1119-03-99 **Douglas Ulrich** (ds_ulrich@hotmail.com), **Richard Rast*** (richard.rast@gmail.com) and **Michael C Laskowski** (mcl@math.umd.edu). *Potential cardinality for countable first order theories.*

Understanding the countable model theory of a theory T has long been a topic of research. The number of countable models is a classical but very coarse invariant of T, and this was refined significantly by Friedman and Stanley with the notion of Borel reductions.

Given theories T_1 and T_2, it is often straightforward to show that T_1 is Borel reducible to T_2. However, there are few tools to show that no such Borel reduction exists. Most of the existing tools only work when the isomorphism relation of one or both is particularly simple, or at least Borel.

We define the notion of "potential cardinality" of T, denoted $\|T\|$, as the number of formally consistent, possibly uncountable Scott sentences which imply T. It turns out that if T_1 Borel reduces to T_2, then $\|T_1\| \leq \|T_2\|$. Additionally, it turns out that very frequently, $\|T\|$ can be computed and is not a proper class.

We use this idea to give a new class of examples of first-order theories whose isomorphism relations are neither Borel nor Borel complete. Along the way we answer an old question of Koerwien and a new question of Laskowski and Shelah. (Received February 10, 2016)