Van den Bussche and Reynvoet (2007) argued that since significant priming was observed for novel primes from a large category, subliminal primes can be processed semantically. However, a possible confound in this study was the presence of non-semantic effects, such as orthographic overlap between primes and targets. Therefore, the first aim of the present study was to validate our previous claim when non-semantic influences are avoided. The second aim was to investigate the impact of non-semantic stimulus processing on priming effects by manipulating target set size. The results showed that when non-semantic effects are eliminated by presenting primes as pictures and targets as words, significant priming emerged for large stimulus categories and a large target set. This cannot be explained by non-semantic accounts of subliminal processing and shows that subliminal primes can be truly semantically processed. However, when using a limited amount of targets, stimulating non-semantic processing, priming disappeared. This indicates that the task context will determine whether stimuli will be processed semantically or non-semantically, which in turn can influence priming effects.