1009-20-126 **Ross Geoghegan*** (ross@math.binghamton.edu), Department of Mathematical Sciences, Binghamton University (SUNY), Binghamton, NY 13902-6000. *Associativity and Thompson's Group.*

Given a set S equipped with a binary operation (we call this a "bracket algebra") one may ask to what extent the binary operation satisfies some of the consequences of the associative law even when it is not actually associative? We define a subgroup $\text{Assoc}(S)$ of Thompson's Group F for each bracket algebra S, and we interpret the size of $\text{Assoc}(S)$ as determining the amount of associativity in S - the larger $\text{Assoc}(S)$ is, the more associativity holds in S. When S is actually associative, $\text{Assoc}(S) = F$; that is the trivial case. In general, it turns out that only certain subgroups of F can occur as $\text{Assoc}(S)$ for some S, and we describe those subgroups precisely. We apply this to familiar examples: Lie algebras with the Lie bracket as binary operation, groups with the commutator bracket as binary operation, the Cayley numbers with their usual multiplication, as well as some less familiar examples. In the case of a group G, with the commutator bracket as binary operation, it is better to think of the "virtual size of G", determined by all the groups $\text{Assoc}(H)$ such that H is a subgroup of finite index in G. This gives a new way of partitioning groups into "small", "intermediate" and "large". (This is joint work with Fernando Guzman.) (Received August 11, 2005)