Corrigendum to ‘Mixing, Communication Complexity and Conjectures of Gowers and Viola’

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In my paper [1], a normalization factor of $|G|^{-1}$ was missing in the statements of Theorem 2.4, Theorem 2.6 and Corollary 2.7. The correct formulation of these results is as follows.

**Theorem 2.4.** Let $G$ be a finite simple group of Lie type of rank $r$ over a field with $q$ elements.

(i) There is a constant $c > 0$ depending only on $r$, such that, if $x, y$ are distributed uniformly over $G$ (but may be dependent), then

$$
\|p_{x,y}\|_2^2 \leq |G|^{-1}(1 + |G|^{-c})
$$

holds with probability at least $1 - |G|^{-c}$.

(ii) There is an absolute constant $c > 0$ and a constant $c'$ depending only on $r$, such that, if $G \notin S$, where

$$
S = \{L_2(q), L_3^\pm(q), L_4^\pm(q), D_4^\pm(q), D_5^\pm(q)\},
$$

and $x, y$ are distributed uniformly over $G$ (but may be dependent), then

$$
\|p_{x,y}\|_2^2 \leq |G|^{-1}(1 + c'q^{-(2^r-1)})
$$

holds with probability at least $1 - c/q$.

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Corrigendum

Theorem 2.6. Let $G$ be a finite simple group. Let $x, y$ be distributed uniformly over $G$ (but they may be dependent). Fix $s$ with $s > 0$.

(i) If $G = A_n$, then for some absolute constant $c$ the probability that
\[ \| p_{x,y} \|_2^2 \leq |G|^{-1}(1 + cn^{-(2-2s)}) \]
is at least $1 - cn^{-s}$.

(ii) If $G$ is a finite simple group of Lie type of rank $r$ over the field with $q$ elements, then the probability that
\[ \| p_{x,y} \|_2^2 \leq |G|^{-1}(1 + q^{-(2s-2s-\epsilon)r}) \]
is at least $1 - q^{-(s-\epsilon)r}$, for any $\epsilon > 0$ and $r \geq r(\epsilon, s)$.

Corollary 2.7. Let $G$ be a finite simple group. Let $x, y$ be distributed uniformly over $G$ (but they may be dependent).

(i) If $G = A_n$, then for any $\epsilon > 0$ there exists $n(\epsilon)$ such that, for any $n \geq n(\epsilon)$, the probability that
\[ \| p_{x,y} \|_2^2 \leq |G|^{-1}(1 + n^{-(2-\epsilon)}) \]
is at least $1 - n^{-\epsilon/3}$.

(ii) If $G$ is a finite simple group of Lie type of rank $r$ over the field with $q$ elements, then the probability that
\[ \| p_{x,y} \|_2^2 \leq |G|^{-1}(1 + q^{-(2-\epsilon)r}) \]
is at least $1 - q^{-\epsilon r/3}$, for any $\epsilon > 0$ and $r \geq r(\epsilon)$.

Consequently, the quotation of part (ii) above in the Introduction should change accordingly. No changes whatsoever are required in the proofs.

Reference