# Monadic Quantifiers Recognized by Deterministic Pushdown Automata: Corrigendum (January 1, 2014)

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Lemma 3 on page 142 of my paper for the 19th Amsterdam Colloquium (Kanazawa 2013), attributed to Harrison 1978, was stated incorrectly. It should be corrected as follows:

> **Lemma 3.** *Let $L \subseteq \Sigma^*$ be a DCFL. There exists a regular set $R \subseteq L$ satisfying the following property: for every $w \in L - R$, there exist $x_1, x_2, x_3, x_4, x_5$ such that*
>
> (i) $w = x_1x_2x_3x_4x_5$*;*
> (ii) $x_2x_4 \neq \varepsilon$*;*
> (iii) *for every $z \in \Sigma^*$ and $n \in \mathbb{N}$, $x_1x_2x_3x_4z \in L$ if and only if $x_1x_2^nx_3x_4^nz \in L$.*

We also need to refer to Proposition 8 on page 146, which can be proved with the help of the following lemma:

> **Lemma A.** *Let $L \subseteq \Sigma^*$ be a regular language. There exists a positive integer $p$ satisfying the following property: for every $w \in L$ with $|w| \geq p$, there exist $x_1, x_2, x_3$ such that*
>
> (i) $w = x_1x_2x_3$*;*
> (ii) $x_2 \neq \varepsilon$*;*
> (iii) $|x_1x_2| \leq p$*;*
> (iv) *for every $z \in \Sigma^*$ and $n \in \mathbb{N}$, $x_1x_2z \in L$ if and only if $x_1x_2^nz \in L$.*

The paragraph after Lemma 4 should be corrected as follows:

> To prove the "only if" direction of Theorem 1, suppose that $W_Q$ is recognized by a deterministic PDA. By Parikh's theorem, $V_Q$ is semilinear. If $W_Q$ is regular, then by Proposition 8, $V_Q$ satisfies the conditions of the theorem. If $W_Q$ is not regular, then, by Lemma 3, there must be $w = x_1x_2x_3x_4x_5 \in W_Q$ that satisfies the conditions (i)–(iii) of Lemma 3. ...

It's not immediately obvious how Lemma 3 follows from Harrison's (1978) iteration theorem for DCFL. See my blog post at `http://makotokanazawa.blogspot.jp/2013/12/machine-based-approach-to-pumping.html` for a direct proof of Lemma 3.

## References

Harrison, Michael A. 1978. *Introduction to Formal Language Theory.* Reading, MA: Addison-Wesley.

Kanazawa, Makoto. 2013. Monadic quantifiers recognized by deterministic pushdown automata. In Maria Aloni, Michael Franke, and Floris Roelofsen, editors, *Proceedings of the 19th Amsterdam Colloquium*, pages 139–146. `http://www.illc.uva.nl/AC/AC2013/uploaded_files/inlineitem/18_Kanazawa.pdf`.