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Erratum to: Classifying maps into uniform tracial sequence algebras

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Abstract. We correct an argument in the original paper.

In the proof of [1, Thm. 2.6], we made an error in equation (2.44), where we wrote

$$f_n^{(k)}(F_n,\theta_n,\psi_n) := \max_{j\le k}\big(\|\theta_n(a_jb_j)\| + \sup_{\tau\in T(B)} |\tau(\psi_n(\theta_n(x_j))) - \alpha(\tau(x_j))|\big). \tag{2.44}$$

There is a typo, and instead of $\alpha(\tau(x_j))$, we had meant to write $\alpha(\tau)(x_j)$. However, this would still be incorrect: since α is a map from $T(B^\infty)$ to $T_{\mathrm{am}}(A)$ and we are quantifying over $\tau\in T(B)$, it does not make sense to take $\alpha(\tau)(x_j)$.

The correction involves representing the affine functionals on $T(B^\infty)$ given by $\tau\mapsto\alpha(\tau)(x_j)$ using self-adjoint elements in B^∞. This idea, of representing the action of the trace via an element of B^∞, is already used (correctly) later in the proof of [1, Thm. 2.6].

To obtain a correct proof, we need to define $f_n^{(k)}$ differently. For each $j\in\mathbb{N}$, using [1, Prop. 1.2] (which is due to Cuntz and Pedersen), we may find a self-adjoint element $c^{(j)}\in B^\infty$ such that

$$\tau(c^{(j)}) = \alpha(\tau)(x_j) \quad \text{for all } \tau\in T(B^\infty).$$

For each $c^{(j)}$, we choose a representative sequence $(c_n^{(j)})_{n=1}^\infty$ of self-adjoint elements in B. We then define

$$f_n^{(k)}(F_n,\theta_n,\psi_n) := \max_{j\le k}\big(\|\theta_n(a_jb_j)\| + \sup_{\tau\in T(B)} |\tau(\psi_n(\theta_n(x_j))) - \tau(c_n^{(j)})|\big). \tag{1}$$

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Then one sees that [1, (2.45)] holds with the new definition of $f_n^{(k)}$ since

$$\begin{aligned}
\limsup_{n\to\infty} \sup_{\tau\in T(B)} &|\tau(\tilde{\psi}_n(\theta(x_j))) - \tau(c_n^{(j)})| \\
&= \sup_{\tau\in T_\infty(B)} |\tau(\psi(\theta(x_j))) - \tau(c^{(j)})| \\
&= \sup_{\tau\in T_\infty(B)} |\tau(\psi(\theta(x_j))) - \alpha(\tau)(x_j)| \\
&\overset{[1,\,(2.42)]}{\leq} \epsilon.
\end{aligned} \tag{2}$$

Next, given a sequence $(F_n, \theta_n, \psi_n) \in \prod_{n=1}^{\infty} X_n$ satisfying [1, (2.46)], define $\phi_n := \psi_n \circ \theta_n$ and let $\phi : A \to B^\infty$ be the map induced by $(\phi_n)_{n=1}^\infty$. Then this is the required ϕ. Indeed, to prove [1, (2.38)], it is enough to verify equality on the dense subset $\{x_j : j \in \mathbb{N}\}$ of A_{sa}. For each j, we have

$$\tau \circ \phi(x_j) = \tau(c^{(j)}) = \alpha(\tau)(x_j) \tag{3}$$

for all $\tau \in T_\infty(B)$, hence for all $\tau \in T(B^\infty)$ by [1, Prop. 2.5], as required.

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References

[1] J. Castillejos, S. Evington, A. Tikuisis, and S. White, Classifying maps into uniform tracial sequence algebras, Münster J. Math. **2** (2021), 265–281. MR4359832

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