

Innovating Knowledge Production with Knowledge Games

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Can games teach us – not only skills,
concepts, topics we already know?

Can games also help reveal the
unknown?

Can games produce brand new
knowledge?

This is already has been happening for
100s of years with **citizen science**.



GET THE APP  

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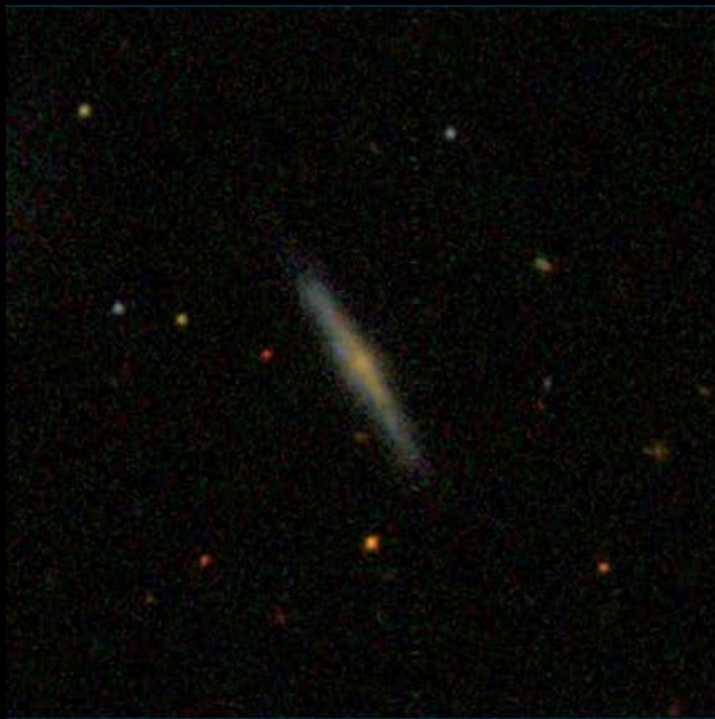
TOGETHER, WE CAN HELP HUMMINGBIRDS

Join us as a citizen scientist to help learn more about hummingbirds and how to protect them.

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Classify



SDSS



Invert

Help

Restart

SHAPE

Is the galaxy simply smooth and rounded, with no sign of a disk?



Smooth



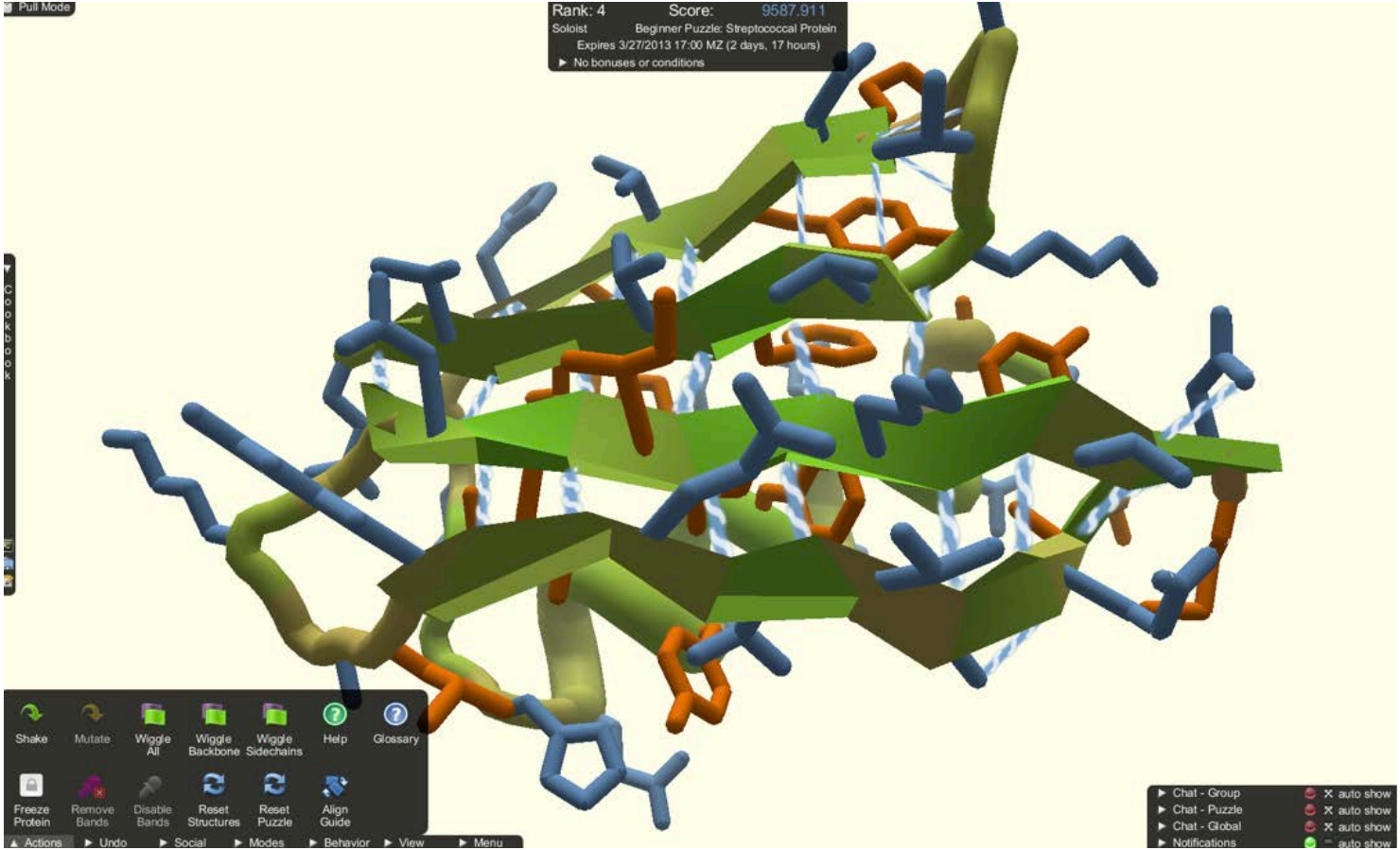
Features or disk



Star or artifact

Now we have “**citizen science**” games.

I call these games **Knowledge Games**,
because they help build knowledge.



Seth Cooper, Firas Khatib, Adrien Treuille, Janos Barbero, Jeehyung Lee, Michael Beenen, Andrew Leaver-Fay, David Baker, Zoran Popović & Foldit players (2010) “Predicting protein structures with a multiplayer online game,” *Nature* 466, 756–760.



Moths!

Setup!

Get Started!

Drag bad photos to the choices below to swap them.
When all the photos look good, click "play" to start!



Not a Moth



Drag a photo to this space if it is not a picture of a Moth.

Trash



Drag a photo to this space if it is too light, too dark, or too blurry to use.

Play

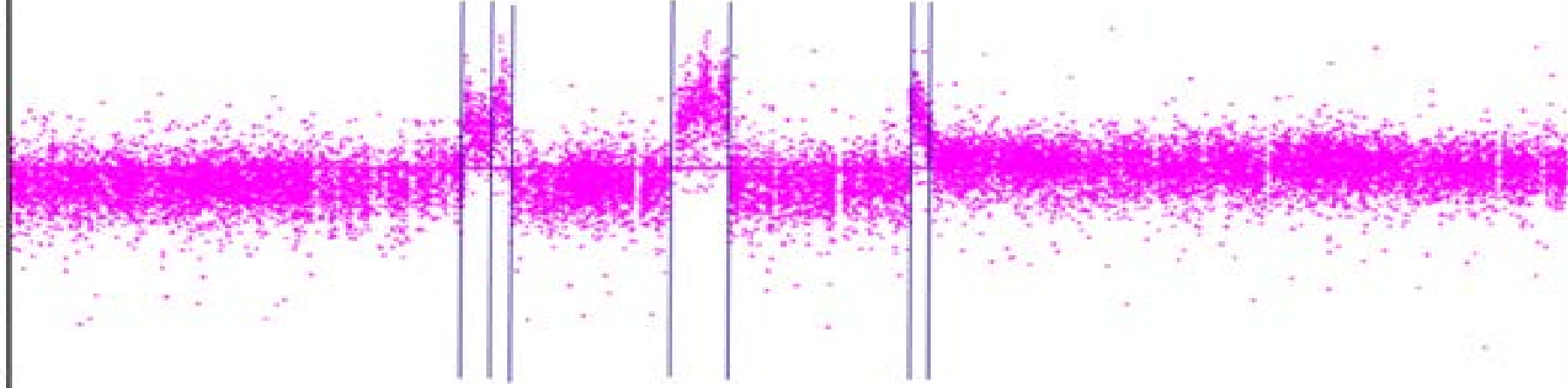


[Instructions](#) | [About](#) | [Credits](#) | [Go Back to Citizen Sort](#)

Greg Newman, Andrea Wiggins, Alycia Crall, Eric Graham, Sarah Newman, and Kevin Crowston (2012). The future of citizen science: emerging technologies and shifting paradigms. *Frontiers in Ecology and the Environment* **10**: 298–304.



-8 -2 0 2 8



PLAY TO CURE™ GENES IN SPACE

IN ONE MONTH
'CITIZEN SCIENTISTS'
HAVE ANALYSED
AROUND

40

MILES OF
DNA DATA



THIS IS THE LENGTH OF

540

FOOTBALL PITCHES

AND AROUND **170** TIMES THE HEIGHT OF THE
EMPIRE STATE BUILDING

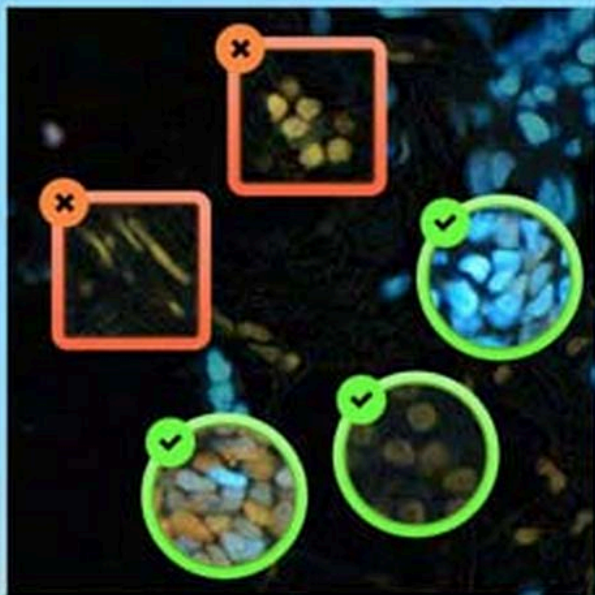


DATA ANALYSED WOULD
HAVE TAKEN A
SCIENTIST APPROXIMATELY
6 MONTHS
TO ANALYSE THAT AMOUNT BY EYE



**HELP BEAT CANCER SOONER
IN THIS GREAT NEW MOBILE GAME!**





The shapes we're looking for are uneven and sometimes speckled, like the ones highlighted in the circles. You can ignore the round or stretched shapes that we've highlighted in red squares. We're not looking for these.



Could we also solve complex social or humanistic problems by enlisting citizen **social scientist or humanist** gamers, too?





Landwehr, P., Spraragen, M., Ranganathan, B., Carley, K., M., and Zyda, M. (2012). "Games, Social Simulations and Data—Integration for Policy Decisions: The SUDAN Game" *Simulation and Gaming*.



Schrier, K. (2012). "Avatar Gender and Ethical Thinking in *Fable III*." *Bulletin of Science, Technology, and Society*.

Copyright:
Microsoft/Lionhead Studios

So, **Knowledge Games**—it seems like a no-brainer, right?

Games are **highly motivating** systems

Why not analyze people data **dynamically**
within a **system**?

Why not analyze people and social issues with
the benefit of **collective collaboration** and
problem solving?

*

1. What about issues such as **privacy** and **security** of data? How can we ensure that people's actions, behavior or attitudes in a game not get used against them?

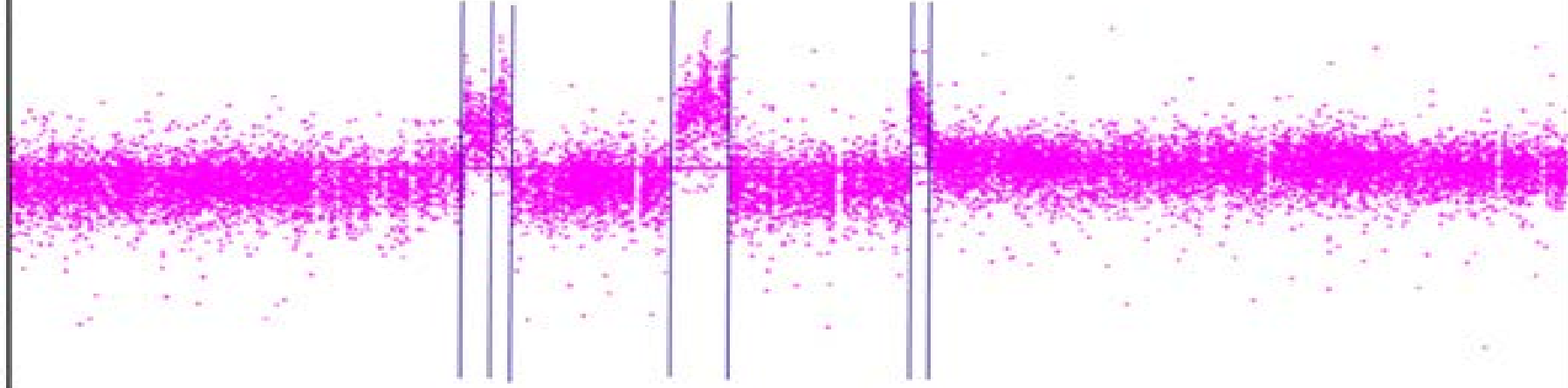
2. What about issues of **data validity** and **accuracy**. How can we ensure that we are getting accurate results in a game, versus a real life or other authentic situation? Are these results externally valid?

3. How do we get participants? How do we **recruit** and maintain a **representative** and appropriate **sample**?

4. Which **biases** are inadvertently added when research questions are tested through a game?

5. What happens when we take data (such as breast cancer data) and convert it to something “fun” like space travel? Is there something inappropriate about **obscuring the origin of the data, research question or social problem** in a game?

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6. What are the **public perceptions** of scientific versus social scientific research and how might this affect how playing Knowledge Games might be perceived?

7. **Is this really that new?** Haven't citizen scientists been contributing for 100s of years— couldn't the same be true of citizen “social” scientists?

8. Are the gamers playing these “citizen” games really contributing knowledge, or are they just day “playbourers” – menial laborers who are contributing data collection or basic analysis, but with no actual interpretation or knowledge production?

9. On the other hand, if we *are* creating and innovating knowledge through games, can we still call them games? If games are about stepping **outside of “work” and “seriousness”** —do they stop being games if they are truly contributing knowledge?

What are some initial guidelines?

Principle 1: Use rigorous research methodologies and protocols, including IRB approval. For example, ensure that data collected is not personally identifiable.

Principle 2: Explain, clearly, why and for what purposes all of the findings or data collected will be used. Be as transparent as possible about the use of your game, and any implications or consequences.

Principle 3: Use authentic tasks, activities, scenarios and environments in the games. The more realistic, the easier to make insights into the “real world.”

Principle 4: Be continually mindful of the limits and benefits of your chosen methodology, such as the use of quantitative vs. qualitative lenses.
Consider the limits of “big data.”

Principle 5: Let your players push, break and manipulate the game's systems. Sometimes you learn from how players break rules rather than how they follow them. Consider how the game's rules and conventions may affect your results.

Principle 6: If it is appropriate and not personally identifiable, open up and share any data. At the very least, share and make transparent any game design and methodology decisions and reflect on how it may bias your results.

Principle 7: Find ways to publicize the playing of the game (to recruit participants), but also the results and their implications. *Fold It's* published results went a long way in legitimizing “citizen science” type games (and games in general). However, we do not need Knowledge Games to legitimize games.

Principle 8: Social data may change positions over time. Find ways to capture (and recapture) this. Understand the benefits and limits of using a dynamic system, such as a game, to better understand the dynamism in social, technical, scientific, and humanistic systems.

Let's find ways to make and research
Knowledge Games together!

Thank you.

Find out more at:

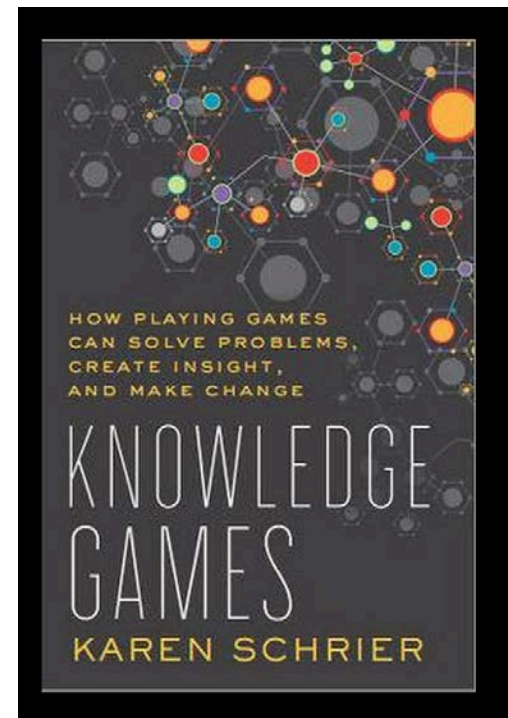
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Knowledge Games:
How Playing Games Can Help Solve Problems, Create Insight, and Make Change
(Coming out in May 2016, Johns Hopkins University Press)