The Play Pyramid:
A Play Classification and Brainstorming Tool for Toy Design
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Toy designers may benefit from a universal classification system to communicate and brainstorm new toy concepts. Being able to classify types of play may also help a designer in determining whether a potential toy product has play value. We have defined four categories of play (Construction, Fantasy, Sensory, Challenge) loosely based on Piaget’s four stages of cognitive development. These four categories can be viewed as the vertices of a tetrahedron which we call the Play Pyramid. The Play Pyramid can be used to plot new ideas for toys to relate them to current toys with similar play value. This is helpful in understanding play affordances perceived by different target users. The Play Pyramid can also be used in brainstorming; by taking a toy idea and moving it around inside the Pyramid, the concept can take on new and unforeseen types of play.

Classification is the first step in bringing order into any scientific endeavor [1]. Just as wine connoisseurs use a wine wheel to communicate the complexity of wine flavor and perfumers use a fragrance wheel, toy designers can benefit from a universal classification system to communicate and improve upon toy concepts. A classification can also be helpful in determining if a toy product has potential play value.

Play Value and Play Affordances

When referring to toys, the term play value could be the likeliness that a toy will be played with by the customer audience. The term customer audience is used by the author to denote that the customer is intended to engage in an experience with the product. Play value could also be used to describe a measure of the benefit of the play. Play value could also refer to the amount, variety, or length of play. If the customer audience engages in play with a toy, we will say the toy has play value. The amount of play value can be determined by developmental benefit, length of play, etc. A designer may believe that their toy concept has play value, but this is ultimately determined by the customer audience. A toy is in the mind of the customer audience and a toy product is in the mind of a designer. Ideally, the toy product is the same in the mind of the customer audience and the designer. In other words, when the designer knows what the customer audience desires, then the designer can create appropriate play affordances.

An affordance, as per Norman, is an action potential of an object, meaning something that limits and guides what you can do with an object [7]. There are an infinite number of affordances for any given product, and so, to indicate a product’s intended use, designers create perceived affordances (e.g. if the product should be held in a certain location, it should be made obvious where the hand should be placed). For a toy, we will use the term play affordance to describe a way in which the customer audience can play with the toy. However, as Brian Sutton Smith says “it is dangerous to pretend we know what a child will do with a toy just from its characteristics alone; children have a way of doing things with toys over and beyond the apparent character of the toy [8].” It is true that children (and adults) can find play value in things that are not toy products (what we call transformed toys) and children and adults will play with toys in ways that are not expected/intended. However, when designing a toy product, we still need a starting point and so the designer should ensure that it affords at least one type of play, thus having play value. A classification, such as the Play Pyramid, can be used to determine if a toy product affords play.
The Play “Pyramid”

In defining a concise and complete classification of play, we draw upon Piaget’s Stages of Cognitive Development [2].

Piaget’s Stages are summarized as follows:

- **Sensory-Motor Period (0 - 18 Months)** The child engages in sensory play and play involving moving objects to produce reactions.
- **Preoperational Stage (18 Months - 6 Years)** The child engages in symbolic play. Rules are not developed. (4 - 7 years) the child can perceive and imagine.
- **Period of Concrete Operations (6 - 12)** The child engages in more problem-solving play. Play involves classification and rules.
- **Period of Formal Operations (12 - 15)** Thought and play become more abstract. Play becomes more social and refined.

Piaget’s stages are helpful in determining if a toy would be acceptable for a given age range, however, in the current format, it is not suitable alone for classifying toys. For example, there are toys that would be classified as a sensory play toy, but would be more appropriate for children/adults over two years of age.

Therefore, we have defined four general categories of play that are loosely based on Piaget’s four stages of development: Sensory (from Sensory-Motor), Fantasy (from Preoperational), Construction or Creation (from Concrete Operations), and Challenge (from Formal Operations). These categories can be applied to any toy or play, do not depend on age, and can be distinguished from each other. We argue that all toys or play can be classified into one of four categories or somewhere between two or more of these four categories.

We can view these four categories as the vertices of a tetrahedron, where the edges consist of play that falls between two categories. The faces consist of play that falls between three categories. And the space inside the tetrahedron is for play that has elements of all categories of play. This classification system, as shown in Figure 1 is what we call the “Play Pyramid.”

When using this classification, it is important to classify play based on where the play value lies. For example, all play can be thought of as sensory as we perceive things, but sensory play involves specified (and intentional) entertaining of the senses.

**Sensory:** This play involves aesthetics and entertaining the senses. A pure form would include using a kaleidoscope or playing in sand.

**Fantasy:** This play is about role-playing or it has a level of pretense. At a pure form, it could include playing house or doctor. This category is what we typically associate with play, but we believe it is possible to have play without this Fantasy element.

**Construction (or Creation):** At the purest form, this play is about creating (and not simply creativity). It could be making up new words or chipping away at a stone.

![Figure 1: The Play Pyramid](image-url)
Challenge: Like all play types, this can be physical or mental. Physical challenges include both fine and gross motor skill development. A pure form can be a riddle or throwing a Frisbee.

Prior Work and The Sliding Scales of Play

There are several other schemes for classifying types of play. The following are two examples.

The National Institute for Play claims the following classification [4]:
Body Play
Object Play
Social Play
Imaginative/Pretend Play
Storytelling Play
Creative Play
Attunement Play

The Consumer Product Safety Commission claims the following classification [5]:
Active Play
Manipulative Play
Make-believe Play
Creative Play
Learning Play

From a toy design viewpoint, some classifications seem to categorize play into groups that cannot be distinguished from one another. Other classifications are too specified. Still others categorize by age or developmental stage. Toy designers require a simple classification that does not depend on age of audience or the type of development.

In the two classifications cited above, categories such as “object play” or “manipulative play” are of little use to a toy designer as all toys can fall into that category. These classifications also contain modifiers such as “social play” or “active play.” “Social” and “active” are not explicitly types of play, but adjectives that describe different play types. To clarify, it would be hard to engage in “social” play without it being of some other nature (e.g. imaginative, body, creative; to use the given categories). These modifiers, although not classifications, are still quite useful. Modifiers can be viewed as scales that can be used to describe all types of play independent of classification. The following are five applicable scales to describe toys and play: Involvement, Social Involvement, Level of Restraint, Mental/Physical, and Gender.

Involvement refers to the amount of effort the participant is exerting and ranges from passive (e.g. watching soccer on TV) to highly active (e.g. playing a game of soccer). Social Involvement refers to the level of interaction with other players and ranges from solitary (e.g. Solitaire) to competitive (e.g. Poker). Level of Restraint refers to the importance of rules and ranges from free play (e.g. splashing in water) to strict rule play (e.g. water polo). The Mental to Physical scale has a midpoint of equal amounts of mental and physical play. The Gender scale ranges from male to neuter to female. These five scales, as shown in Figure 2, are called the Sliding Scales of Play.

The Sliding Scales of Play can also be used as a brainstorming tool. A designer can plot a toy concept onto the scales and then, by sliding the Scales of Play, the designer can imagine other possibilities for their toy. As an example, let us look at a standard set of Lego toy construction
bricks and plot them on the Scales of Play. Legos could be characterized as Active but not Highly Active, most likely not Competitive, closer to Free Play than Strict Rule Play, a bit more Physical than Mental, and Neuter leaning towards Male. How can one redesign the toy to make it more Active? Perhaps if each toy brick was a meter wide. How can one redesign the toy to make it even more Free Play? Perhaps if the placement of the connecting pegs were not fixed. In these cases, the overall play classification is unchanged, but the play has been modified (i.e. all of these redesigns would be considered Construction play). The Sliding Scales of Play are not classifications and cannot be used to determine if a toy has play value. For example, an object that is gender neutral, designed for solitary, active, physical use with few associated rules does not imply that it has play value. When one begins to reference the categories of the Play Pyramid (Sensory, Fantasy, Construction, Challenge), then potential play value becomes apparent.
Using the Play Pyramid

Designers can use the Play Pyramid to determine if a toy has potential play value. A toy can be said to have play value or afford play if it falls somewhere in or on the Play Pyramid.

We can plot current toy products into Pyramid. This can be used to see where successful toys for certain age groups are located. We can also see where there are gaps. Blank spaces in the diagram are perhaps market opportunities. The Play Pyramid can be used to plot new ideas for toys to relate them to current toys of similar play value. It can also be used as a brainstorming tool. By taking a toy idea and moving it around inside the space of the Pyramid, an idea for a toy can take on new and unseen play value.

Figure 3: The Edges of the Play Pyramid

Toys and play are listed as follows: Kaleidoscope, Whoopie Cushion, Furby, Teddy Bear, Disney World Amusement Park Rides, Movies, Television, GI Joe Action Figure, Finger Puppets, Tamagotchi, The Sims, Nintendo DS, Monopoly, Nerf Football, Playing Cards, Crossword Puzzle, Jigsaw Puzzle, Taboo, Jenga, Origami, Balderdash, Stamp Collecting, Beading Necklaces, Crayola Crayons, Foam Blocks, Play-Doh, Sand Play, Play and Freeze Ice Cream Ball, Finger Paint, Toy Xylophone, Jack-in-the-Box, Slip and Slide, Jaw Breakers, Nickelodeon Slime, Magic Eye, Bop-It, Pogo Stick, Skip-It, Juggling Balls, Doll House, Play Make-Up Kit, Mr. Potato Head, Brio Train Set, Lego, Construction Blocks, Doodling.
A toy or a form of play at the very center of the Pyramid could afford equal amounts of play value from all four categories. Perhaps a good example of a (very successful and award winning) toy that could be placed near the center of the Pyramid is video game developed for PlayStation 2 called Guitar Hero. This is a game where the player uses a Mini Gibson SG Guitar controller (Fantasy) to create (Construction) music (Sensory) to match the notes that are presented on the screen (Challenge).

Having a toy in the center of the Pyramid does not always imply that it will be successful. However, a toy that has perceived play affordances in all four categories allows for a variety of audiences to find play value in the toy. It might also be possible to narrow the audience by adding play affordances.

Most play and toys for play lie somewhere on the edges of the Play Pyramid (i.e. involve two categories of play). A toy that is used in only the pure form of a play category is relatively uncommon. A toy that is significantly used in three or more categories of play is also rare. Figure 3 describes the six edges of the Play Pyramid and presents examples of play and toys that typically fall on these edges. The placement is based on intended play affordance as agreed upon by over 50 undergraduate students.

There are several types of play, typically ones not involving toys, that are a bit ambiguous in their placement in the Play Pyramid. Flirting and teasing, for example, might be considered Fantasy-Challenge as one is playing a game with emotions. Exploration, if it is to be considered play [8], might also be Fantasy-Challenge as one is testing new limits. Jokes and riddles could be Challenge as they involve making non-obvious connections between seemingly unrelated things [6].

If a toy product does not have play value, then it seems reasonable to say that it is not actually a toy. Designer toys are collectibles produced in limited editions and are typically vinyl or plush. The target audience for designer toys are adults and older teens. These items can be thought of as works of art that resemble action figures, but are not intended for Fantasy play. If one happens to play pretend with them, they could be viewed as Fantasy toys. If one is trying to collect a complete set, then the designer toys could be viewed as a Construction toy. However, designer toys are used mostly as a means of self expression and a means of creating an image for oneself, similar to a piece of jewelry or a painting.

The Play Pyramid and Stages of Development

Perceived play affordances depend on the age of the customer audience. A child at age 2 may play with the same toy in a completely different manner when they are age 3; at age 4, they may not want to play with that toy at all. Twenty years later, that individual may find new play value in that same toy. Understanding age and gender differences is an important tool in toy design. The Play Pyramid can be used to better visualize the stages of development for designing age-appropriate toys.

Based on reviews and ratings from websites including: Amazon.com, Hasbro.com, Mattel.com, ToysRUs.com, and About.com, we chose popular toy products and plotted them on a chart, shown in Figure 4, based on the manufacturer age suggestion and gender affiliation. The gender placement was influenced by research findings in Blakemore and Centers [3].

We assigned a play type to each toy in Figure 4 designated by a colored circle corresponding to the Play Pyramid classification. A toy that has a play type between categories is designated with a split color tag. In Figure 5, we plotted these colors in place of the toy images to show which types
Figure 4: Popular Toys of 2006-2007 for Age and Gender.
These toys are only a sample of popular toys and properties based on online reviews. All age placements were suggested by the manufacturer or distributor; Gender placement is influenced by studies of Blakemore and Centers of play are popular for gender and age.
These toys are only a sample of toys on the market; however, one can see trends involving play, age and gender.
We can compare these results with Piaget’s developmental stages [2]. Popular toys for children under the age of 18 Months (both boys and girls) involve mostly Sensory play. This corresponds directly with Piaget’s Sensory-Motor stage of development where children learn about their environment and objects through their senses.
Children from the ages of 18 Months-6 years are in Piaget’s Preoperational Stage. This is categorized sometimes by ego-centric behavior where child believes everyone shares their viewpoint. This can also be categorized by symbolism where the child can make objects stand for something else and animism where the child believes all objects have some kind of consciousness. This stage fits well with our label of Fantasy play. One can see in the chart that this area between the ages of 2-7
Figure 5: Popular Play Types of 2006-2007 for Age and Gender.
This plot corresponds to the toys presented in Figure 4

is largely composed of toys that afford Fantasy play. Between 2-5 there are many toys affording Sensory-Fantasy play and between 5-7 there are many toys affording Challenge-Fantasy play. This shows a shift from learning through senses to learning through challenges.

Children in the age range of 6-12 are in Piaget’s Concrete Operations Stage. Thought becomes more rational in this stage and children can engage in play that involves rules and classification. In this stage, toys that afford pure Challenge play emerge in our chart.

Figure 5 is not fully filled through Piaget’s final Formal Operations Stage, but here the child can think abstractly and speculate different solutions to a given problem. The child makes hypotheses about the world and then tests them with concrete evidence. This stage lends itself nicely to more Challenge related play.

As expected, the data presented in Figure 5 agrees with Piaget’s developmental stages.

In Figure 5, we can also see other patterns related to play type and gender. Pure Construction and
pure Sensory play appear to be gender neutral. Construction and Sensory toys begin to be assigned a gender when they are mixed with Fantasy affordances. Sensory-Construction play also tends to be gender neutral. Alternatively, pure Fantasy play tends to be gender specific. It is difficult for a Fantasy toy product to be appealing to both male and female children in the Preoperational Stage [3]. Finally, pure Challenge play emerges in toys for children over 8 years and does not seem to have a correlation with gender. Fantasy-Challenge, however, is gender specific.

The Play Pyramid classification is used here to visualize the stages of development and how play preferences change with age and gender. Figure 5 can be used as a tool for designers to compare toy concepts to toys on the market as far as age and gender appropriateness. If similar charts are made in future years, one might see if and how play preferences change over time.

**Applying the Play Pyramid in Industry**

As an example, we will analyze a popular toy using this classification system. Nerf® Blasters from Hasbro® Inc can be described as a product line of indoor-safe projectile toys that involve foam plastic, such as dart launchers and foam ball launchers. These toys typically do not involve Construction play and do not emphasize Sensory play. Most play involving the Nerf® Blasters can be placed in the middle of the Challenge-Fantasy edge of the Play Pyramid. In 2004, Hasbro® Inc began a new line of “N-Strike” Nerf® Blasters including the N-Strike Unity Power System which allows the user to piece together and customize their blaster (Construction) and an interactive DVD Game (Sensory) to accompany some of the N-Strike Blasters. This innovation in the product line moved Nerf® Blasters more towards the center of the Play Pyramid. The N-Strike Unity Power System was priced around 40 dollars and was more successful in the market than its predecessors, which were typically placed under the 10 dollar price mark. This demonstrates that adding play affordances adds play value and makes a toy more appealing to a wider audience. The greater play value, in this case, also adds monetary value to the toy product.

Using the Scales of Play we can say that Nerf® Blasters are typically highly active, highly social, free play, mostly physical, and more on the masculine side. Sliding the Scales of Play will ultimately change the nature of the toy. As one can imagine with this example, sliding the Scales may not be a means of making the toy “better.” But it can be used as a brainstorming technique to view the product in a new light and expand the brand into new directions.

**Conclusions**

The Play Pyramid is a simple classification of play that can be used for identification, communication and ideation. Being able to plot a toy into the Play Pyramid is a way of ensuring that the toy affords play. The Play Pyramid in combination with the Scales of Play can be used as a tool for the designer to classify their ideas and compare them with existing products. Designers can also use these tools to brainstorm new toys, add play value to existing toys, and alter toys for different customer audiences and stages of development.

We have found that the Play Pyramid is quite helpful in teaching toy design to students. Play is a very abstract concept and to have a physical classification tool for reference helps students bridge abstract play concepts to physical toys. Students also reference the Play Pyramid classifications when determining the appropriate age for a toy concept. The Play Pyramid can be considered general for generic play classification, but has proven to be very powerful in toy design and toy design education.
References


