Corrigendum


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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 \(|u| + |v| \leq |w| \) unless \( u = v_1^t \), \( v = v_1^{t_1}v_2 \) and \( w = v_1^{t_1}v_2v_1^{t_2} \) where \( v_1 \) is primitive, \( v_2 \) a proper possibly empty prefix of \( v_1 \), \( t > p_2 \), and \( p_1 \geq p_2 \geq 1 \).

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 \(|u| + |v| \leq |w| \). Moreover, if \(|u| < |v| < 2|u| \) and either \( v \) or \( w \) is primitive, then \(|u| + |v| \leq |w| \).

Proof. Let us assume by contradiction that \(|u| + |v| > |w| \). Then by Lemma 3, \( u = v_1^t \), \( v = v_1^{t_1}v_2 \) and \( w = v_1^{t_1}v_2v_1^{t_2} \) for a primitive \( v_1 \), a proper possibly empty prefix \( v_2 \) of \( v_1 \), and \( t > p_2 \), \( p_1 \geq p_2 \geq 1 \). If \( u \) is primitive, \( t = 1 \) and so \( t > p_2 \geq 1 \) is a contradiction. If \(|v| < 2|u| \), then \( v_1^{p_1}v_2v_1 \) is a prefix of \( v_1^{t_1} \), 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 \( w = v_1^{t_1} \), and so \(|u| \geq |w| \), a contradiction. If \( w \) is primitive, then \( w = v_1 \), and so \(|w| = |v| \), a contradiction. \( \square \)

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

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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.

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