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Corrigendum

Corrigendum to “On a lemma of Crochemore and Rytter” [Journal of Discrete Algorithms 34 (2015) 18–22]

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The erratum concerns the following changes: Lemma 3, Corollary 4 and relevant changes in their proofs, the Conclusion, and an acknowledgment to our Ph.D. student, Adrien Thierry, who pointed out the inconsistency.

Lemma 3 (page 19) should be replaced by

Lemma 3. *Let $u^2 = v^2$ be proper prefixes of w^2, then $|u| + |v| \le |w|$ unless $u = v_1^t$, $v = v_1^{p_1} v_2$ and $w = v_1^{p_1} v_2 v_1^{p_2}$ where v_1 is primitive, v_2 a proper possibly empty prefix of v_1, $t > p_2$, and $p_1 \ge p_2 \ge 1$.*

The paragraph after Lemma 3 (page 19) should be replaced by

Lemma 3 shows that the strings (u, v, w) violating $|u|+|v| < |w|$ consist of two types; one corresponding to the example given by Fraenkel and Simpson. Corollary 4 illustrates that Lemma 3 is a generalization of Lemma 2.

Corollary 4 and its proof (page 19) should be replaced by

Corollary 4. *Let u^2 be a proper prefix of v^2 that is a proper prefixes of w^2 and let u be primitive, then $|u| + |v| \le |w|$. Moreover, if $|u| < |v| < 2|u|$ and either v or w is primitive, then $|u| + |v| \le |w|$.*

Proof. Let us assume by contradiction that $|u| + |v| > |w|$. Then by Lemma 3, $u = v_1^t$, $v = v_1^{p_1} v_2$ and $w = v_1^{p_1} v_2 v_1^{p_2}$ for a primitive v_1, a proper possibly empty prefix v_2 of v_1, and $t > p_2$, $p_1 \ge p_2 \ge 1$. If u is primitive, $t = 1$ and so $t > p_2 \ge 1$ is a contradiction. If $|v| < 2|u|$, then $v_1^{p_1} v_2 v_1$ is a prefix of v_1^{2t}, which can only be true when v_2 is empty due to Lemma 6. If v is primitive, then $p_1 = 1$ and so $p_2 = 1$ and so $u = v_1^t$, $t > 1$ and $v = v_1$ and $w = v_1^2$, and so $|u| \ge |w|$, a contradiction. If w is primitive, then $w = v_1$, and so $|w| = |v|$, a contradiction. □

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Beginning of section 3 till the end of Case 1 (page 20) should be replaced by:
Let $u \neq v$, and u^2 and v^2 be both proper prefixes of w^2. Lemma 3 states that

$$\{u = v_1^t,\ v = v_1^{p_1} v_2,\ w = v_1^{p_1} v_2 v_1^{p_2}\} \text{ or } \{|u| + |v| \leq |w|\}. \tag{S}$$

Case 1 in the proof (page 20) should be replaced by:
1. Case when u and v are not proportional, i.e. $2|u| \leq |v|$.
If $|u| < |v_1|$, then $|u| + |v| < |v_1|^{p_1+1} + |v_2| \leq |v_1|^{p_1+p_2} + |v_2| = |w|$.
If $|u| \geq |v_1|$, since u^2 is a prefix of $v = v_1^{p_1} v_2$, then u^2 and $v_1^{p_1} v_2$ have a common factor of length $|u| + |v_1|$, and by Lemma 7, u and v_1 have the same primitive root, and so v_1 is the primitive root of v_1. Thus $u = v_1^t$ for some $t \geq 1$, $v = v_1^{p_1} v_2$, and $w = v_1^{p_1} v_2 v_1^{p_2}$.
If $t \leq p_2$, then $|u| + |v| \leq |w|$, but if $t > p_2$, then $|u| + |v| > |w|$.

The Conclusion section (page 21) should be replaced by:
We showed that the conclusion of the Crochemore and Rytter's lemma on three squares starting at the same position also holds under alternative conditions. The proof is based on a novel insight into the combinatorics of double squares.

The Acknowledgments (page 21) should be replaced by:
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