INTRODUCTION
Previous research has demonstrated that patients with damage to the basal ganglia (BG) are impaired at rule-based (RB) category learning while normal on an information integration approach (Ell, et al, 2006). While BG structures play a demonstrated role in RB category learning, the effective implementation of decision rules has also been shown to be critically dependent on regions of prefrontal cortex. The current study examined the role of prefrontal cortex in 2 types of category learning (RB and II) in 8 patients with damage primarily to medial prefrontal regions.

METHODOLOGY
Procedure - Eight patients with damage to frontal cortex and 7 matched controls (see Table 1) assigned lines of various orientations and lengths, presented on a computer screen, to one of 4 categories. The categorization utilized 2 different structures (see below, example stimuli in green) each tested separately in sessions at least 1 week apart. Subjects indicated their categorization by pressing 1 of 4 buttons.

Session 1 - 6 100-trial learning runs
- Feedback was given after each trial and at the end of each run
Session 2 - Same procedure as before but with the condition that had not previously been tested (At least 1 week later).

RESULTS

Rule Based Learning

Template displaying overlap of regions of damage in 6 of 8 patients. (Areas in blue include 2 patients and teal 3 or more)

Information Integration Learning

In contrast to the results from RB learning, 5 patients were clearly impaired at information integration learning, failing to reach comparable performance by the sixth learning run.

COMPLEXITY

1. In contrast to previous work in patients with damage to the basal ganglia, patients with damage to medial prefrontal cortex were able to achieve comparable learning, relative to matched controls, in a rule based category learning task.

2. Also in contrast to previous work (Ell, et al, 2006), frontal patients demonstrated clear impairment on category learning when the task required an information integration approach. This impairment seems primarily driven by a subset of patients who continue to use RB strategies throughout the task.

3. Frontal patients clearly impaired on the task had damage overlap in VMPC. The performance of the 3 that were unable to adopt an II strategy is consistent with an inability to disengage the most salient approach to a task even when this approach may lead to suboptimal performance (Damasio, 1991). Of the impaired patients who eventually adopt an II strategy, there appears to be better performance on the II task.

CONCLUSIONS


This work was supported by a career development award from NIMH – K23 MH64004 and by NIMH grant MH61781, both to Boston University.