

What Grad School is About

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Research

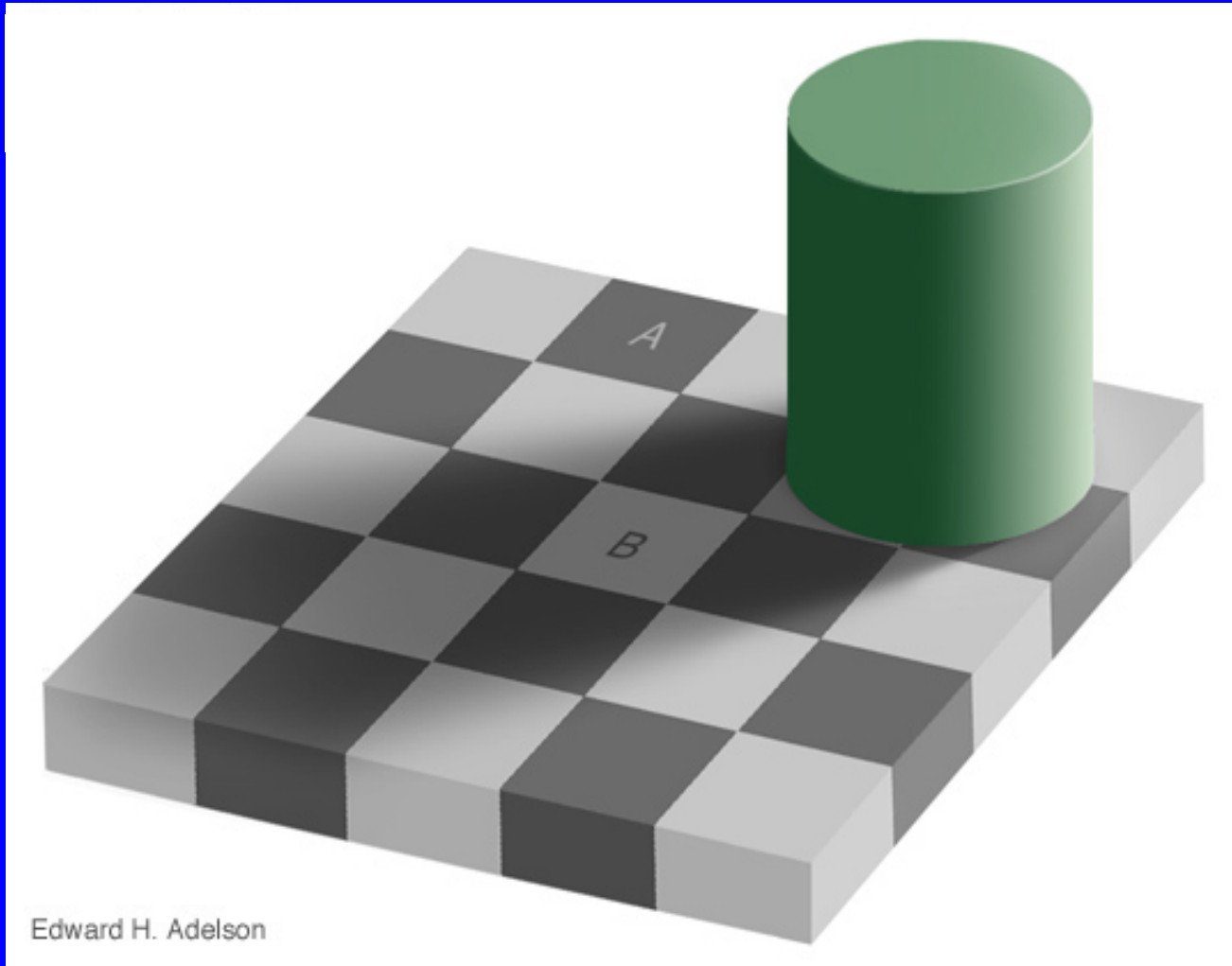
What Research is All About

- You spend a lot of time learning.
 - Reading papers, re-implementing algorithms, talking with other students, taking relevant classes.
- But your learning tends to be directed towards a more narrow goal.
- Doing something new
 - Try to solve difficult problems.
 - Often, the most important part is trying to figure out what problem to try to solve.
- Work as a community.
 - Learn from others, work with others, try to contribute something that others will be able to use.

Research

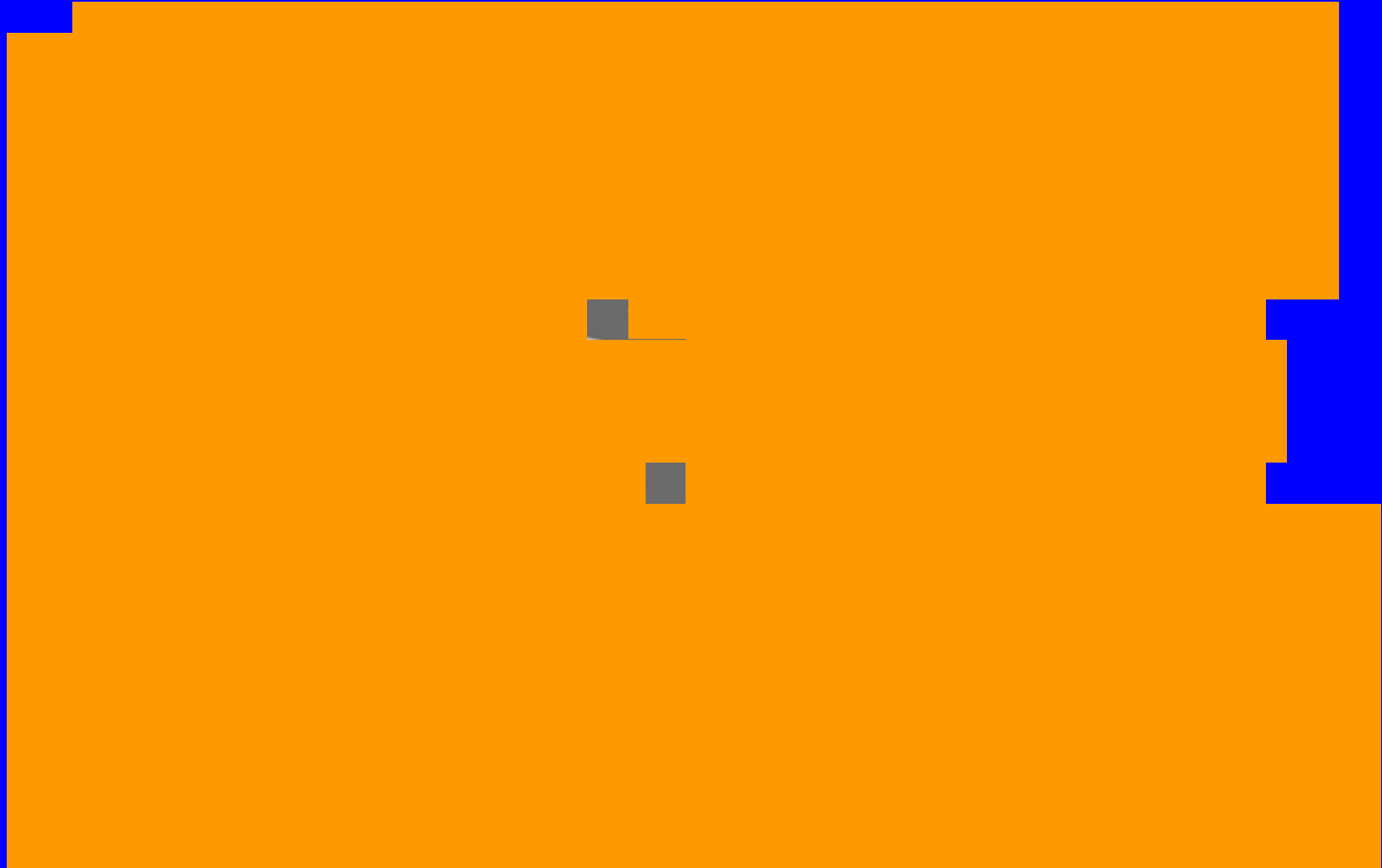
- Pro: You work on a problem no one has ever solved before. Fascinating and rewarding
- Con: You work on a problem no one has ever solved before. Frustrating
- Pro: Extremely flexible schedule. Freedom
- Con: Extremely flexible schedule. Must be disciplined.
- Pro: You get paid for this.
- Con: Pay is low.
- Pro: You are always learning. Work is very interesting.
- Con: You are always learning. Never an expert.

Vision is inferential: Light



(http://www-bcs.mit.edu/people/adelson/checkershadow_illusion.html)

Vision is inferential: Light



(http

delsc

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What is it like to do computer vision?

- A very diverse field
 - Important work comes from people belonging to many different fields: Computer Science; Electrical Engineering; pure math; applied math; physics; neuroscience; psychology.
- Common language is math
- Diversity of goals: building useful systems; understanding biological vision; fundamentals of vision; testbed for learning or optimization.
 - Diversity of tools: math; optimization; system building (including real time systems); AI; learning...

Modes of Operation: Possible steps in doing a vision thesis

- Starting points
 - A practical problem: activity recognition; leaf recognition; real-time tracking.
 - An unresolved issue in a fundamental problem: role of occlusions in stereo; effect of motion on pose and shading.
 - A technique: fast multipole methods; Kalman filtering; belief propagation.

- First steps:
 - Implement benchmark algorithms.
 - Find a simple, toy domain to solve mathematically
 - Look for flaws in current algorithms and try to improve them.
- Influential work:
 - Solve a fundamental math problem, especially one that gives rise to new algorithm.
 - Show importance of technique from other field.
 - Create a new problem.
 - Build impressive system that demonstrates new ideas or potential effectiveness of existing ones.

What makes a good vision researcher?

- Core competency in many areas: programming, math, knowledge of other fields.
- But can excel in many ways:
 - System building
 - Math/Algorithms
 - Vision and ... (graphics, hci, psychology, learning).