

**A FORMAL AND NEUROSCIENTIFIC  
INVESTIGATION OF THE DISTINCTION  
BETWEEN NORMATIVELY CORRECT AND  
INCORRECT HUMAN REASONING**

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## ABSTRACT

Logic is the normative theory of reasoning. It prescribes the correct ways to reason, using various formalisms. There is evidence from the field of psychology of reasoning that humans reason in a manner inconsistent with logic. Such departures from context-independent normatively correct reasoning are explored in this thesis. These departures were once surprising but are now considered the norm in the domain of psychology of reasoning. The main goals of this research are three-fold.

- **G1: To systematically investigate the differences between context-independent normatively correct reasoning and context-dependent normatively incorrect reasoning.**
- **G2: To investigate the “suspicious” similarities between the various normative and psychological theories of reasoning.**
- **G3: To investigate and present evidence regarding this presumed difference between the two reasoning systems by using some techniques from neuroscience.**

The first objective of this research, G1, has to some degree, has been pursued, and partially reached by others. But the objective of this research is to extend the investigations so that a number of the many different schemes for normatively correct deductive reasoning are set out and examined. These schemes and the psychological theories are analyzed in detail. Reaching the first objective G1 makes aiming for the second objective G2 possible. Similarities between formal theories of reasoning and psychological theories can be suspicious if there is reason to think that the but instead simply put forth psychological theories that happen to match up with the formal material that they happen to know. For example, if a psychologist happens to be familiar with a formal theory  $T$  of deductive reasoning and not with a theory  $\mathcal{T}'$  of such reasoning, he or she might well propose a psychological theory of reasoning  $T_p$  reflective of  $T$  while the reading may be that one of  $\mathcal{T}'$  may be better.

This research program can be extended to different stimuli that have emerged

from the various psychological theories. A formal analysis of these stimuli can show other correspondences between the normative theory and the psychological theory. Other future implications of this work relate to how various psychological theories of reasoning naturally “fall out” of the logical formalisms with which they are most closely aligned.