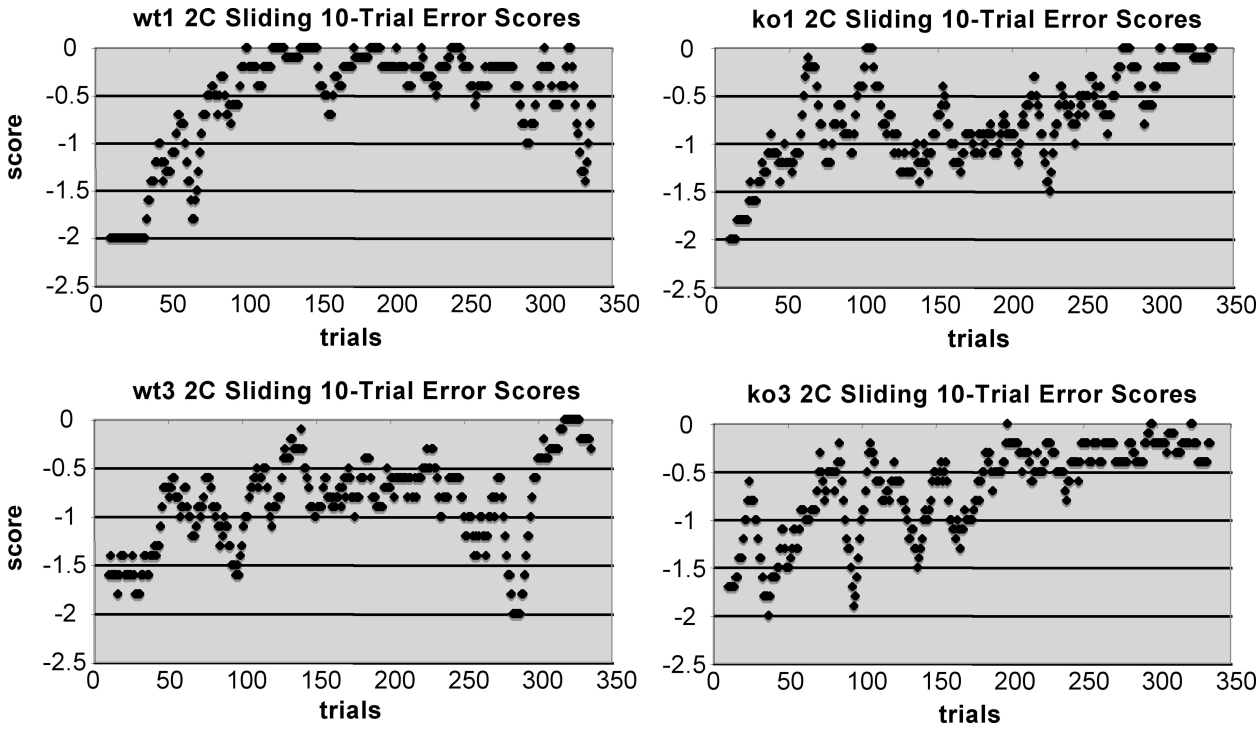
10 yo male Sliding 10-Trial Error Scores
0
-0.5
-1
-1.5
-2
-2.5
0
20
40
60
80
100
trials


45 yo female Sliding 10-Trial Error Scores
score
0
-0.4
-0.8
-1.2
-1.6
-2
0
20
40
60
80
100
trials


13 yo male Sliding 10-Trial Error Scores
0
-0.4
-0.8
-1.2
-1.6
-2
0
10
20
30
40
50
60
trials


45 yo male Sliding 10-Trial Error Scores
score
0
-0.5
-1
-1.5
-2
-2.5
0
20
40
60
80
100
trials


11 yo male Sliding 10-Trial Error Scores
0
-0.5
-1
-1.5
-2
-2.5
0
20
40
60
80
100
trials


wt1 2C Sliding 10-Trial Error Scores
ko1 2C Sliding 10-Trial Error Scores
wt3 2C Sliding 10-Trial Error Scores
ko3 2C Sliding 10-Trial Error Scores
score
trials
0
-0.5
-1
-1.5
-2
-2.5
0
50
100
150
200
250
300
350