Erratum:
On the spectra of randomly perturbed expanding maps

V. Baladi and L.-S. Young

June 1994

The authors wish to point out an error in Sublemma 6 in Section 5 of [1]. The claims in Theorems 3 and 3' have been revised accordingly; a correct version is given below. Other results in [1] are not affected.

The first author is grateful to P. Collet, S. Isola, and B. Schmitt for useful discussions.

i) Revised statement of results in Section 5.C.

Section 5 of [1] is about piecewise C^2 expanding mixing maps f of the interval. The number Θ below refers to $\Theta = \lim_{n\to\infty} \sup(1/|(f^n)'|^{1/n})$. These maps are randomly perturbed by taking convolution with a kernel θ_ϵ, and the resulting Markov chain is denoted $\mathcal{X}^\epsilon$. The precise statements of Theorems 3 and 3' should read as follows:

Theorem 3. *Let $f : I \to I$ be as described in Section 5.A of [1], with a unique absolutely continuous invariant probability measure $\mu_0 = \rho_0\, dm$, and let $\mathcal{X}^\epsilon$ be a small random perturbation of f of the type described in Section 5.B with invariant probability measure $\rho_\epsilon\, dm$. We assume also that f has no periodic turning points. Then*

(1) *The dynamical system (f, μ_0) is stochastically stable under $\mathcal{X}^\epsilon$ in $L^1(dm)$, i.e., $|\rho_\epsilon - \rho_0|_1$ tends to 0 as $\epsilon \to 0$.*

Let $\tau_0 < 1$ and $\tau_\epsilon < 1$ be the rates of decay of correlations for f and $\mathcal{X}^\epsilon$ respectively for test functions in BV. Then:

(2) $\limsup_{\epsilon\to 0} \tau_\epsilon \le \sqrt{\tau_0}$.

Theorem 3'. *Let f and $\mathcal{X}^\epsilon$ be as in Theorem 3, except that we do not require that f has no periodic turning points. Then*

(1) *$|\rho_\epsilon - \rho_0|_1$ tends to 0 as $\epsilon \to 0$ if $2 < 1/\tau_0 \le 1/\Theta$;*
(2) $\limsup_{\epsilon\to 0} \tau_\epsilon \le \sqrt{2\tau_0}$.

If θ_ϵ is symmetric, the factor "2" in both (1) and (2) may be replaced by "3/2".

Section 5.D is unchanged.

ii) Revised version of Section 5.E.

We follow the notation introduced at the beginning of 5.E, except that we consider only the situation where

$$\Sigma_0 = \{1\} \quad \text{and} \quad \Sigma_{1,0} = \emptyset\,.$$

That is to say, the reader should read 5.E with $\kappa_0 = 1$, $\kappa_{11} = \kappa_1 = \tau_0$, etc.

Sublemma 6, which is problematic in [1], is valid in this more limited setting because $\pi_0\varphi = \rho_0 \cdot \int \varphi\, dm$. Lemmas 1' and 3', which use Sublemma 6, are also correct under the present assumptions. We take this opportunity to add "$X_0^\epsilon \to X_0$", which had been inadvertently left out in [1], to the conclusion of Lemma 3'.

To prove Theorem 3, one applies Lemmas 9, 1' and 3' with κ close to (and slightly bigger than) $\sqrt{\tau}_0$. To prove Theorem 3', take κ close to $\sqrt{\tau_0/2}$ (or $\sqrt{\tau_0/(3/2)}$ if θ_ϵ is symmetric).

References

1. V. Baladi and L.-S. Young, *On the spectra of randomly perturbed expanding maps*, Comm. Math. Phys. **156** (1993), 355-385.

Mathematik, ETH Zürich, CH 8092 Zürich, Switzerland
(on leave from UMPA, ENS Lyon (CNRS, UMR 128), France)
E-mail address: baladi@math.ethz.ch

Department of Mathematics, UCLA, Los Angeles, CA 90024, USA
E-mail address: lsy@math.ucla.edu