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Braids, free group automorphisms and orderings.

Emil Artin, who defined the braid groups B_n , showed that there is a faithful representation of B_n in the automorphism group $Aut(F_n)$ of a free group. It's well-known that that F_n can be ordered in such a way as to be invariant under multiplication on the right or left (known as a bi-ordering). In fact there are uncountably many such bi-orderings if $n > 1$. I'll discuss the question of which braids produce automorphisms of F_n which preserve such a bi-ordering. We make the key observation that a braid produces an auto which preserves a bi-ordering if and only if the "augmented closure" (consisting of the usual closure of the braid together with the braid axis) has a bi-orderable fundamental group of its complement.

One reason for interest in this is the theorem that a knot whose group is bi-orderable cannot produce a Heegaard-Floer L-space via surgery. However, the well-known Whitehead link has complement which fibres over the circle and we argue that its complement has bi-orderable group. On the other hand there exist surgeries on the Whitehead link which do produce L-spaces.

This is joint work with Eiko Kin of Osaka University.