**Behavioral Data**

There was a significant main effect of group whereby SZ were less accurate under the Execute instruction compared to CO ($F(1,30) = 6.7$, $p = .01$). There was also a significant main effect of stimulus type ($F(2,30) = 8.1$, $p = .0008$). Paired t-tests indicated greater accuracy with the Animated stimulus compared to both Symbolic ($t(31)=2.2$, $p=.04$) and Spatial ($t(31)=3.7$, $p=.0008$) stimuli. Finally, there was a significant group-by-condition interaction. Planned contrasts indicated no significant group difference in performance with the Animated stimulus ($F(1,60)=3.0$, $p=.055$), but patients were less accurate with the Symbolic ($F(1,60)=31.2$, $p<.0001$) and Spatial ($F(1,60)=36.5$, $p<.0001$) stimuli. Importantly, however, there was no significant main effect of group ($F(1,30) = 1.3$, $p = .26$), condition ($F(2,30) = 0.2$, $p = .81$), or group-by-condition interaction ($F(2,30) = 2.1$, $p=.13$) on the number of trials in which participants failed to complete a three-movement sequence before the end of the trial. Nor was there any main effect of group ($F(1,30) = 3.7$, $p = .07$), condition $F(2,30)=.5$, $p=.59$), or group-by-condition interaction ($F(2,30) = 1.4$, $p = .26$) on accuracy under the Observe instruction. To summarize, although SZ were generally less accurate than CO, accuracy was still high. Further, putative group differences in activation under the Execute instruction cannot simply be explained by fewer finger movements in the patient group, nor can group differences in activation under the Observe instruction be due to patients not following task instructions and making key presses more frequently.

*Response Times (RT)*

For movement initiation latency under the Execute instruction, there was no significant main effect of group ($F(1,30) = 1.1$, $p = .31$) or stimulus type ($F(2,30) = .43$, $p = .65$). However, there was a significant group-by-stimulus interaction ($F(2,30) = .10.1$, $p = .0002$). Planned contrasts indicated longer latency to initiate the movement sequence in SZ with the Symbolic ($F(1,60)=10.9$, $p=.002$) and Spatial ($F(1,60)=32.0$, $p<.0001$) stimuli, but not the Animated ($F(1,60)=0.4$, $p=0.52$) stimulus.

For movement completion time under the Execute instruction, there was also no main effect of group ($F(1,30) = 1.4$; $p = .24$). However, there was a main effect of condition ($F(2,30) = 36.4$; $p < .0001$). Paired t-tests indicated slower completion for the Animated ($t(31)=5.1$, $p<.0001$) and Symbolic ($t(31)=9.1$, $p<.0001$) stimuli compared to the Spatial stimuli. Finally, there was a significant group-by-condition interaction ($F(2,60) = 4.1227$; $p = .02$). Planned contrasts indicated that SZ were actually faster than CO for the Animated ($F(1,60)=16.3$, $p<.0001$) and Symbolic ($F(1,60)=10.8$, $p=.002$) stimuli, but not for the Spatial stimulus ($F(1,60)=0.04$, $p=.84$).

TABLE S1. Accuracy and Reaction Times

| | SZ (n=16) | CO (n=16) |
|---|---|---|
| Accuracy: % (s.d.) | | |
| Execute | | |
| Animated | 94.75 (5.39) | 96.79 (2.84) |
| Symbolic | 90.76 (7.52) | 97.05 (3.75) |
| Spatial | 89.93 (8.70) | 95.75 (3.08) |
| Observe | | |
| Animated | 98.35 (2.58) | 99.78 (.55) |
| Symbolic | 98.96 (2.28) | 99.09 (2.40) |
| Spatial | 97.66 (3.83) | 99.48 (1.55) |
| Execute Incomplete: % (s.d.) | | |
| Animated | 3.12 (4.55) | 2.52 (2.70) |
| Symbolic | 3.60 (6.07) | 1.65 (2.74) |
| Spatial | 4.17 (6.17) | 1.69 (2.22) |
| Reaction Time: sec. (s.d.) | | |
| Initiation Latency | | |
| Animated | .84 (.12) | .85 (.09) |
| Symbolic | .86 (.12) | .82 (.07) |
| Spatial | .87 (.15) | .79 (.08) |
| Completion Time | | |
| Animated | 2.76 (.08) | 2.81 (.07) |
| Symbolic | 2.78 (.07) | 2.82 (.04) |
| Spatial | 2.73 (.08) | 2.74 (.07) |

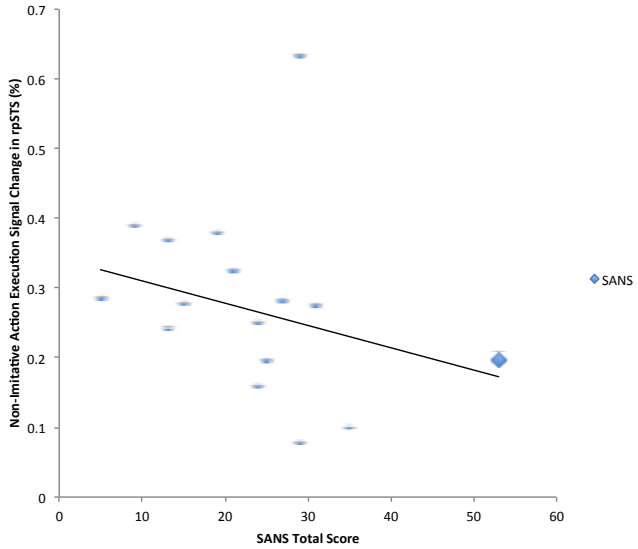
TABLE S2. Peak Talairach Coordinates of All Significant Group Activations

| | | | Peak Talairach coordinates | | | | |
|---|---|---|---|---|---|---|---|
| | | cluster size | x | y | z | max t-value | max p-value |
| **Imitate > Action Execution** | | | | | | | |
| ***Control > Schizophrenia*** | Right inferior parietal lobule/posterior superior temporal sulcus | 94 | 45 | -40 | 22 | 4.54 | 0.00008 |
| ***Control > Schizophrenia*** | Right precentral gyrus | 10 | 54 | -1 | 28 | 3.58 | 0.001 |
| | Left middle occipital gyrus | 15 | -49 | -70 | 4 | 3.2 | 0.003 |
| **Imitate > Baseline** | | | | | | | |
| ***Control > Schizophrenia*** | Right middle temporal gyrus | 15 | 55 | -25 | -8 | 3.69 | 0.0008 |
| | Right precentral gyrus | 11 | 54 | -1 | 31 | 3.42 | 0.002 |
| | Right posterior superior temporal sulcus | 63 | 45 | -43 | 19 | 4.24 | 0.0002 |
| | Right superior frontal gyrus | 34 | 15 | 32 | 49 | 4.16 | 0.0002 |
| | Left putamen | 11 | -18 | 2 | 4 | 3.45 | 0.002 |
| | Left thalamus | 9 | -27 | -25 | 1 | 3.93 | 0.0004 |
| | Left middle occipital gyrus | 56 | -49 | -70 | 4 | 3.68 | 0.0009 |
| | Left inferior parietal lobule | 13 | -48 | -34 | 31 | 3.55 | 0.001 |
| ***Schizophrenia > Control*** | Left parahippocampal gyrus | 11 | -27 | -55 | 4 | -4.37 | 0.0001 |
| **Action Execution > Baseline** | | | | | | | |
| ***Control > Schizophrenia*** | Right Precuneus | 18 | 15 | -49 | 28 | 4.3 | 0.0002 |
| ***Schizophrenia > Control*** | Right inferior parietal lobule | 492 | 51 | -34 | 22 | -4.95 | 0.00003 |
| | Right postcentral gyrus | | 51 | -22 | 37 | -4.17 | 0.0002 |
| | Right precentral gyrus | | 27 | -25 | 55 | -4.73 | 0.00005 |
| | Right precuneus | | 18 | -64 | 49 | -4.65 | 0.00006 |
| | Right Insula | 69 | 36 | 5 | 7 | -5.61 | 0.000004 |
| | Right parahippocampal gyrus | 20 | 30 | -4 | -17 | -3.61 | 0.001 |
| | Right middle frontal gyrus | 27 | 18 | 44 | 4 | -3.74 | 0.0007 |
| | Left lingual gyrus | 109 | -15 | -67 | 4 | -4.19 | 0.0002 |
| | Left precuneus | 24 | -6 | -34 | 43 | -3.65 | 0.001 |
| | Left superior parietal lobule | 34 | -24 | -58 | 58 | -4.05 | 0.0003 |

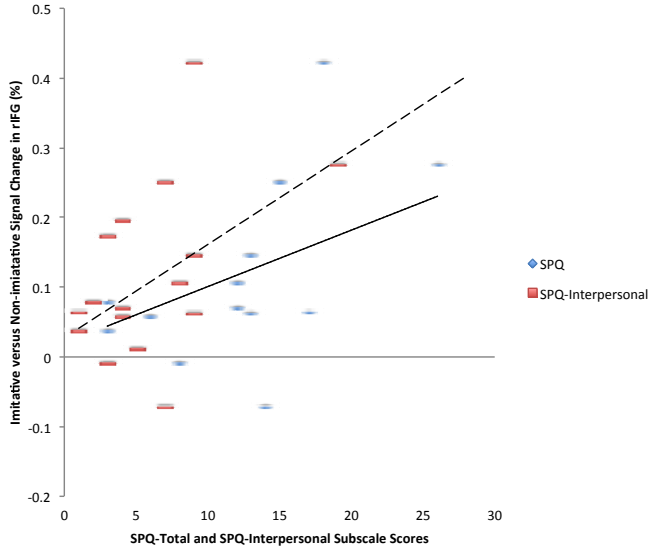
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Left amygdala | 37 | -21 | -1 | -20 | -3.82 | 0.0006 |
| | Left postcentral gyrus | 124 | -39 | -22 | 31 | -4.14 | 0.0002 |
| | Left superior temporal sulcus | | -39 | -28 | 4 | -3.77 | 0.0007 |
| **Animated Action Observation > Non-animated Action Observation** | | | | | | | |
| ***Control >Schizophrenia*** | Right inferior parietal lobule | 9 | 51 | -25 | 22 | 3.47 | 0.002 |
| | Right middle frontal gyrus | 19 | 36 | 17 | 25 | 3.96 | 0.0004 |
| | Left middle frontal gyrus | 14 | -33 | 35 | 16 | 3.43 | 0.002 |
| | Left claustrum | 14 | -33 | -4 | 4 | 3.72 | 0.0008 |
| **Animated Action Observation > Baseline** | | | | | | | |
| ***Control > Schizophrenia*** | Right inferior parietal lobule | 184 | 51 | -28 | 22 | 4.52 | 0.00009 |
| | Right inferior parietal lobule/posterior superior temporal sulcus | | 61 | -43 | 22 | 3.98 | 0.0004 |
| | Right inferior temporal gyrus | 10 | 54 | -55 | -5 | 3.43 | 0.002 |
| | Right middle frontal gyrus | 38 | 39 | 17 | 22 | 3.67 | 0.0009 |
| | Right postcentral gyrus | 52 | 18 | -34 | 64 | 3.54 | 0.001 |
| | Right precuneus | 151 | 9 | -58 | 52 | 3.81 | 0.0006 |
| | Right cingulate gyrus | 17 | 9 | -28 | 40 | 3.55 | 0.001 |
| | Left lingual gyrus | 52 | -9 | -70 | 4 | 3.64 | 0.001 |
| | Left middle frontal gyrus | 17 | -33 | 29 | 19 | 3.44 | 0.002 |
| | Left claustrum | 24 | -33 | -4 | 4 | 4.04 | 0.0003 |
| | | 16 | -33 | -16 | 4 | 3.47 | 0.002 |
| | Left insula | 23 | -33 | -1 | 19 | 3.97 | 0.0004 |
| | Left posterior superior temporal sulcus | 33 | -42 | -31 | 13 | 3.51 | 0.001 |
| **Non-animated Action Observation > Baseline** | | | | | | | |
| ***Control > Schizophrenia*** | Right superior parietal lobule | 35 | 15 | -67 | 52 | 4.56 | 0.00008 |
| | Left lingual gyrus | 57 | -18 | -64 | 4 | 3.61 | 0.001 |
| | Left precuneus | 21 | -15 | -70 | 46 | 3.31 | 0.002 |

FIGURE S1.

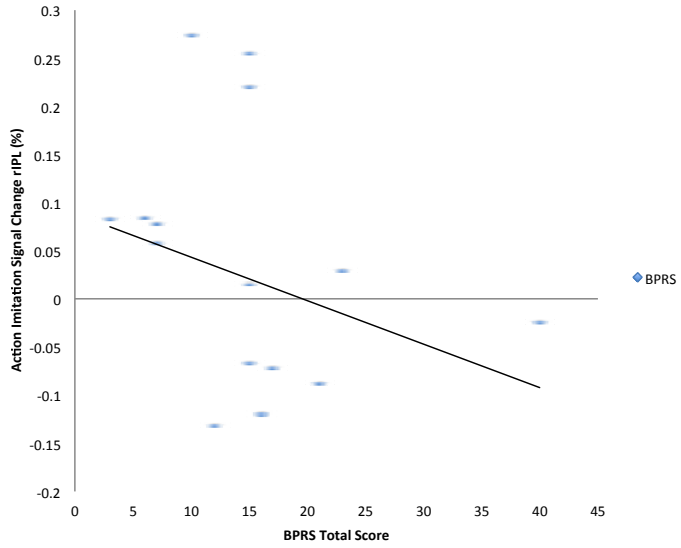
a)


Non-Imitative Action Execution Signal Change in rpSTS (%)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
10
20
30
40
50
60
SANS Total Score
SANS

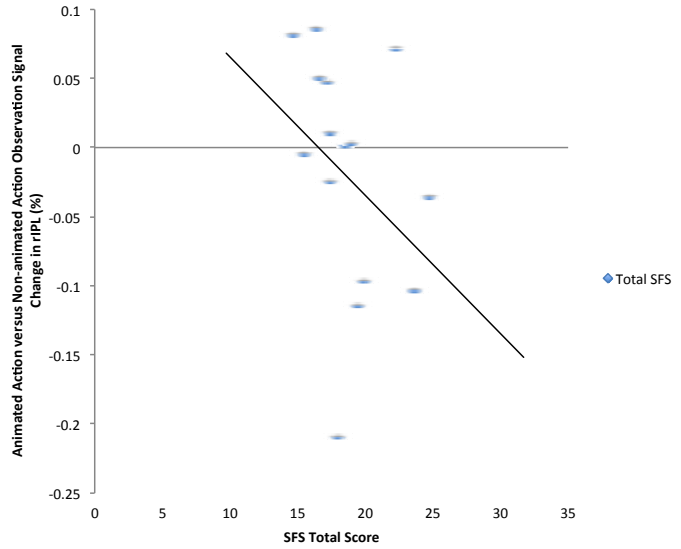
b)


Imitative versus Non-imiatative Signal Change in rIFG (%)
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
0
5
10
15
20
25
30
SPQ-Total and SPQ-Interpersonal Subscale Scores
SPQ
SPQ-Interpersonal

c)


0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-0.2
0
5
10
15
20
25
30
35
40
45
Action Imitation Signal Change rIPL (%)
BPRS Total Score
BPRS

d)


0.1
0.05
0
-0.05
-0.1
-0.15
-0.2
-0.25
0
5
10
15
20
25
30
35
Animated Action versus Non-animated Action Observation Signal Change in rIPL (%)
SFS Total Score
Total SFS