Human Computation and
The Wisdom of Crowds

Ed Lazowska
Bill & Melinda Gates Chair
Paul G. Allen School of Computer Science & Engineering
Luis von Ahn
Hours per year, world-wide, spent playing computer solitaire: 9 billion

Hours spent building the Panama Canal: 20 million – less than a day of solitaire!
The New York Times

Years 1851-1980 were fully digitized, start-to-finish, in 2009!
Crowdsourced scientific discovery

David Baker
UW Biochemistry
Zoran Popovic
Paul G. Allen School
**Profile**

**Name:** BootsMcGraw  
**Global Soloist Rank:** #6  
**Global Soloist Score:** 3784  
**Cases**

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**Location:** Dallas, Texas USA  
**Started Folding:** 12/08/08  
**About me:** An educated redneck here, from Dallas, Texas.

When I was in grad school in 1986 at the State University of New York at Buffalo, my master's thesis was to construct and present a computer program that predicted the secondary structures (helix, sheet, loop) of proteins based on their amino acid sequences. Tertiary structure (i.e., folding) prediction was a pipe-in-the-sky fantasy.

Imagine my delight, a quarter century later, to find out that not only are people determining tertiary structures of proteins, but they've made a "game" of it.

**Hobbies:** Licensed Massage Therapist, also a photographer, videographer, and webmaster. I have studied health and nutrition for over twenty years. Ask me my opinions about the subject.

**Groups:** Contenders
Public Solves Protein Structure

Players of an online game that allows users to adjust how proteins are folded have solved a decade-long protein structure mystery.

By Jef Akst | September 18, 2011

A small group of diverse individuals living on at least three continents, who call themselves The Contenders, have solved the structure of a protein that has stumped scientists for more than 10 years. And they did so from the comfort of their own homes, playing on online protein folding game called Foldit.
Crowdsourced national security
40th Anniversary of the Internet

Waterfront Park
Portland, OR

Union Square
San Francisco, CA

Chase Palm Park
Santa Barbara, CA

Chaparral Park
Scottsdale, AZ

Lee Park
Memphis, TN

Centennial Park
Atlanta, GA

Glasgow Park
Christiana, DE

Tonsler Park
Charlottesville, VA

Katy Park
Katy, TX

Collins Avenue
Miami, FL

4367 registrants
39 countries
922 submissions
370 correct locations

29 Oct – Announced
5 Dec – Balloons Up

$40k Prize

[Peter Lee, DARPA]
Games for learning

Refraction: Teaching Fractions through Gameplay

Abstract

Refraction is a new puzzle game for teaching fractions. The game is not obviously a lesson in fractions, but requires knowledge of fractions to succeed. We built this game in cooperation with experts in learning, early mathematics, virtual manipulatives, and game design. In Refraction, the player must partition lasers in order to power spaceships containing various animals who have gotten stuck in space, as shown in Figure 1. These animal spaceships all require different fractions of the lasers, and the player is given several pieces that split and bend the lasers to reach the animals and satisfy these requirements. These mechanics can be used teach many important fraction concepts, such as equal partitioning, addition, multiplication, mixed numbers, improper fractions, and common denominators. The game itself is instrumented so that it records everything the player does, allowing teachers and researchers to analyze play data.
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