Prototyping a New Economy

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Abstract: It is conceivable that capitalism and the new market economy as it currently operates is unsustainable despite the bullish opinions of businessmen and entrepreneurs. There are many obvious concerns surrounding an economy without money the most basic of which is the accounting of productivity. However, if we are seriously engaged in this thought experiment, we must also consider two operations of the current system that seem to be most detrimental to societal and more recently, political constructs which are the accumulation, and transfer of money. Moderate restrictions have been placed on both operations but considering the involvement of business in government countless examples evidence the lack of enthusiasm to restrict them further. If we consider life without money, we need to substitute some values that would take the place of cash in order to reshape societal values by placing an importance on things that have greater return than the construct of money can provide. In this study we developed a series of prototypes to learn how a game might be designed in order to emulate a new economic system using time and choice as important values. This study extends students’ understanding of the prototyping process through participation in both development and usability. The students who have a basic understanding of economics provide the feedback loop in order to establish rules, playability, and begin to understand how the game can be rigged in their favour.

Keywords: prototyping; game design; capitalism; human behaviour

1 Introduction

Project problems for design students often have parameters that are well defined. Professors or the problems themselves impose constraints that determine the scope of the project within the skills and cognitive capabilities of the student. In this paper, we describe a project and process that goes beyond most any design students’ capability in part to push students to ask the question “what if?”. We asked them to consider an economy that moves away from using money. The problem requires them to shift their thoughts from commodities and services to concepts like
incentives, and what new set of values could bring to bear for a new economy. Incentives and values brought conceptual similarities from the game design space, which opened up the possibility for prototyping an economic simulation. We imagined a game environment where time and choice are the highest valued possessions of a player. In this game, a player suspends disbelief and sets aside the concept of money in lieu of activities that provide more free time and choice to motivate players to participate and actively play the game. The goal of this study was to demonstrate an economy that holds the benefits of money, such as incentive, without the downside of money - the power to corrupt. The study also allowed for distortions and deviations from social norms in order to benefit one’s self and to see how self-governing in a game environment would call out those deviations when using the prototypes. Preliminary discussions with students informed us of the ingrained power of money, how we limit our imagination when dealing with problem complexity. The students could hardly fathom any other form of economy.

2 Background

Typical collaborative design processes use prototypes as a tool for development and communication to create a space to exchange ideas. Multiple stakeholders collaborate when prototyping such as designers, users, consultants, for example in a variety of capacities. Role organization is an important part of collaborative design to differentiate communication around the object such as inputs and outputs, or criticism and evaluation. Supporting communications using what has been defined as boundary objects should happen at different levels of discussion between individuals or groups in reference to the project (Chiu, 2002). A boundary between users and designers helps transform knowledge in a manageable and organized way limiting scattered conversation because of their focused attention on the object (Bogres, 2014). Prototypes help users to discover their needs and add or change some attributes to the characteristic of the new product through objects (Terwiesch & Loch, 2004) that are seen as tangible or unfinished. The role of the designer in collaborative design changes focus from user centred to co-designing (Sanders, 2008) where users are active participants.

2.1 The Purpose of Prototyping

Prototyping has more recently become a central element in corporate innovation processes (Leonard & Rayport, 1997; Mascitelli, 2000; Schrage, 2000). Creating early versions of the design have an effect at all stages of the process from definition of the problem, to problem solving, and through manufacturing after customers provide feedback in order to improve the design, prototypes [should] always improve, until the last prototype, (Bogers, 2014). Refining products for manufacturing is not the only purpose of prototyping. Designs that modify behaviour by forming a relationship between designed objects and their user is also an important aspect. The process for creating prototypes and collecting user feedback requires the designer to understand the nuance of the user’s environment. Looking at the process of co-design where users transform into designer limits the input from those roles to concepts and functionality of the object. These roles fluctuate between the emphasis of designer and user (Fischer, 2002) however, they often favour the expertise of the participant. In the area of co-design little has been written about the roles of participants when user and designer are one in the same that requires any transformation is required.

Coughlan offers three objectives related to the purpose of prototyping; “building to think, learning faster by failing early, and giving permission to explore new behaviour” (Coughlan, 2007, p. 122). Prototypes also help researchers and designers empathize and communicate with people they hope to serve. (Scaletsky & Ruecker, 2014). In a similar way Scaletsky and Ruecker argue prototypes generate, communicate, test ideas and even build theory about ideas within three categories; developmental, experimental and provocative prototypes. To rephrase these purposes in terms of thinking, learning, and exploring we can identify the breadth of their function. To what degree then do we understand the reactions users provide or the depth they feel about the prototype?

2.2 Collaboration in Design Education through Prototyping

Teaching students to solve complex problems is one of the responsibilities of design education. Quick prototyping helps to build and test the initial ideas (Snyder, 2003) and break the complex problems to smaller ones. One of the features of collaboration in design education is prototyping. Exchanging information and communication through prototype helps to change design pedagogy. Collaboration between students and teachers in problem solving improves critical thinking and understand design process. Each individual participant shares the information and ideas to solve the problem (Chiu, 2002). Prototyping is a tool for communication between students and teachers to learn the process and express their ideas. Through collaboration both student and teacher build the prototype, then test it, changing the structure, function and material. If any of the prototypes fail make new ones and test them again until they fit the characteristic of the potential solution. This method is an Interactive iterative method with the possibility of quick fails and emerged the ideas by building and failing quickly.
Donald Schön in 1987 said, the main key of design collaboration is effective communication (Schön, 1987). An effective communication is a clear, accurate to the objective, proper response or feedback, understanding each other by knowing the main purpose of the message and easily express the ideas (Thompson, 2018). As we know prototyping use to express ideas (Cross, 1989), to interact designer and users (Warfel, 2009) through verbal and non-verbal communication, to exchange their ideas and feedback about a design problem and potential solutions (Derksen & Shafieyoun, 2018). Therefore, prototyping is a useful tool to create effective communication in design collaboration and it would be useful Constructivist approach in design education. Schön defines design as a contemplative conversation to use the constructivist view of human perception in design process (Schön, 1987). Collaborative design needs to share experience and understand the design restriction to develop the relevant solution.

3 Methods: Design Prototypes in Our Game - Co-design

The process for developing the Money Game emerged from iterative versions of prototypes. Four successive classes were dedicated to building a new prototype through playing the game and making changes to the game board, rules and the physical materials as needed. Each iteration was improved upon in the following class and following rounds of play. Our strategy for creating prototypes in this way was to build quickly but also to explore methods of participatory design where users closely collaborate with each other to design solutions. Participatory Design has been defined as, “a strong commitment to understanding practice, guided by the recognition that designing the technologies people use in their everyday activities shapes, in crucial ways, how those activities might be done” (Robertson and Simonsen, 2012, p. 05). The design classroom is uniquely suited in that students may fit the demographic profile of the game audience and at the same time has the advantage of understanding design principles. The professor’s role is facilitator of a process that encourages users/design student to ask the necessary questions of their ideas.

3.1 Levels of Engagement in Games

Chunking is a phenomenon in cognitive theory that suggests humans engage with the world at different levels and is something we do continually. The chunks transition across three level of brain function: the first level is conscious thought, then a level of integration, intuition and association, followed by the third level of adventure (Koster, 2013). Koster believes games or puzzles prompt the same problem-solving skills similar to learning to drive a car. New drivers are hyper aware of the car when they start, then form habits as they integrate an understanding of the physical world, followed by a confidence that motivates us to explore. Students learn to build prototypes in a similar way; initial interactions with the physical world and humans who use the prototype transforms into an intuition around how prototypes need to function.

At the second level of integration, intuition and association a dissonance is created by the students own understanding of games in general and their conscious thoughts of how an economics game should be played. Playing a game requires players to consciously think about their current standing in the game, their strategy for playing and the other players in the game to ensure they are playing by the rules, for example. Designing a game that currently does not have rules or physical structure engages our conscious attention to be focused on our preferences for chunked information rather than force new processes into established patterns. By reducing the cognitive effort from game logistics to defining simple motivations for playing was necessary to move students from their focused attention on logistics and trust their own game experience and intuition. Reminding students to create a game that did not reward acquisition and transference of values (trading acquired things) was enough of a guiding principle for them to begin.

The adventure level of chunking defined by Koster is exploration and probing motivated by the unknown. This level directly relates to prototyping from the design perspective of creating that which does not exist. A designer’s interest in discovering how users will interact with their ideas is central to the purpose of prototyping. However, we intentionally stalled this stage so that students would continue to think through game play for an economy game that used new values of choice and time. The differences between the game prototypes were large which also delayed reaching the third level of cognitive understanding and as a result the last level of exploration that required engagement from players we did not observe.

Game theory suggests that competition between players is the incentive and mechanism to keep the players engaged. Competitors make optimal choices so that the advantage is greater for themselves than their opponent even though cooperative play can advantage both players described by Merrill Flood and Melvin Dresher in the game strategy, prisoners’ dilemma (Dixit & Nalebuff, 2008). Incentives are bound to the notion that we can outsmart or outperform our opponents rather than cooperate to beat the game. In free market types of games cooperation is imperative, players find ways to become valuable to other players and join teams or contract to cooperate. It allows players to set
the value of objects based on a market rate instead of setting values provided by the game developers. For these reasons substituting values such as time and choice become less significant in the game scenario. The reward for playing is more appropriately determined by players.

### 3.2 Prototyping through Play

The role of designer as user violates basic tenets of usability according to Neilson/Norman Group (Neilson, 2008) It is possible however, to distinguish between user as designer and designing prototypes for users in recognizing the expert user profile. (Barcellini, Prost & Cerf, 2015) In this study the users should be considered novice even though they participate in the consumption of goods and services daily. The expert user would be someone who understands the concerns of the greater economy including supply and demand exchanges, inflation, and economic growth trends. The roles of the users in participatory design methods engage in the development at the conceptual stages of a project where input is organized by expertise and deep understanding among the complexity of a problem (Barcellini et al., 2015). Therefore, we would identify the students who designed the game as *designers* first, who understand many aspects of the *user* condition.

Students in this study collaborated in the design of the game, playing the role of co-designer as the game was being developed. Through discussion and consensus on the format of board game was determined among the students facilitated by the professors of the class. Objectives for playing emerged from game play that was guided by the *economy without money* concept and the use of time and choice as substitute values. Measuring time using a stopwatch was immediately adopted, which instigated discussions around urgency and decision making and the logistics of keeping time. Resulting paths on the game board were varied in length to delay or quicken one’s arrival to a point to make a choice.

Decision making and support for making the *right* decision reflected the students’ current choices. Because they were in school, decisions to take a path going to school seemed to confirm their real-life choices, as a type of public declaration that they made the right real-life decision. Rules as the function of the prototype created and tested the same time as testing the structure of the game. Knowing functionality of a rule was a reason to change it to another rule and test it again. Rules not only made based on the objective of the game but also to make the game more fun. Student and teacher created the game and play it at the same time and surprisingly they were excited to play the game and be the winner. Rules were created in different level of the game, the beginning, in the middle of the game and when they feel they learned the skills. It seems rules gave them some challenges and each step they tried to keep them balanced between challenges and skills.

### 4 Case Study

We proposed the idea of a world without money and replacing it with the values of choice and time. This type of world supported an economy that was not as tangible for the participants who struggled with a concept so abstract. The prototypes created during a collaboration between student and teacher. The first prototype was a simply drawn ellipse of cells, where each player will count off as they move around the board. The second prototype is a set of circles with different radii, cells sat on each radius to count from the roll of a dice. The game started at the centre and players selected any path to move along. The third prototype was similar to the second but included three circles and the fourth prototype increased in detail adding more objects to win in the circles. Improvements made from the quick hand drawn prototypes provoked more input from players in the structure and function of the game. Where later versions focused more on function and material content.

Eight senior and two junior students in Design at the University of Illinois at Urbana-Champaign participated in this study. They learned about prototyping through readings and discussion of 20 papers ranging in length. We discuss the structure of the alternative-to-money game as a group. Some of the students believed it would be a boring world without the motivation of money yet others found it impossible to conceive. We sketched the structure as we discussed the game to make it more tangible to see the potential using the prototype, even if all the details of the game had not been made clear. The result of the discussions gave the participants/players confidence that smaller aspects of the game could be tested using this method.

#### 4.1 First Prototype - Creating and Playing the Preliminary Game

All the prototypes had the same set of goals, which were developed in the first game. The first game also instigated many of the rules that were used in subsequent games (Figure 1). Players rolled one dice to move their piece around the board, landing on spaces that requested them to make choices usually implying lengths of time. Objects that were
simply acquired when landing on the square were later changed to be manufactured. The materials of the first prototype were limited to cars, homes, computers and cell phones, which split out as follows: cars (small, mid, large), house (1 bedroom, 2 bedrooms, 3 bedrooms), computer (tablet, desktop, laptop) and cell phones (bar, slide, smart). Item selection stops were created in a variety of cells on the board, and some of the cells stayed empty. Players seemed to change their cell phones and computers more than their cars and houses, which may be indicative of the participant’s age. Manufacturing included production and trade of commodities, but also added the unwanted behaviour of stockpiling goods. One player who had a number of cell phones could trade them for something else but if they did not make a trade, they could continue to produce more of them. A participant requested that cheating be an option in the game, they posed the scenario, “if I pretend my cell phone was lost or broken, I would have to produce another one”. Cheating was allowed in this way only to see what the effect would be on the game and no rules were added to disallow it.

Students seemed more excited about the world without money during prototype testing than before the game began. In the first prototype, players continued to perceive monetary value in their choices. For instance, they chose a 3-bedroom house because it has higher dollar value in their mind rather than a changed value based on need, for example. Changes in the rules of the game required a pre-written lifestyle to shift choices toward players’ needs. For example, if they decided to be homeless a house would not be one of their choices or options to trade.

### 4.2 Second Prototype - New Choices in Harry Potter Game

The second prototype focused on function and was based on the Harry Potter books to avoid the perceived dollar value of the first game (Figure 2). Material, the content of the game in this prototype was abstract or fantastical which was a harder valuation leading to a better result. In Harry Potter world they could choose their players characteristics such as ambitious, witty, brave, loyal. Some of the choices of commodities were books, brooms, familiars, robes, and cauldrons. Each player had a score sheet and when they reached five items of the same type they could manufacture or trade it. Discussion of the game created new rules during the play just as the first game. Objects were awarded by rolling a dice and landing on a cell with that object. Other than the main goals of the game players showed less excitement during the game than before play began. Without the perceived value of objects participants needed more motivation such as pre-planned goals or smaller achievements to make the game more fun. During the second prototype participants were merely collecting objects.
4.3 Third Prototype - Life Scenario

This prototype was more refined in its production, which changed the type of input from users (Figure 3). The focus shifted to strategy and brought back a more real-life scenario of acquiring cars and homes to observe the functional behaviour of rule constraints and strategy. Participants drew their player piece and selected a name for themselves. Goals such as, what type of job, education, car and house they wanted were documented before the start of the game. Similar to previous prototypes, the game rules emerged as it was played.

Additional materials such as furniture, types of relationships, pets etc were also winnable options. Participants started play by rolling a dice, some participants could reach their pre-planned goals where others gained more objects than they need, while others acquired less. Excitement the game was higher in this prototype but still needed more fun elements beyond acquiring objects. Levels of occupation varied in the number of cells for example to emulate real world scenarios of spending more time in college versus getting a job immediately after high school.

![Figure 3. Third Prototype](image)

5 Conclusion

In this paper we discuss some options for substituting values for money as a basis for a new economy. The characteristics required for shifting values from money to anything else would take a catastrophic event however, prototyping an economy within a game environment helps to conceptualize such a world and identify the difficulties if implemented. Iterating through a number of prototypes during the conceptual stages of the game with designers who are also users of the economy provides immediate feedback and a unique opportunity to make changes as the game is played.

The process of designing and developing a game for users who are designers has the benefit of making changes while the game is evolving. The designer makes changes based on their understanding of roles and human behaviour. As a user, their focus is on the logistics and strategy of play within the constructs of incentives to find value. Time and choice in a sense, have values that are portable because they are ubiquitous and we would argue universally understood. The study does hint at the expert players interest to be adventurous and even distort and deviate from social norms similar to our current economic system.

The participants in this study formed strategies that still clung to the idea of accumulation of objects and signs of wealth or perceived need. Players expressed little interest in the games that provided little challenge to acquiring objects but at the same time were motivated to cheat just to acquire more objects to obtain more. These are early findings for our economic game prototype but they indicate how deeply ingrained our attachment to the economic system is but also indicates the possibilities for substituting values through the use of prototypes.

References


**Bibliography**


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**Stan Ruecker** (PhD) is the Anthony J. Petullo Professor in Design at the University of Illinois. His research focused for many years on the future of reading, where his teams were responsible for the creation and testing of over two-dozen prototypes. He is currently exploring physical interfaces for complex conceptual work, such as text analysis, modeling time, and designing experience. He is also the principal investigator of the design concepts lab, which is focused on using design approaches to develop operational models of key abstract ideas. Stan is a frequent international speaker and consultant on the development of Ph.D.