Phylo: Crowdsourced Biodiversity & Science Trading Card Game

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Phylo (http://Phylogame.org) is an exercise in crowd sourcing, open access, and open game development to create a trading card game (TCG) that makes use of the wonderful, complex, and inspiring things that inform the notion of biodiversity. Beginning as a reaction to the following nugget of information, “Kids know more about Pokémon creatures than they do about real creatures,” this project has grown to broach elements of game based science education, ecological literacy, and hackathon mechanics within the teaching community. Given its flexible and open workflow, *Phylo* has benefited from the input of many communities of expertise, and many collaborations (both formal and spontaneous) leading to a continually expanding resource that is under constant reiteration.

Seed

Tell us about your idea or project. What’s your vision?

Phylo an online initiative aimed at creating a Pokémon card type resource but with content focusing on real creatures on display in full artistic wonder. In particular, the primary conceit is to see what can be produced if we essentially allow the project to evolve through reiterative crowdsourcing contributions. This includes obvious groups of expertise such as having: (a) the scientific community weigh in on the scientific accuracy of such cards; (b) members of the artist/graphic design community to develop and contribute towards aesthetic considerations; and (c) individuals from the gaming community who can participate in the design of interesting game mechanics, as well as offer both play-testing opinions. Furthermore, as in any other crowdsourcing project, whereby reasonable autonomy is given to the community, we would expect other pockets of expertise to contribute as content is created. This would hopefully include members of the teacher community who will participate to see whether these cards have educational merit, as well as other unforeseen groups of expertise that may appear during various stages of reiteration (i.e. intellectual property law, museum culture, etc - see below). As outlined in the opening text of the project’s website, the hope is that this will all occur in a non-commercial-open-access-open-source-because-basically-this-is-good-for-you-your-children-and-your-planet sort of way.

The idea was primarily inspired by a letter published in *Science* and written by conservationist Andrew Balmford (et al., 2002). Here, Andrew shared his eye opening study that showed that children as young as eight had the remarkable ability to identify and characterize upwards of 120 different Pokémon characters. However, when the same rubric was applied using photos of “real” flora and fauna (animals and plants that lived in the children’s back yards) the results were comparatively poor.

In effect, Andrew asked the conservation community the following: Can we learn engagement strategies from Pokémon, and use those insights to create the same type of enthusiasm for biodiversity and ecology content? With this seed of an idea, my lab then queried whether the notions of crowdsourcing and open access could work towards Andrew’s suggestion. And with his blessing, we have been pursuing this idea since 2010, optimistic that the Internet, its social networking ability, and its often wonderfully active and engaged denizens will deliver something amazing.

What problem are you trying to solve and why does it matter?

In a way, due to the overarching game development model being defined by the act of crowdsourcing, the specific problems being broached are fluid if not undefined. At its core, it is visualized that different communities or deck hosts will attempt to create their own cards/decks in response to a specific problem that is dependent on the localized contexts and desires. However, a few obvious goals can be suggested:

1. That the *Phylo* project is used as a tool to increase student's ecological literacy, especially in this day of nature deficit tendencies. This is arguably one of the heart and soul agendas of the project, especially given the disconnect between Pokémon and "real life" organism cognition. Around this core goal is the realization of a viable TCG culture, where high quality cards can be collected and traded, if not purchased in similar ways to other well known TCGs.

2. That the *Phylo* project is used as a classroom resource for student content creation (particularly around science concepts such as organism identification and knowledge acquisition). In effect, taking common learning objectives met by common activities like poster or diorama generation, and using that same media to create a deck of cards.

3. That the *Phylo* project is used as a classroom resource for student content creation, providing a launching point for DIY game development, and in turn creating opportunities for deeper learning. In other words, classroom decks could be created in house, but with the added objective of turning the deck into a playable game, where mechanics attempt to emulate specific science/biodiversity/environmental concepts.

What challenges might pop up?

A number of foreseen challenges will likely arise. These include the following:

- That the project is reliant on crowdsourcing contributions. This is entirely unpredictable both in terms of quantity of contributions as well as the quality of contributions.
- That due to the unpredictable nature of crowdsourced game development, the project could easily lose focus and direction. As well, progress may be inadvertently defined by popularity of the contributor as oppose to the merits of the contribution.
- That the project requires expertise from various and diverse communities, many of which are not often familiar with interdisciplinary collaborations. As a result, the project needs to ensure that civility is maintained in all interactions.
- That the project aims to adhere to open philosophies, whilst also being respectful of the professional (and often compensatory) nature of contributions being provided. Here, notions of ownership must also be considered in a manner that is fair and yet still provides free access to the educational community at large.
- That concerning the key goal of enhancing ecological literacy in children, it is understood that research rigorously measuring this feature is academically recognized to be very challenging.

Sprout

As a crowdsourced project, by default, *Phylo* is continually evolving. That being said, this article will briefly describe the three phases in the project's evolution that together constitute a makeshift "origin story." For additional details on these three phases, please visit http://Phylogame.org/about

The first phase was a very fast paced stage which involved quick reiteration and large numbers of contributions that all occurred in the first two years (but especially in the first 8 or so months). This essentially resulted in the creation of a card databank, a workable production process, as well as a playable game (that focused on ecosystem building concepts).

The second stage formally entertained the idea of creating high quality purchasable decks. Here, cards produced were less about crowdsourcing, as the bulk of the development work was done in the first phase. Instead, this stage was more about following existing deck production templates, while navigating the nuances involved in decks having the option of revenue generation.

The third stage is quite recent, and largely concerns itself with two main streams of activity. One, where the functionality of the website is enhanced to allow for easier DIY classroom deck generation (by teachers and their students for instance), as well as development of other game mechanics that focus on "process of science" concepts.

Below are some key dates for the first phase. The other two phases are detailed in the "Bloom" section.

January 11, 2010: Here, the "*Phylo*mon" project began in earnest. This date was primarily chosen because 2010 happened to be the United Nations *International Year of Biodiversity*. Interestingly, it was also decided that my lab (http://bioteach.ubc.ca) would do a "soft" launch – January 11th to be exact and at two places on the web–the *Science Creative Quarterly* (http://scq.ubc.ca) and *The World's Fair* (no longer active). These are both websites that my lab were affiliated with, and at the time both also attracted considerable web traffic–note that the seed item was authored as a pseudo press release with the lab's institutional letterhead included for formality.

Almost immediately, a number of blogs picked up on the story. And some, being quite high profile catalyzed a number of graphic artists signing up, as well as a number of art submissions. In fact, within the first two weeks, we received many media impressions, including several from high profile websites (*Pharyngula, Metafilter, Kottke, MAKE, Brain Pickings, Reddit*). Interestingly, from the comments left on these various places, it became clear that gamers wanted a place to hold discussions.

January 29th, 2010: At this time, given the feedback, a free forum was set up, where folks could converge and discuss all things *Phylomon*. This proved to be an excellent move in that very quickly a community was established. In fact, within a week, there was already much discussion and debate about the artwork, about the logo, about the game itself, and indeed by that first week, we even had some folks go to the trouble of putting up great ideas and some very detailed game rules.

One of the more interesting discussions that came from the forums was the issue of copyright, given that *Phylo*-mon was premised on being open access throughout. This initially began with a thread comment where a patent held by Wizards of the Coast (a holding of Hasbro, and owners of Pokémon and Magic TCGs) was shared. This was useful because it provided some information on game mechanics to be avoided. It also brought up the issue of trademark infringement – specifically, the nuance where our project was called *Phylo*"mon" which in court could be argued to benefit from implied recognition of the Pokémon brand.

February 25th, 2010: Around this time, the project received a request for an interview from *WIRED* magazine (the UK version). More importantly, this forced a deadline for producing a reasonable graphic of what the cards might look like. As a result, the forum comments were examined for all feedback on card content, and decisions were made on what metadata and general layout would be presented. Overall, the cards were envisioned as general content holders (kind of like flash cards), which allowed flexibility of game mechanic design.

March to April, 2010: At this point, the UBC's Office of Learning Technology (and specifically Enej Bajgoric) volunteered to create an open access Wordpress template that essentially would allow easy and dynamic creation of blog posts that essentially looked like cards. In other words, we had ourselves a worthy beta website that doubled as a trading card generation portal. This was officially launched on April 7 and you can check out the website at http://Phylogame.org. This has more or less looked the same since its inception (Figure 1), although extra pieces of functionality have since been added as described in Phase Two and Three in the Bloom section.

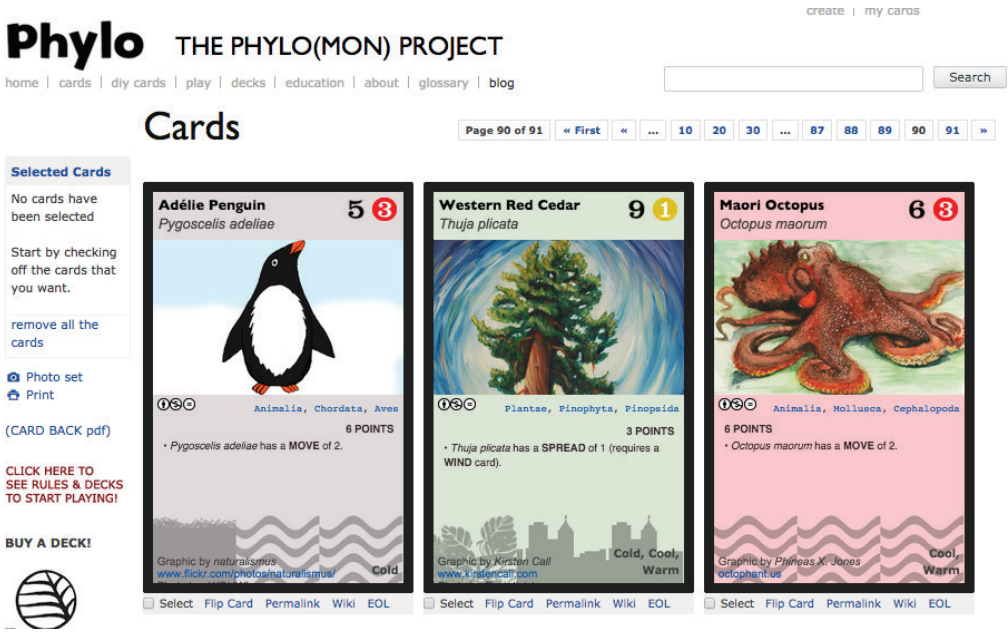

Figure 1.

Around this time, the aesthetics of the artwork was also more formally broached. This led to interesting discussions over the scientific literacy nature of the images used. Essentially, there was a debate over how realistic the images "should" be, versus how cartoony they "could" be. This discussion was actually quite heated, but fortunately my lab was hosting a high school student science conference (http://www.bioteach.ubc.ca/highschool-conference-2010/) where we took it upon ourselves to ask the students themselves what they thought about this. In the end, responses were varied with diverse preferences delineated. However, the central thing agreed upon by the 100 or so students who filled out the questionnaire was that diverse art was fine, as long as it was "good." This largely settled the debate nicely, and strategically turned out to be useful because it diversified the type of art we could use. As well, this move introduced concepts around custom decks (i.e. if you prefer cartoony images, you could make your custom deck with just the cards with cartoony images).

April 22, 2010: This dates marks the release of Version 1.1 of the Ecosystem Building game mechanic, as primarily developed by three members of the crowdsourcing game community (Fenrislorsrai, ColinD and Naturalismus). Full details can be found at this link (http://Phylogame.org/ecosystem-building-game/). Note that each reiteration carefully tracks previous editions.

Upon release of these rules, feedback was immediate. Interestingly, from "geek" culture types, the feedback was overwhelmingly positive, whereas from "gaming" culture types, the feedback was overwhelmingly thoughtful, but generally negative and critical of the whole premise and game mechanic (a great example of this can be seen at this link - http://havocjack.blogspot.ca/2010/04/Phylomon-and-fanatics.html). Note that at this point, the game play is still tough to test properly as rules are still largely amorphous and card sets not yet determined.

May to August, 2010: Versions 1.2 to 1.4a of the game rules were released over this timeframe, as well as prototype starter decks. With the version 1.4a in place, the basic elements (cards, rules, and point of access) were available, and the *Phylo* project more or less hummed along independently for about six months. By March 2011, there were approximately 200 cards available on the site, as well as creation of a few starter decks.

January 27, 2011: The first official collaborative deck was released at this time. This one was a result of my sabbatical at London's Natural History Museum, although this deck was largely designed as a scavenger hunt deck (i.e. look for the corresponding organisms in the museums vast exhibits). Details can be found at http://Phylogame.org/cards/london-nhm-deck/.

By now (a year into the project), traffic to the website had decreased overall but stabilized at about 1000 visitors (individual IPs) per day. Activity in the forums also dropped considerably, which was understandable given that the bulk of the development work was perceived to have been finished. However, one point of discussion became a recurring theme: that is, how would one be able to "purchase" cards, and not rely on home printing, given that the quality of the cards would only be as good as the printer used.

This set up an interesting stream of discussion that led to the following ideas:

1. That we open the *Phylo* game to "hosts" who are interested in offering custom host decks. These hosts, for instance, could be organizations such as museums, or environmental non-profits.

2. The project would crowdsource details on a possible mechanism that would allow these hosts to "sell" their cards, possibly even to gain revenue, but that efforts would also be made to ensure that the cards (or a version of the cards) are still available for free on the web. Along the same lines, measures would be put in place to protect the open nature of the game itself, although individual cards could be placed under host/artist copyright.

3. That with the purchasing option in the mix, then efforts would be made to provide reasonable compensation for the artists involved. In effect, this was an attempt to properly reward the gracious contributions by the project's art community, who arguably represent the most significant crowdsourced contribution in the project (in terms of hours per card provided for instance).

With this matrix in place, the next step was to find a suitable pilot host who could help us produce the "first" high quality purchasable deck (hereafter abbreviated HQ deck). To aid in this, my lab begins to offer "art commission" grants, on the basis of providing $5000 towards payment of art (this at $200 per image, 25 images total), whereupon we find our first candidate–an on campus natural history museum (the Beaty Biodiversity Museum).

May to June 2011: At this time, the website undergoes some tinkering related to general updates required for security (as advised by Wordpress), as well as the addition of a new functionality. This specifically was a section devoted to DIY card production which was designed as a way for classrooms and their teachers to create and store their own cards on the website without these DIY cards mixing in with the curated main *Phylo* cards. With this in place, my lab worked with a number of elementary school classrooms to help them produce their own "classroom" decks. Examples can be seen at http://Phylogame.org/make/ (section 4). This proved to be a huge hit, but was very labour intensive for the teacher.

December 12, 2011: Version 2 of the game rules are released at http://*Phylo*game.org/ecosystem-game-basic-rules-version-2-0/. This constitutes an end to Phase One.

Bloom

As of May 2012, HQ decks began appearing in earnest, with the first two being the aforementioned Beaty Biodiversity Museum Deck and a coral themed World Science Festival Deck. Initially, this was quite slow, as it generally required my lab's assistance (both in terms of consultation and/or in terms of the art commission grant). As well, art commissions from these HQ decks tended to provide most of the new free online content, as oppose to general art donations which represented a marked difference from how the card database expanded during the first 2 years of the project. As these decks began appearing, this activity constituted the second phase of the project.

Overall, the second phase resulted in the publication of a good mix of different decks (and expansion packs), which operated under various different logistical circumstances. For a list of current and in progress decks, please visit the deck section of the *Phylo* website (http://Phylogame.org/decks/). Altogether, this provided good proof of concept experiences to produce a deck-making template.

This template is represented by a number of documents that include information on both design and assignment of specific cards, as well as overall logistics in production and distribution. For instance, it was determined that for small-scale hosts, using real-time publishing print shops was a good solution (our most used vendor is the U.S. based Game Crafter–http://thegamecrafter). If the host was more amenable to independent distribution means (i.e. they have their own shop or online shop), then they tended to go through a conventional printer, as this was usually much cheaper. This template also provided copies of documents that represented good working examples of appropriate art related contracts.

Recently, the crowdsourced nature of the project has led to two significant developments. This I consider the latest phase in the project: Phase Three.

First, the project was courted by the Genetics Society of America (http://*Phylo*game.org/heads-up-new-deck-being-worked-on-for-genetics-society-of-america/) to create a custom deck for their upcoming 2016 conferences. This organization provided funding to produce a deck that focused on genetic model organisms. However, as the list of model organisms does not naturally lend themselves to ecosystem building, a new game mechanic was required to be designed by a team of undergraduate and graduate students.

This game mechanic, in effect, focuses on “process of science” concepts. The beta version of this game was completed in October 2014, and has been play tested to great feedback. At this stage, the *Phylo* site has released this game as a public beta to work out final kinks and the stage is set to begin art commissions in the fall of 2015, with a mind to have the deck ready by early 2016. Because this new game mechanic tested so positively, another deck has been initiated (with funding from the WWEST NSERC. This deck will focus on Women in Science and Engineering (WISE) issues.

Overall, these developments are exciting because they promote the idea that this project could adopt alternate rule sets depending on the learning outcomes desired. For the first three years, the gaming community strongly focused on one rule set, making it work well, but to the detriment of other possible game mechanic ideas. The new GSA and WISE card decks will hopefully enable community participants to think more about designing other ways to use the cards.

Second, due to the great feedback we obtained with our pilot DIY classroom decks, it was clear that the website had to be revamped so that DIY card production was made as simple as possible. Up until this point in time, classroom decks were essentially prepared by the teachers involved. In other words, whilst, students created the media, it was still left to the teacher to assemble the media as a card. Even though the website made this relatively easy (about five to 10 minutes per card), the amount of time required really stacks up when a teacher needs to worry about content from a classroom of students. Therefore, a move was made to make DIY card generation as simple as possible so that a young child could navigate their way through this process.

This new functionality of the website was launched in February 2015, allowing a teacher to have an account that enables administrative control over cards that his/her student creates. So far, a few teacher/student accounts have been provided, as we are slowly beta testing this new feature. It will be interesting to see how the kinks are worked out over the months, as well as hearing back from these teachers as they develop logistics and lesson plans around the resource.

Looking forward, what kind of impact do you think your work will have? How might it continue to evolve?

At this point in time, I believe the project is in a very interesting place. We will soon be releasing a DIY DECK kit, which will hopefully enable more spontaneous production of HQ decks. With this in place, as well as uptake from teachers wanting to use this as a resource, I do think the project is set to continue to do well and expand considerably.

That being said, there are three elements that would be great to see happen:

First, whilst the deliverables of the project have gone beyond my wildest expectations, it would be wonderful to start seeing some research around the project. This could in terms of formal assessment of its utility as a learning tool, in gauging its role as a proponent of ecological literacy, or even in its use as mode to study student game development. None of this has really happened to date, but the project is entirely open to such opportunities. My lab is even keen to co-write proposals should any strategic grant opportunities exist.

Second, currently the *Phylo* project is more or less a physical game entity, as opposed to a digital game. In a way, this presents itself with a number of advantages (e.g., teachers appear to be more comfortable in creating a physical game, and the students do seem to get a real kick out of the physical tactile nature of the cards they buy, make). That being said, it might be interesting to see whether the project can also exist in a digital format. This obviously requires some major input (especially when viewed through crowdsourcing lenses), but it would still be interesting to see what this might look like. Note, that there have been a few small attempts at this: the primary problem is that the game requires a large tableau space when played, which isn’t well suited for the limited screen real estate of most mobile devices.

Third, at a certain point, I worry that the project might get too “successful” and therefore becomes difficult to moderate or manage. As such, I’ve always thought that the ideal circumstance would be for the project to eventually evolve into a non-profit, where some revenue could be collected from sale of cards to provide salaries to the staff that look after and guide the project.

Quick Links to Explore

Main Website – http://Phylogame.org

Card Archive – http://Phylogame.org/cards

Information on making cards and decks - http://Phylogame.org/make/

List of currently available and in progress decks - http://Phylogame.org/decks/

References

Balmford, A., Clegg, L., Coulson, T., & Taylor, J. (2002). Why conservationists should heed Pokémon. Science, 295(5564), 2367-2367.