

(A) PWM1-R1

```
A|0.435318|0.969401|-0.200671|-0.200671|-0.788457|-0.788457|
C|0.167054|-2.3979|-0.788457|-2.3979|0.820981|-0.788457|
G|-0.788457|-2.3979|-2.3979|0.820981|-0.788457|-0.788457|
T|-0.200671|0.167054|0.969401|-0.200671|-0.200671|0.969401|
```

(B) PWM2-R1

```
A|0.646627|1.21302|-2.3979|-2.3979|-0.788457|0.820981|
C|-0.200671|-2.3979|-2.3979|-2.3979|-0.200671|-2.3979|
G|-0.200671|-2.3979|-0.788457|-2.3979|-0.788457|-0.788457|
T|-0.788457|-0.788457|1.21302|1.31568|0.820981|0.167054|
```

(C) PWM3-R1

```
A|-0.893818|-0.526093|-0.526093|-0.04652|-0.893818|-0.257829|-0.257829|
-0.526093|0.127833|0.127833|0.405465|-0.526093|-0.526093|-0.257829|
-0.893818|-0.893818|0.127833|-0.526093|-0.257829|-0.257829|-0.04652|
-1.4816|-1.4816|-0.893818|-0.257829|0.127833|0.276253|-0.526093|
-0.893818|-0.526093|-0.526093|
C|-1.4816|0.127833|-0.257829|-0.893818|-0.04652|0.127833|0.127833|
0.405465|-1.4816|-0.526093|-0.526093|-0.04652|-0.893818|0.405465|
-0.04652|0.276253|0.127833|-0.257829|-0.526093|-0.04652|-0.04652|
-3.09104|-0.257829|0.276253|-0.257829|-0.04652|-0.257829|-0.893818|
0.405465|0.127833|-0.257829|
G|-0.526093|-0.257829|-0.893818|0.127833|0.276253|-0.04652|-0.257829|
-0.257829|-0.893818|-1.4816|-0.04652|0.405465|-0.257829|-0.04652|
0.276253|0.127833|-0.257829|0.276253|0.519875|0.276253|0.405465|
0.276253|0.62253|0.405465|-1.4816|-0.04652|-0.893818|-1.4816|
0.127833|0.519875|0.276253|
T|1.01983|0.405465|0.800778|0.405465|0.276253|0.127833|0.276253|
0.127833|0.800778|0.71562|-0.04652|-0.04652|0.800778|-0.257829|
0.276253|0.127833|-0.04652|0.276253|-0.04652|-0.04652|-0.526093|
0.879249|0.127833|-0.257829|0.800778|-0.04652|0.405465|1.01983|
-0.04652|-0.526093|0.276253|
```

Figure S2. The R1 versions of random position weight matrices constructed by randomly shuffling columns within individual genuine matrices. (A) PWM1-R1 constructed from PWM1. (B) PWM2-R1 constructed from PWM2. (C) PWM3-R1 constructed from PWM3.