

# Educational Game Design

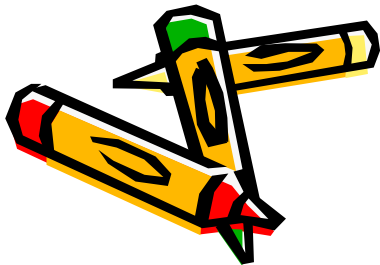
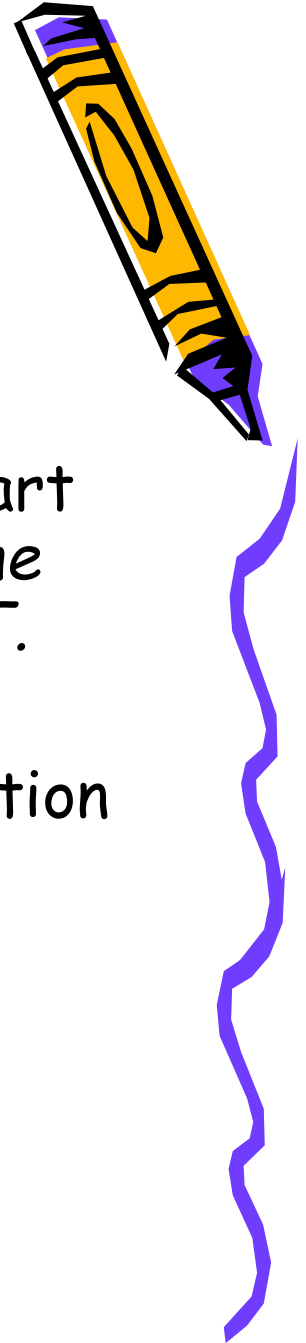
D. E. Metafas

Assistant Professor, University of  
West Attica



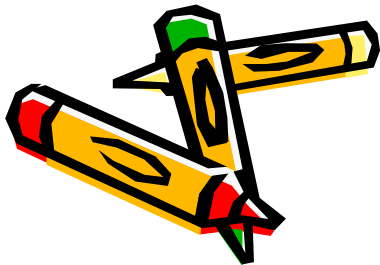
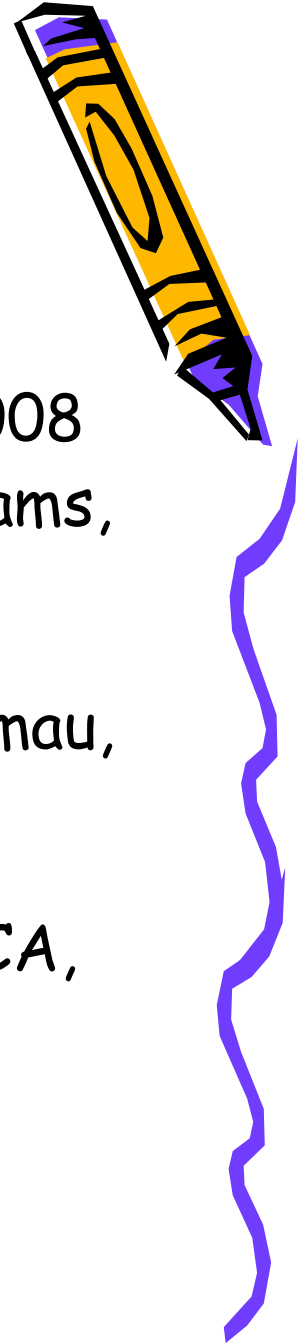
# Educational Game Design

- "Computer games are art—a popular art, an emerging art, a largely unrecognized art, but art nevertheless" - *Henry Jenkins, director of the Program in Comparative Media Studies at MIT.*
- Part design and part technology, the presentation will cover the basic concepts underlying the educational game design and development.



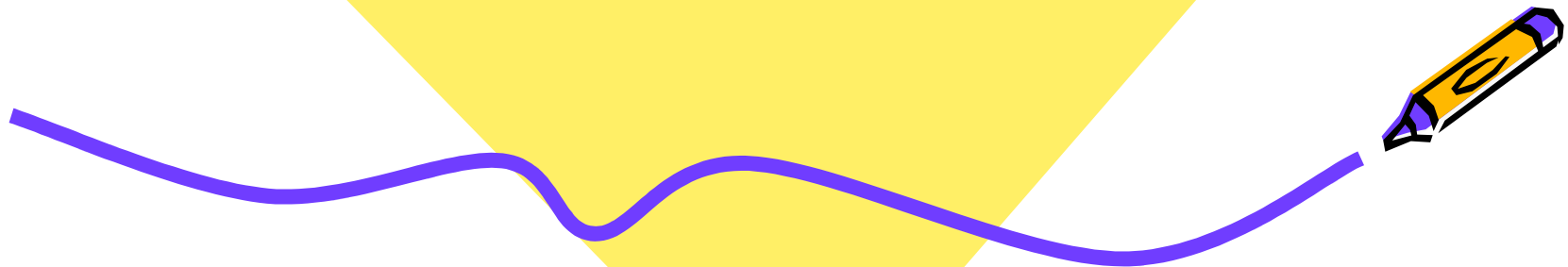
# Textbooks for additional reading

- "The Art of Game Design" by Jesse Schell, 2008
- "Fundamentals of Game Design" by Ernest Adams, Andrew Rollings, 2006
- "Core Techniques & Algorithms in Game Programming" by Daniel Sanchez - Crespo Dalmau, 2003
- "Artificial Intelligence for Games" by Ian Millington, Morgan Kaufmann, San Francisco, CA, 2006

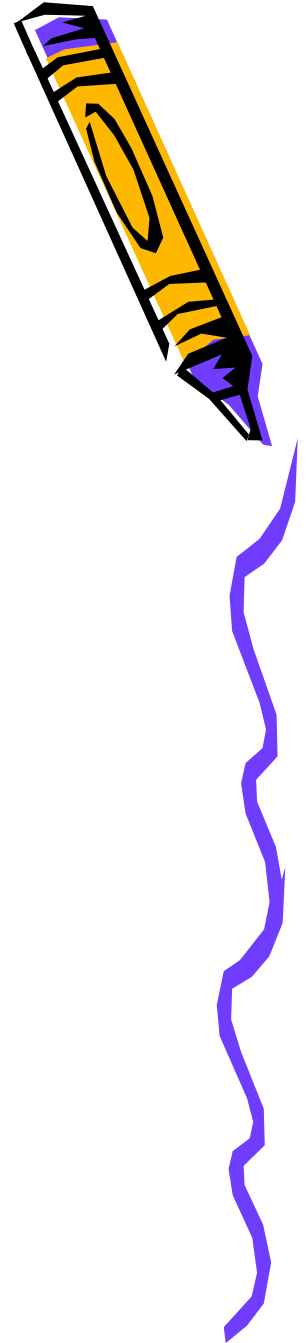




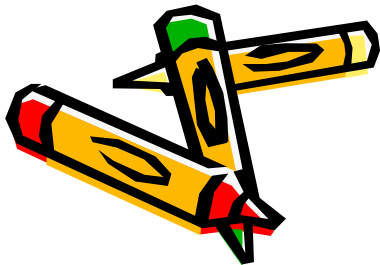
In the beginning, There  
Is the Game Designer



# In the beginning, There Is the Game Designer

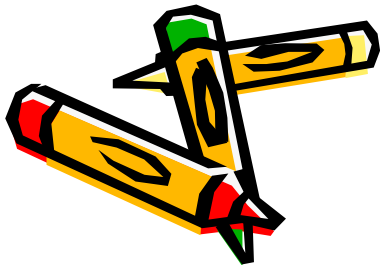


Designer



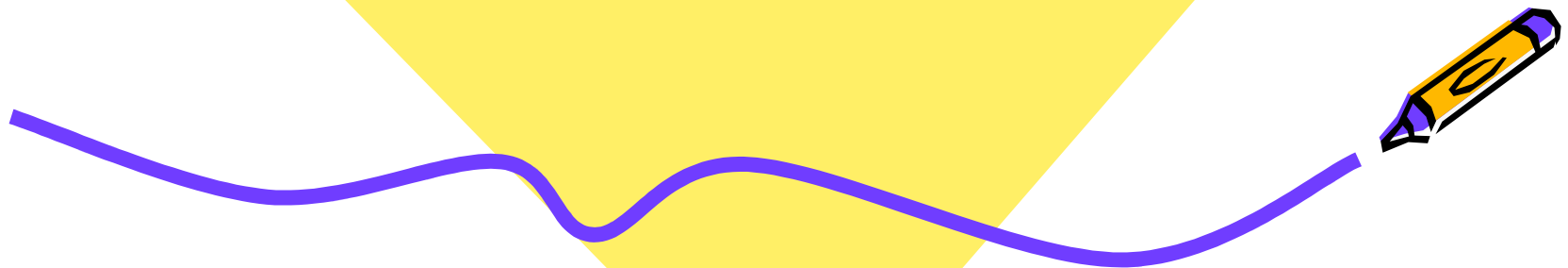
# The designer

- Magic words
  - "I am a game designer"
- What skills does a game designer need ?
  - Animation, anthropology, architecture, brainstorming, business, cinematography, communication, creative writing, economics, engineering, history, management, mathematics, music, psychology, public speaking, sound design, technical writing, visual arts .. But the most important is listening to your team, your audience, your game, your client and yourself.

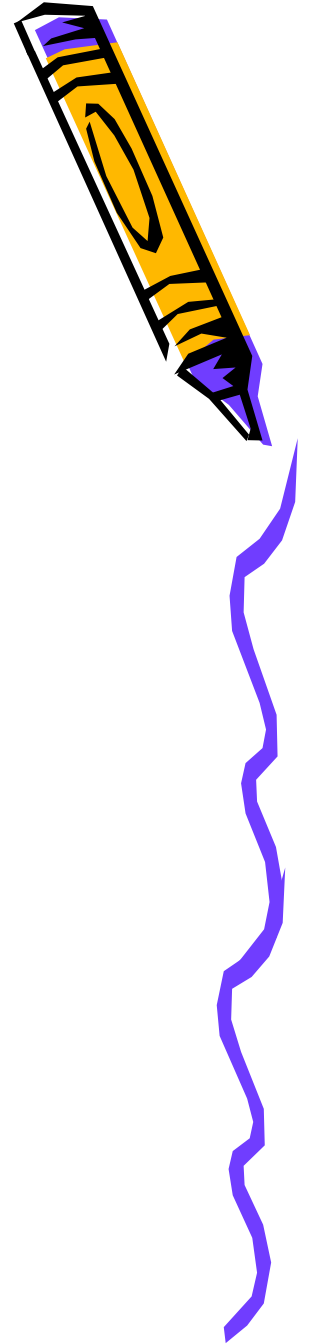




The Designer Creates  
an Experience

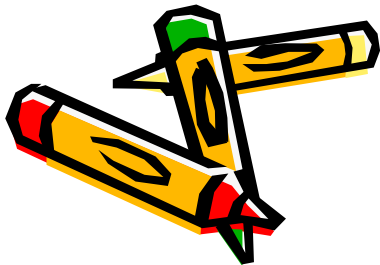


# The Designer Creates an Experience



Experience

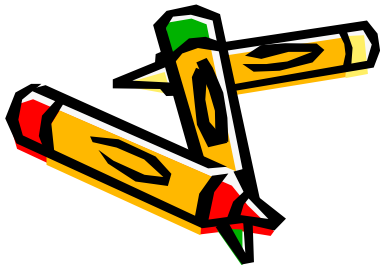
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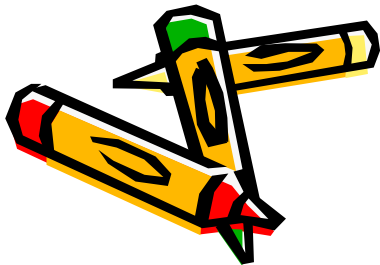
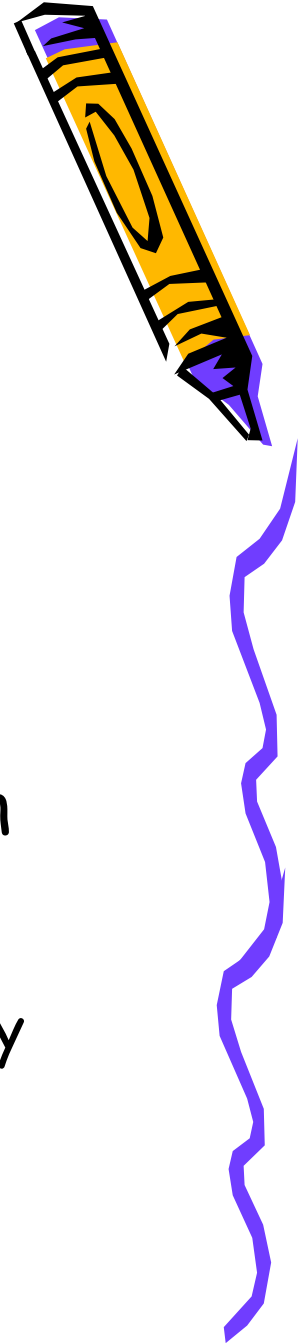
# The Designer Creates an Experience

- The Game Is Not the Experience
  - The game enables the experience
- Is this Unique to Games ?
  - No, but we could generate experiences that can be had no other way (feeling of choice, feeling of freedom, feeling of accomplishment etc)
  - The split between the artifact and the experience is much more obvious
  - Non linear experience
  - We create an artifact that a player interacts with, and cross our fingers that the experience that takes place during that interaction is something they will enjoy



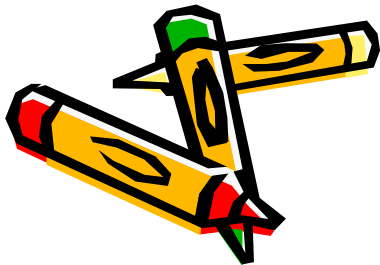
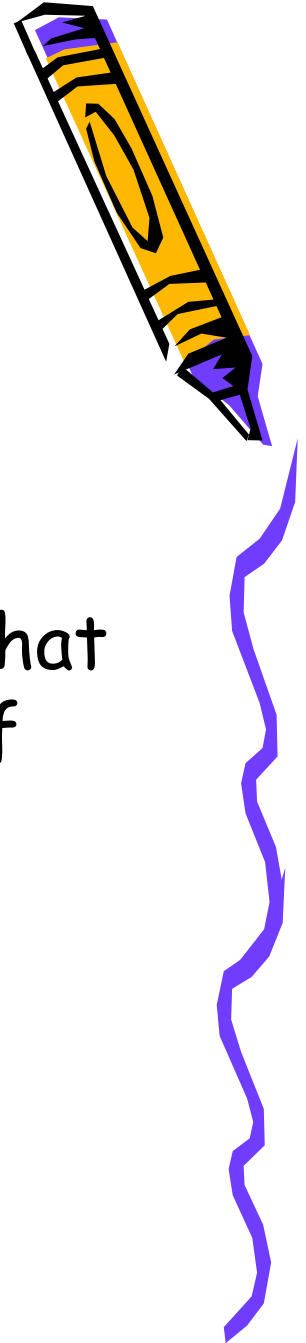
# Approaches

- Where we could find useful tools for mastering human experience
  - Psychology
  - Anthropology
  - Design
- One more important tool: Introspection
  - Peril 1: Introspection can lead to false conclusions about reality
  - Peril 2: What is true of my experiences may not be true for others



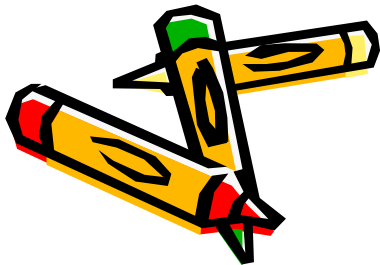
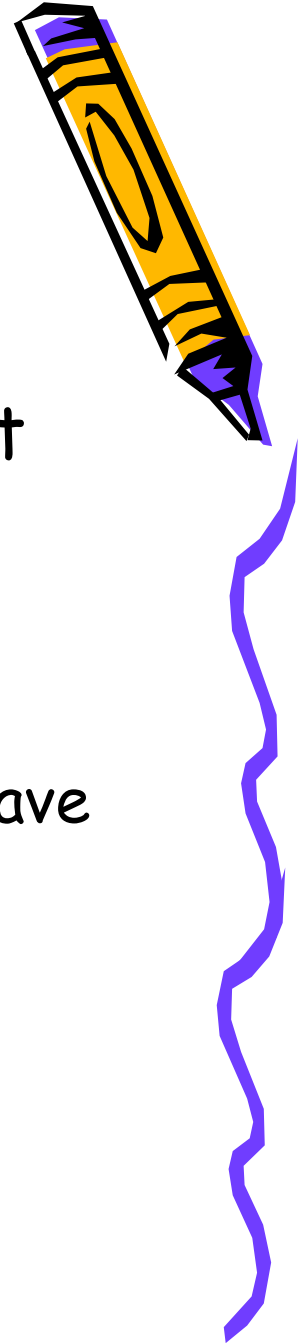
# Essential Experience

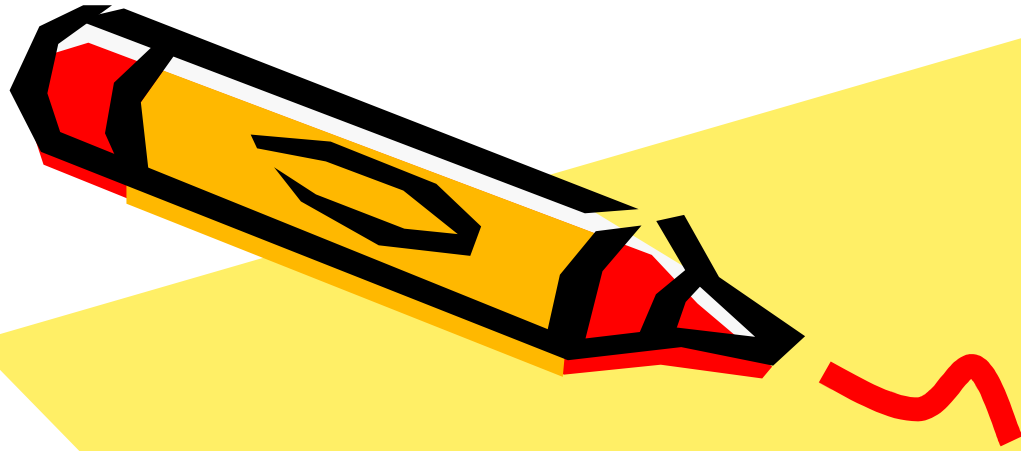
- Essential experience
  - You don't need to replicate real experiences to make a good game. What you need is to capture the essence of those experiences for your game



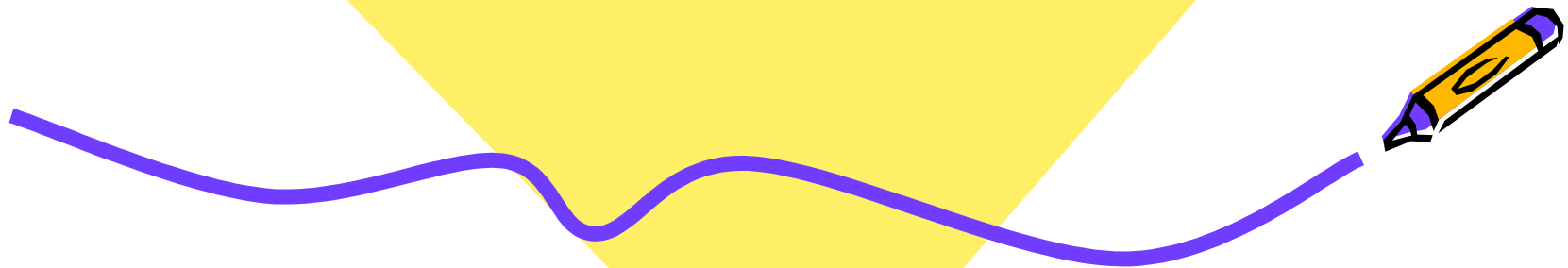
# Lens: The Lens of Essential Experience

- To use this lens, you stop thinking about your game and start thinking about the experience of the player. Ask yourself these questions:
  - What experience do I want the player to have ?
  - What is essential to that experience ?
  - How can my game capture that essence ?





The Experience Rises  
Out of a Game



# The Experience Rises Out of a Game

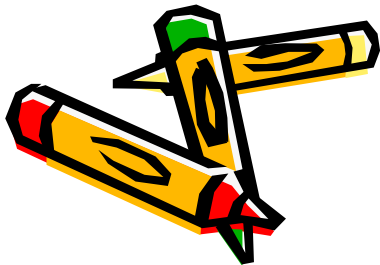
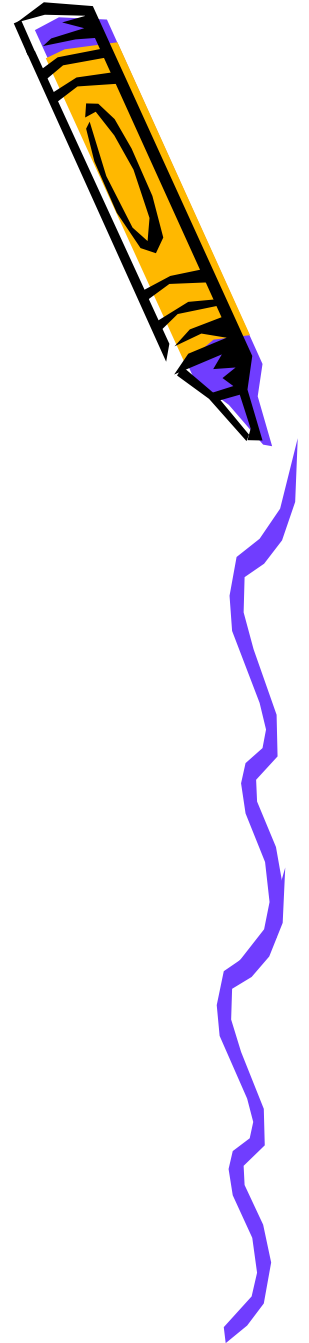
Experience



Game

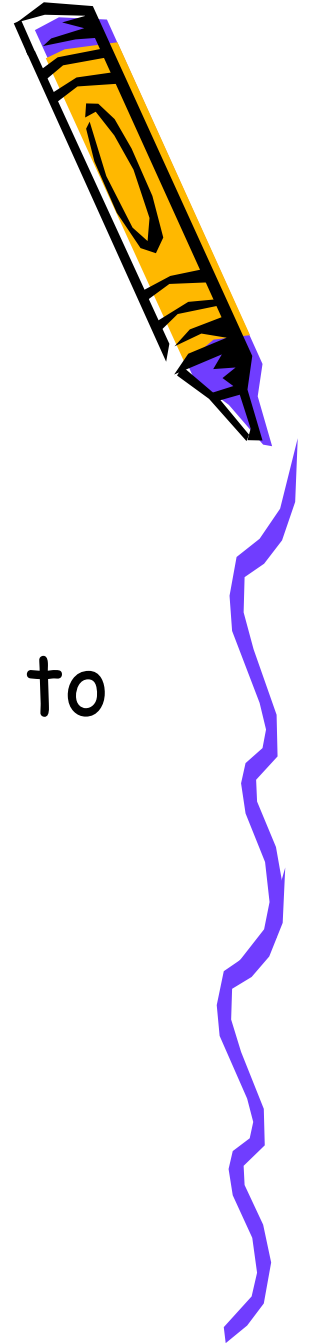


Designer



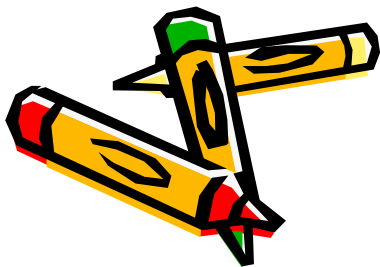
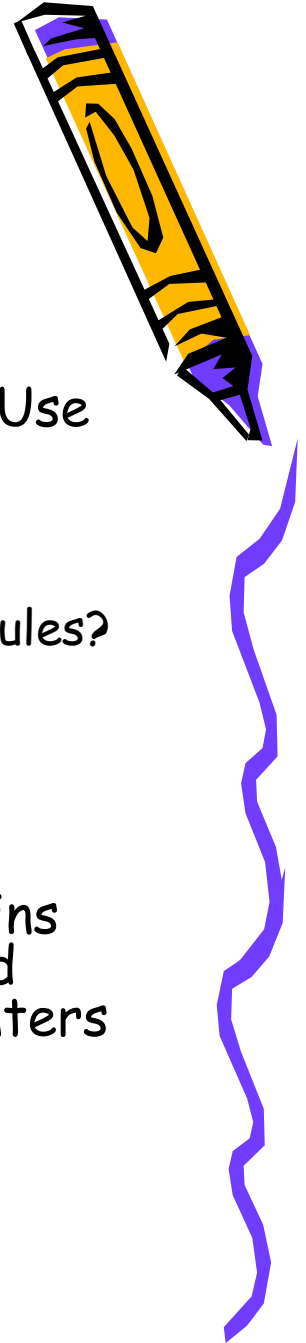
# So, What is a Game ?

- A game is something you play
- A toy is an object you play with
- A good toy is an object that is fun to play with
- Fun is pleasure with surprises



# Lens: The Lens of Surprise

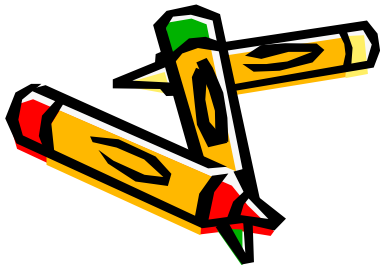
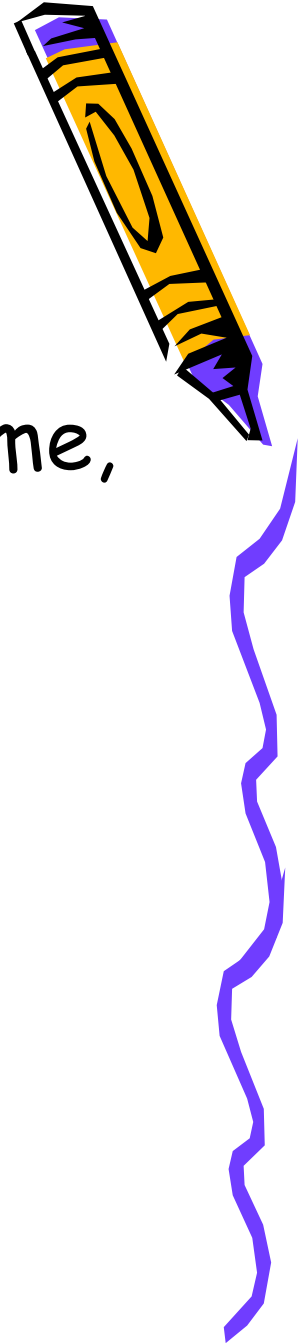
- Surprise is so basic that we can easily forget about it. Use this lens to remind yourself to fill your game with interesting surprises. Ask yourself these questions:
  - What will surprise players when they play my game ?
  - Does the story in my game have surprises? Do the game rules? Does the artwork? The technology?
  - Do the rules give players ways to surprise each other?
  - Do your rules give players ways to surprise themselves?
- Surprise is a crucial part of all entertainment. Our brains are hardwired to enjoy surprises. Experiments revealed that even during unpleasant surprises, the pleasure centers of the brain are triggered.





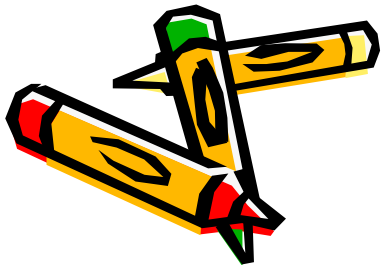
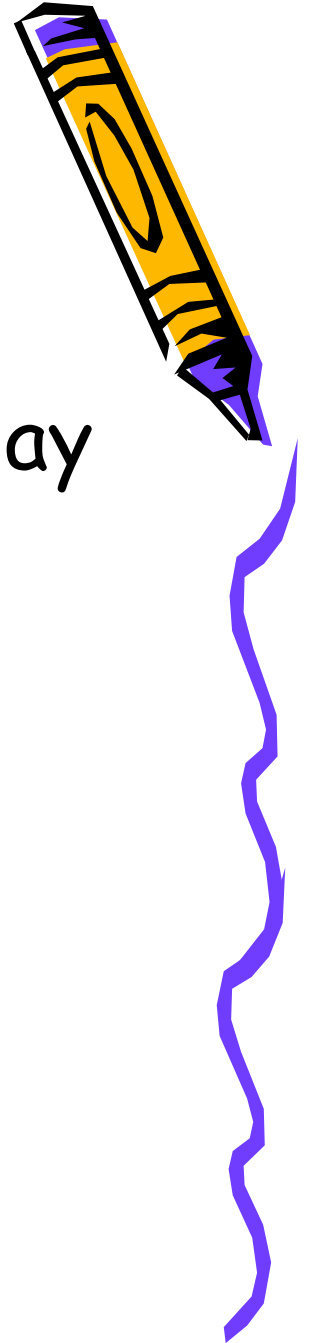
# Lens: The Lens of Fun

- Fun is desirable in nearly every game, although sometimes fun defies analysis. To maximize your game's fun, ask yourself these questions:
  - What parts of my game are fun?
  - What parts need to be more fun?



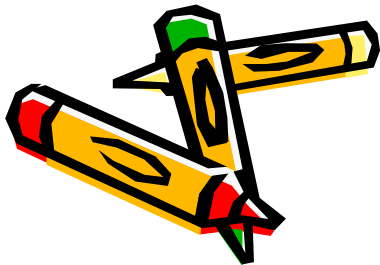
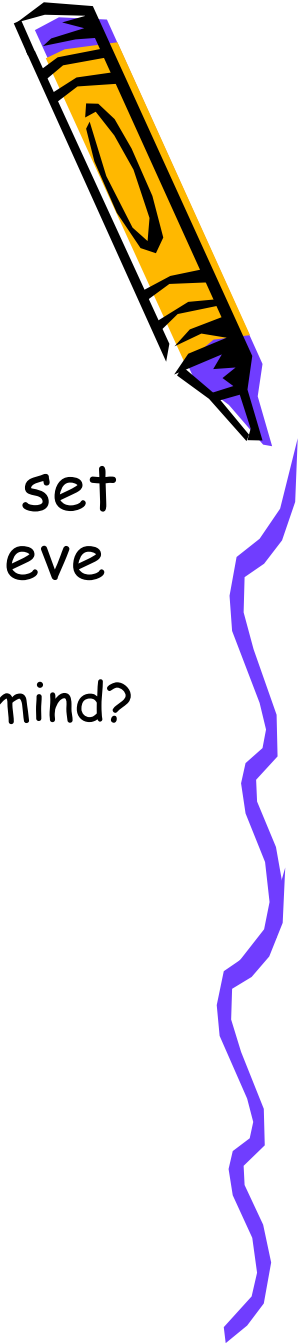
# So, What is a Game ?

- A number of definitions of what play means.
- Play is manipulation that indulges curiosity



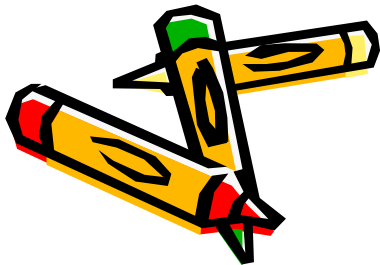
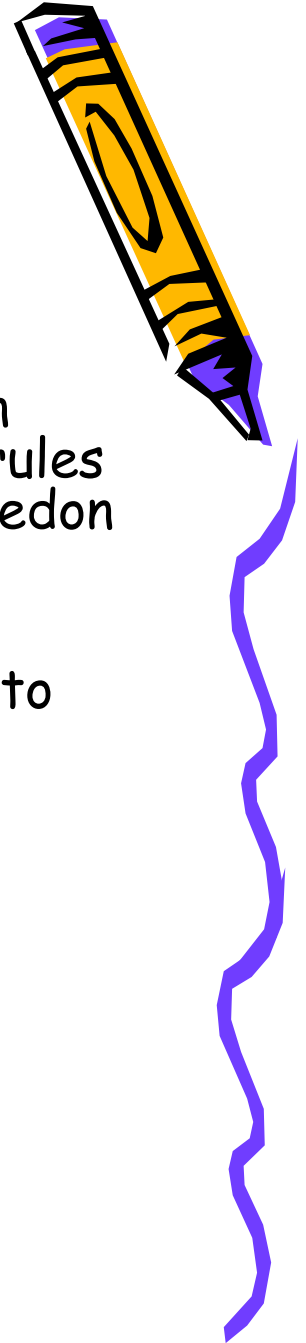
# Lens: The Lens of Curiosity

- To use this lens, think about the player's true motivations - not just the goals your game has set forth, but the reason the player wants to achieve those goals. Ask yourself these questions:
  - What questions does my game put into the player's mind?
  - What am I doing to make them care about these questions?
  - What can I do to make them invent even more questions?



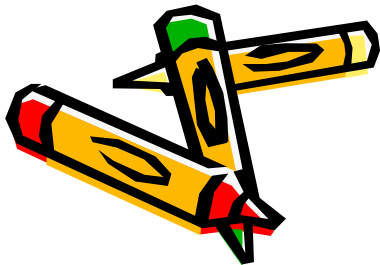
# So, What is a Game ?

- "Games are an exercise of voluntary control systems, in which there is a contest between powers, confined by rules in order to produce a disequibrial outcome" - Elliot Avedon and Brian Sutton-Smith
- This definition points out some key qualities important to games:
  - Q1: Games are entered willfully
  - Q2: Games have goals.
  - Q3: Games have conflict.
  - Q4: Games have rules.
  - Q5: Games can be won and lost.



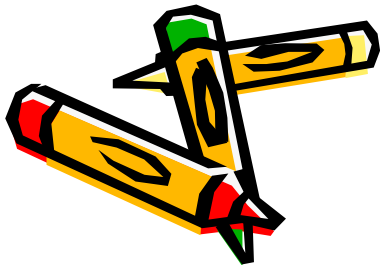
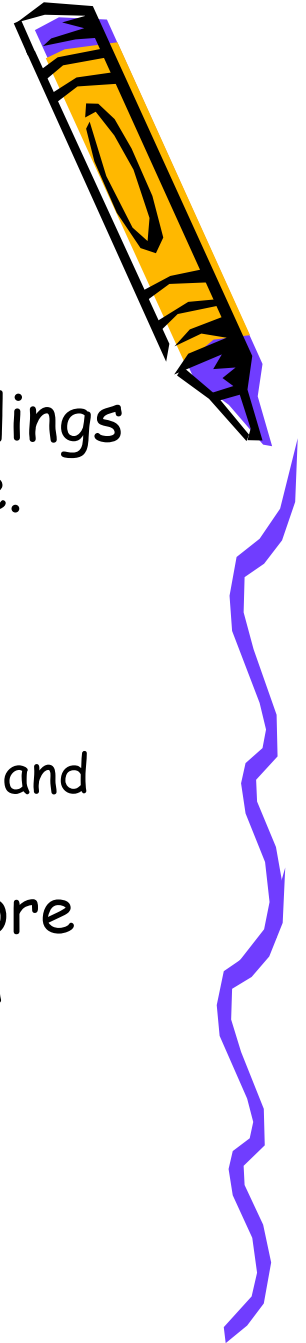
# So, What is a Game ?

- "Game is an interactive structure of endogenous meaning that requires players to struggle toward a goal" - Greg Costikyan
- Three new qualities we can add to our list:
  - Q6: Games are interactive
  - Q7: Games have challenge
  - Q8: Games can create their own internal value



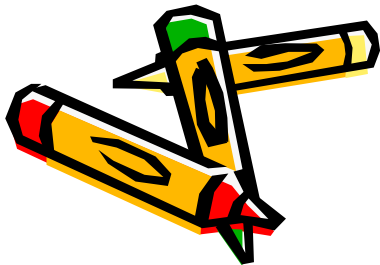
# Lens: The Lens of Endogenous Value

- To use this lens, think about your players' feelings about items, objects, and scoring in your game. Ask yourself these questions:
  - What is valuable to the players in my game?
  - How can I make it more valuable to them?
  - What is the relationship between value in the game and the player's motivations?
- Remember that the value of the items and score in the game is a direct reflection of how much players care about succeeding in your game.



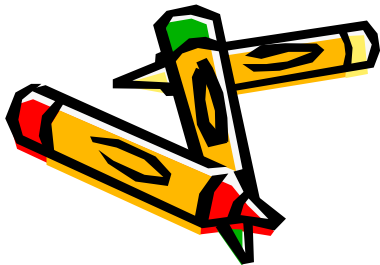
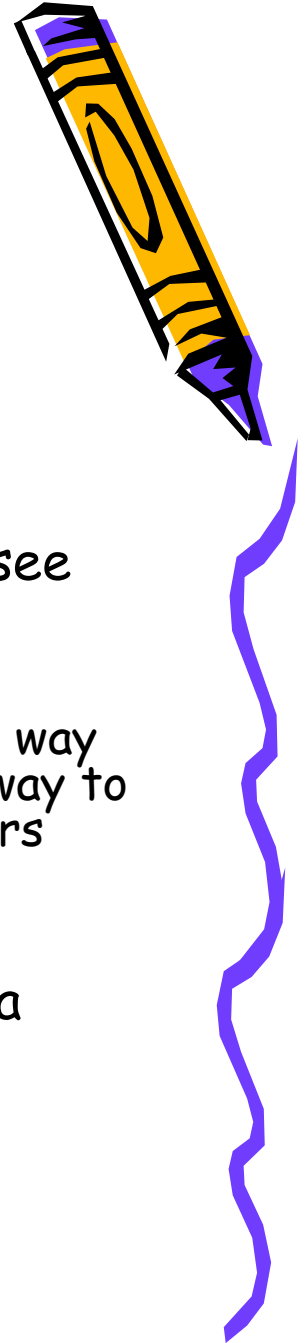
# So, What is a Game ?

- "A game is a closed, formal system, that engages players in structural conflict, and resolves in an unequal outcome" - Tracy Fullerton, Chris Swain, and Steve Hoffman
- Two new qualities we can add to our list:
  - Q9: Games engage players
  - Q10: Games are closed, formal systems



# So, What is a Game ?

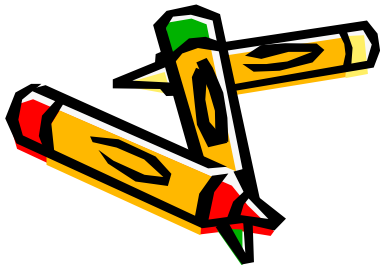
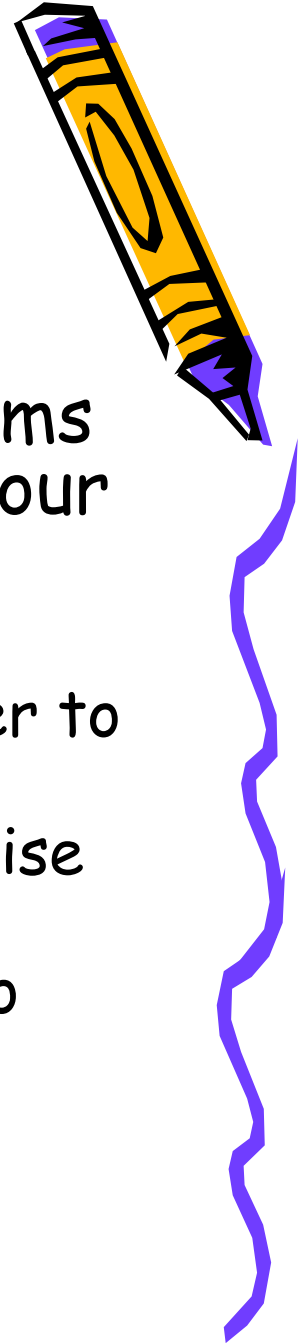
- It seems that all games involve some kind of problem solving, and problem solving is one of the things that defines us as a species. If we look more closely at the mental mechanisms we use for problem solving, we will see that they are related to the properties of games.
  - Find a way to get more points than the other team; find a way to get to the finish line before the other players; find a way to complete this level; find a way to destroy the other players before they destroy you; etc
- "A game is a problem-solving activity, approached with a playful attitude" - Jesse Schell's definition





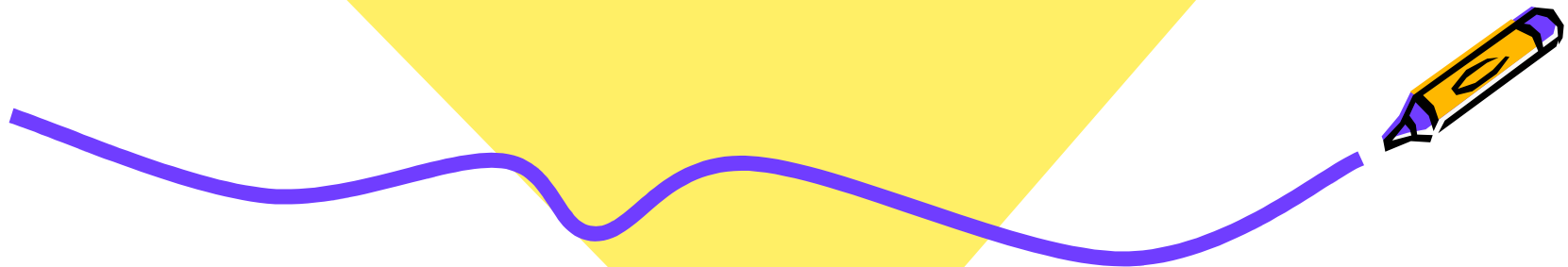
# Lens: The Lens of Problem Solving

- To use this lens, think about the problems your players must solve to succeed at your game, for every game has problems to solve. Ask yourself these questions:
  - What problems does my game ask the player to solve?
  - Are there hidden problems to solve that arise as part of the gameplay?
  - How can my game generate new problems so that players keep coming back?

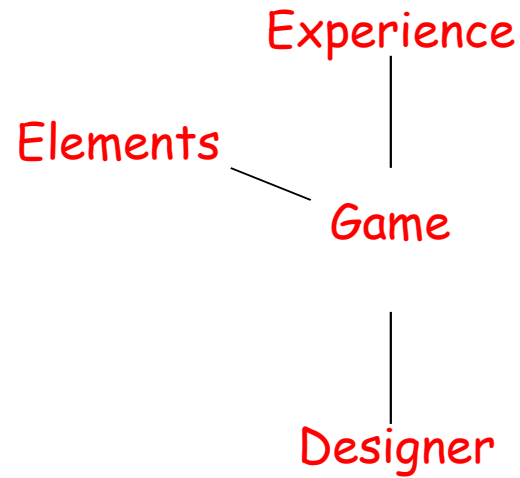
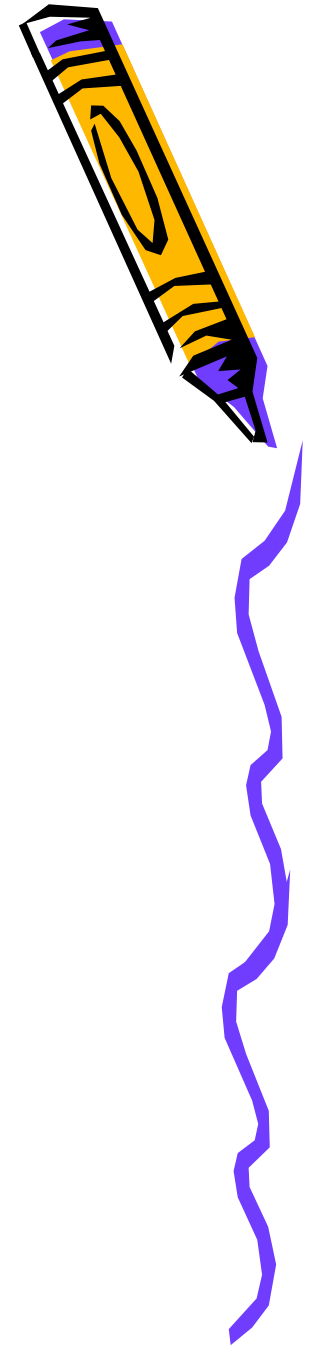




The Game Consists of  
Elements

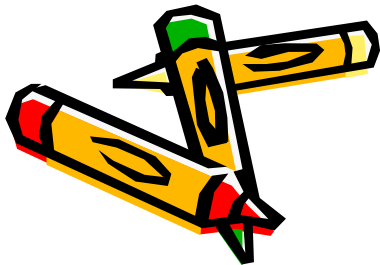
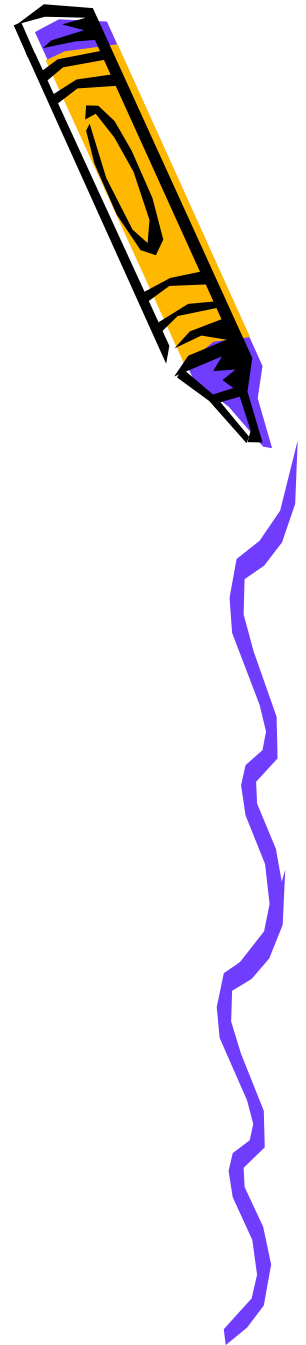


# The Game Consists of Elements



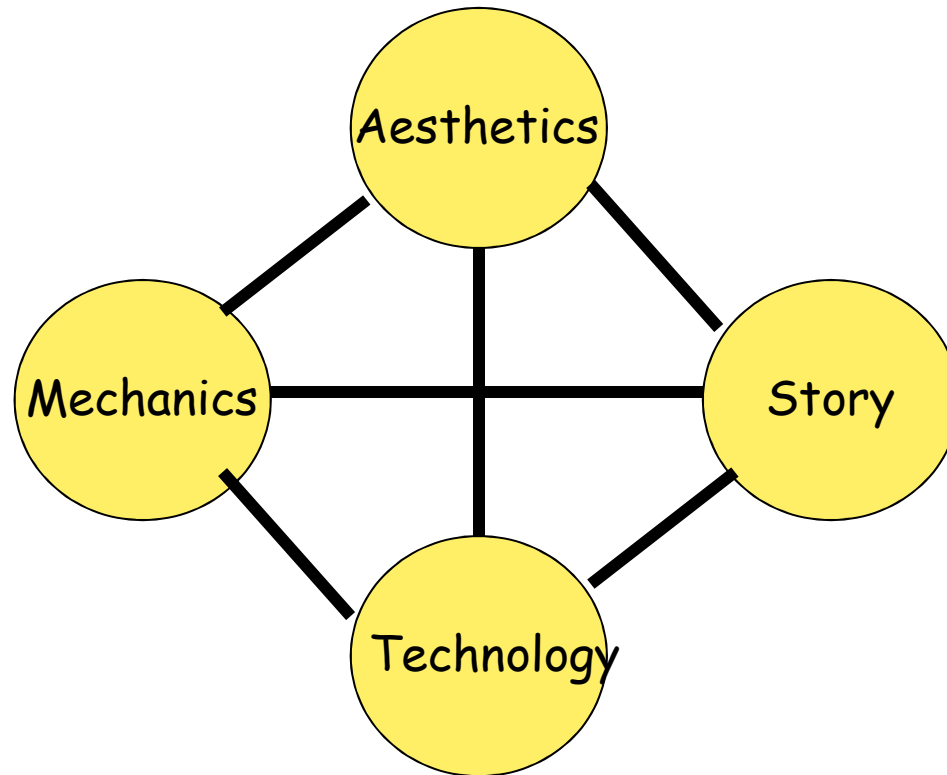
# The Game Consists of Elements

- The four basic elements
  - Mechanics
  - Story
  - Aesthetics
  - Technology

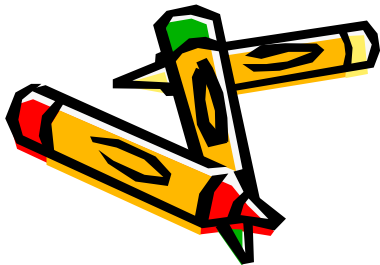
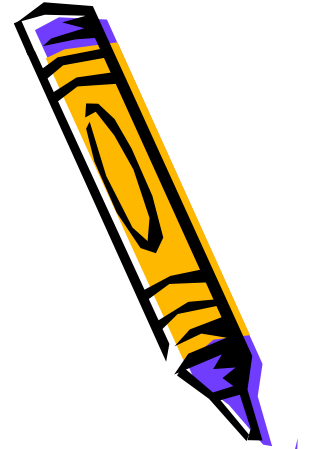


# The Game Consists of Elements

More visible

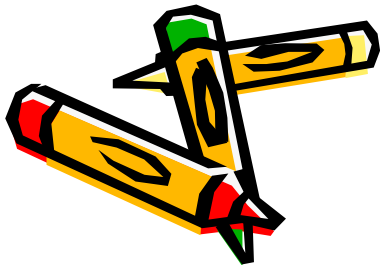
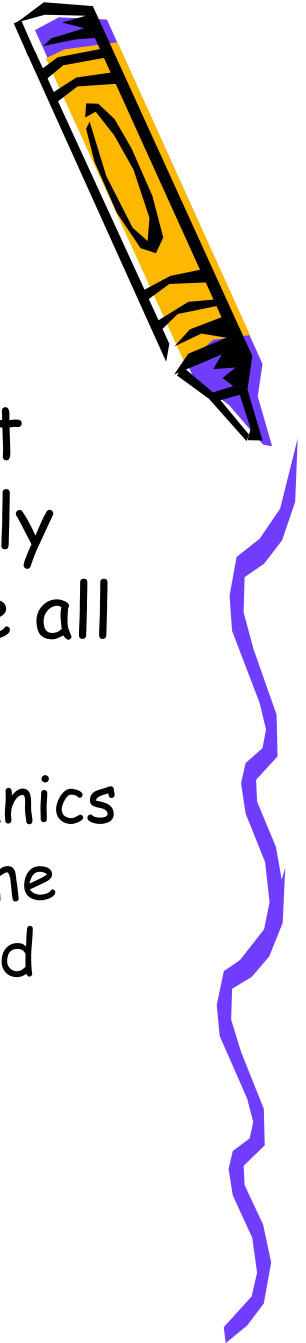


Less visible



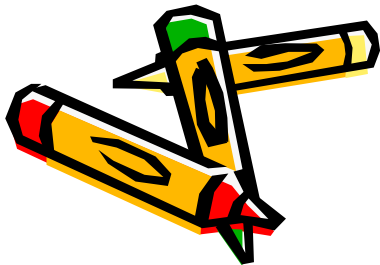
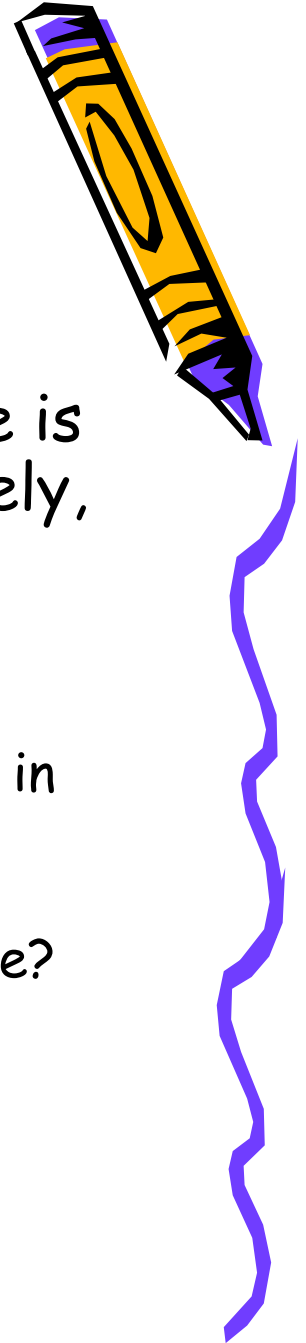
# The Game Consists of Elements

- None of the elements is more important than the others, and each one powerfully influences each of the others. They are all essential.
  - Game designers tend to believe that mechanics are primary; artists tend to believe the same about aesthetics; engineers, technology; and writers, story.



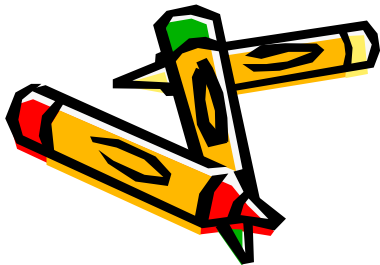
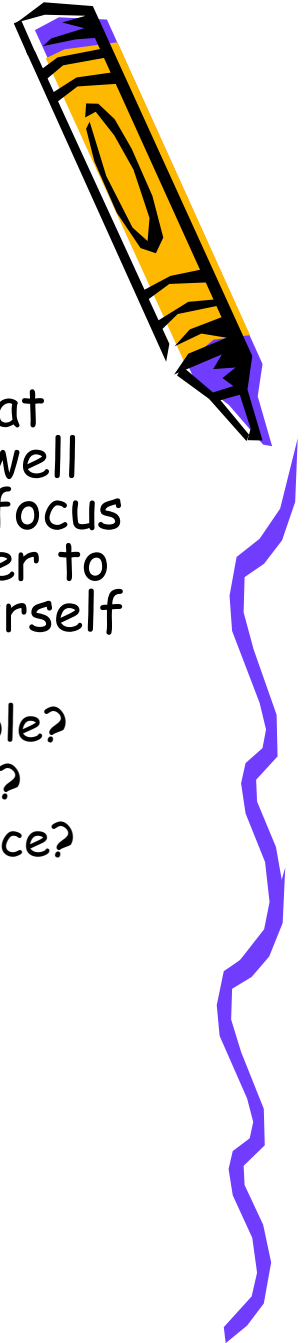
# Lens: The Lens of the Elemental Tetrad

- To use this lens, take stock of what your game is truly made of. Consider each element separately, and then all of them together as a whole. Ask yourself these questions:
  - Is my game design using elements of all four types?
  - Could my design be improved by enhancing elements in one or more of the categories?
  - Are the four elements in harmony, reinforcing each other, and working together toward a common theme?

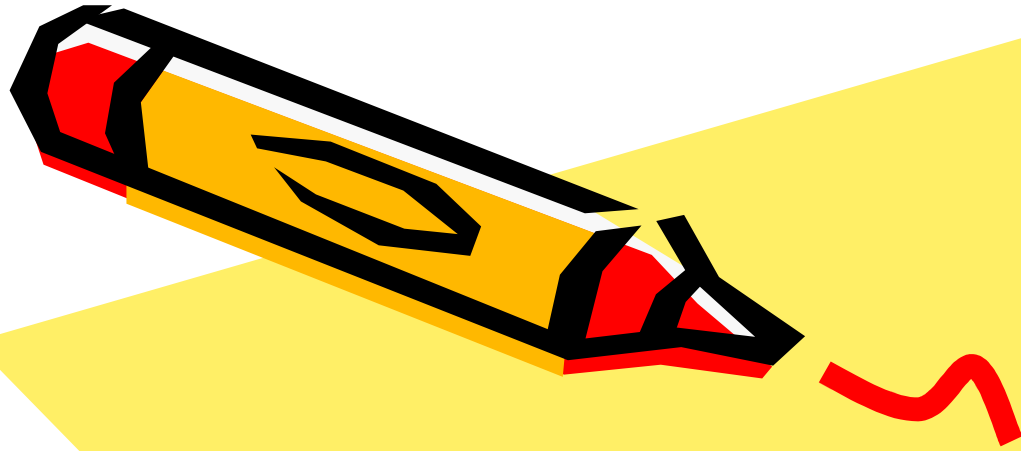


# Lens: The Lens of Holographic Design

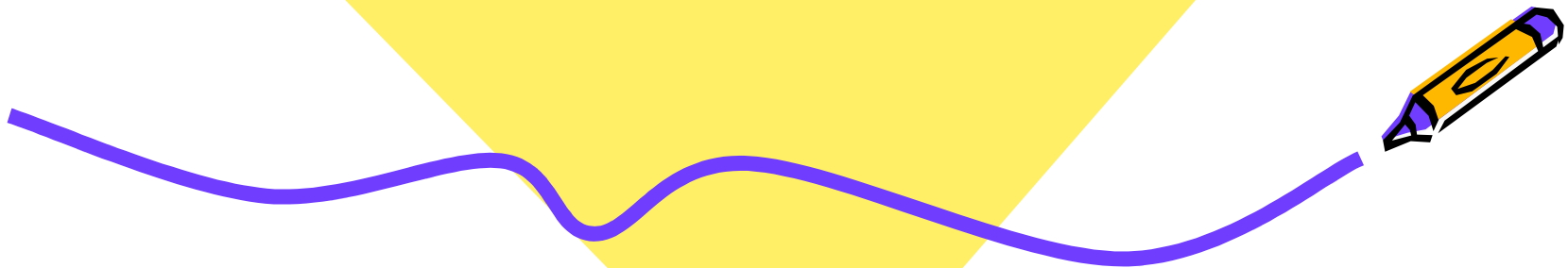
- To use this lens, you must see everything in your game at once: the four elements and the player experience, as well as how they interrelate. It is acceptable to shift your focus from skin to skeleton and back again, but it is far better to view your game and experience holographically. Ask yourself these questions:
  - What elements of the game make the experience enjoyable?
  - What elements of the game detract from the experience?
  - How can I change game elements to improve the experience?



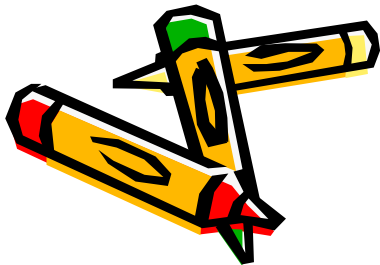
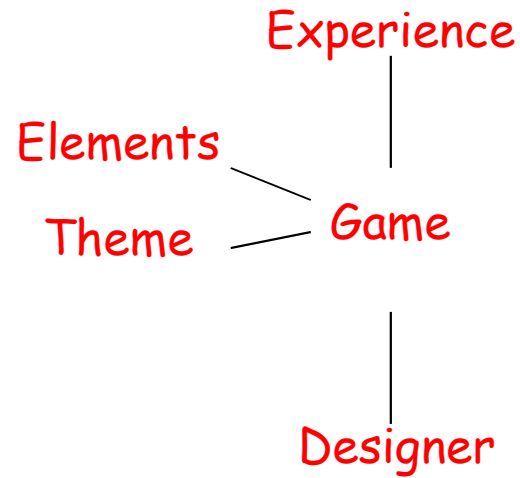
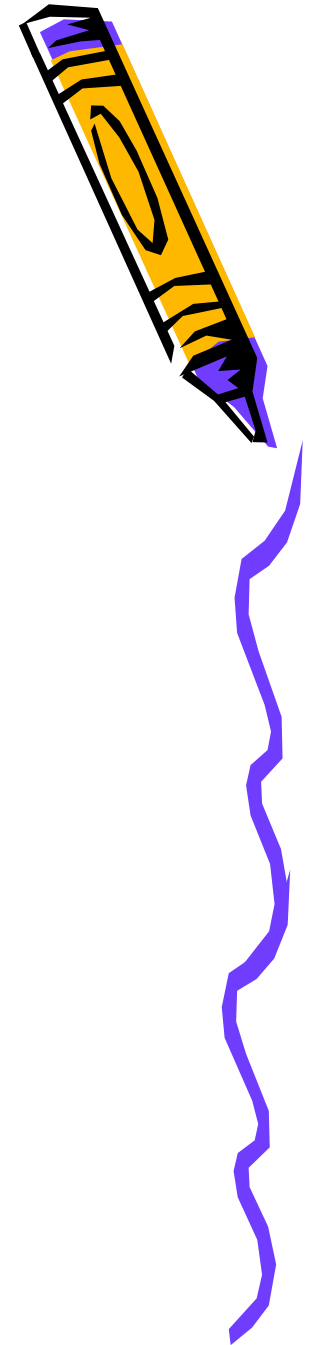




The Elements Support  
a Theme

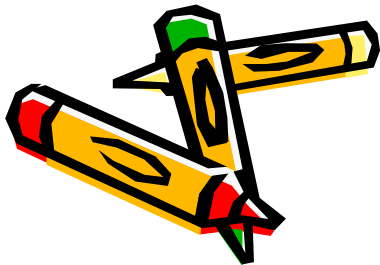
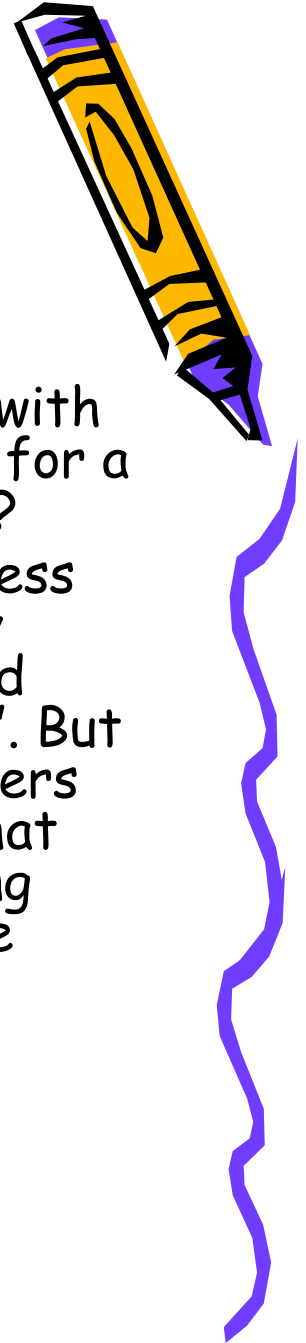


# The Elements Support a Theme



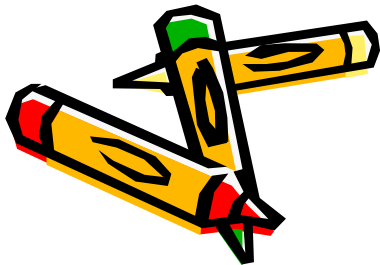
# Mere Games ?

- Great themes and deep meanings are often associated with literature or with great works of art. Is it pretentious for a "mere game" to aspire to the same levels of greatness ?
- Some people view games, in all their forms, as meaningless diversions. Even they admit that some games were very important to them. They say "it wasn't the game I cared about - it was the experience that went with the game". But experience wasn't random. It is what emerges when players interact with the game. The parts of the experience that are important to people, such as the drama of a sporting event, the camaraderie between bridge players etc, are determined by the design of the game.



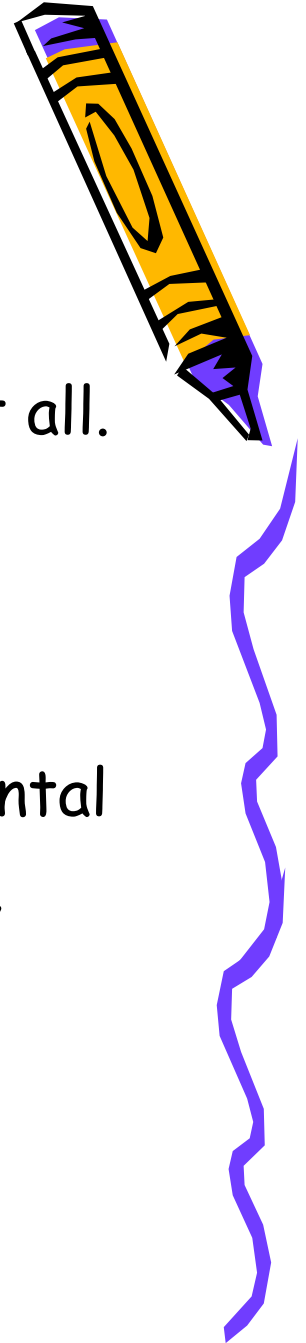
# Mere Games ?

- As technology advances, more and more aspects of human life and expression will be integrated into games. You can put a painting, a radio broadcast, or a movie into a game, but you cannot put a game into these other things.
- All media are subsets of games.
- The problem is that games have only recently emerged as anything like a serious medium of expression. It will take time for the world to grow used to this idea. But we have no reason to wait. We can create game with powerful themes right now.
- Artistic creation is not our goal. We are designers. Our goal is to create powerful experiences.
- We could create games that do not have themes but if our game have unifying, resonant themes, the experiences we create will be much, much stronger.



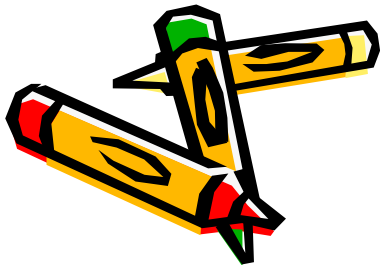
# Lens: The Lens of Unification

- To use this lens, consider the reason behind it all. Ask yourself these questions:
  - What is my theme?
  - Am I using every means possible to reinforce that theme?
- It works very well with the Lens of the Elemental Tetrad. Use the tetrad to separate out the elements of your game, do you can more easily study them from tha perspective of a unified theme.



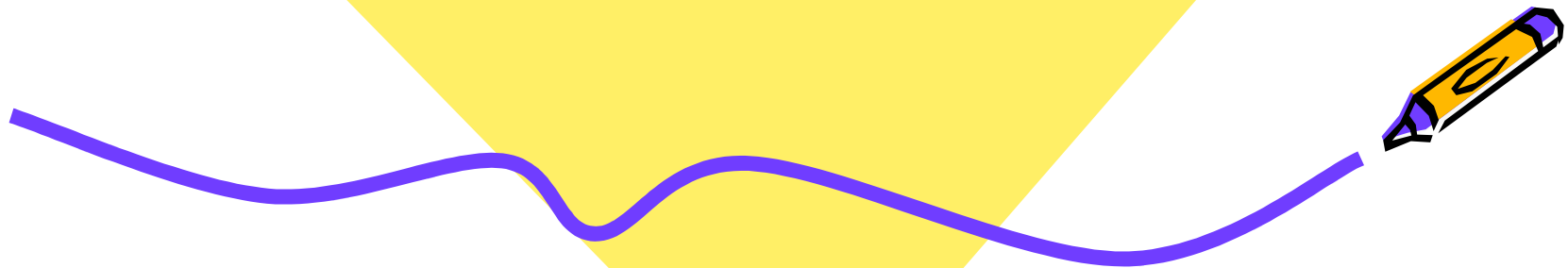
# Lens: The Lens of Resonance

- To use this lens, you must look for hidden power. Ask yourself these questions:
  - What is about my game that feels powerful and special?
  - When I describe my game to people, what ideas get them really excited?
  - If I had no constraints of any kind, what would this game be like?
  - I have certain instincts about how this game should be. What is driving those instincts?
- The Lens of Resonance is a quiet, delicate instrument. It is a tool for listening to yourself and listening to others. We bury important things deep inside ourselves, and when something causes them to resonate, it shakes us to our very core. The fact that these things are hidden gives them power, but also makes them hard for us to find.

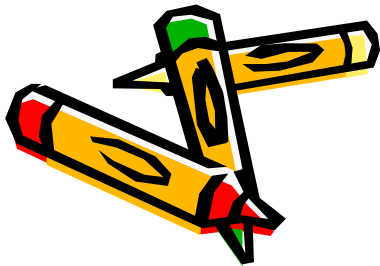
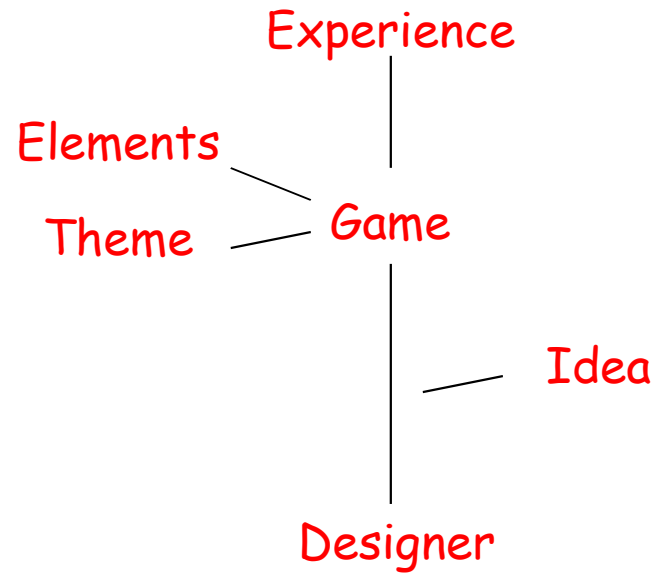
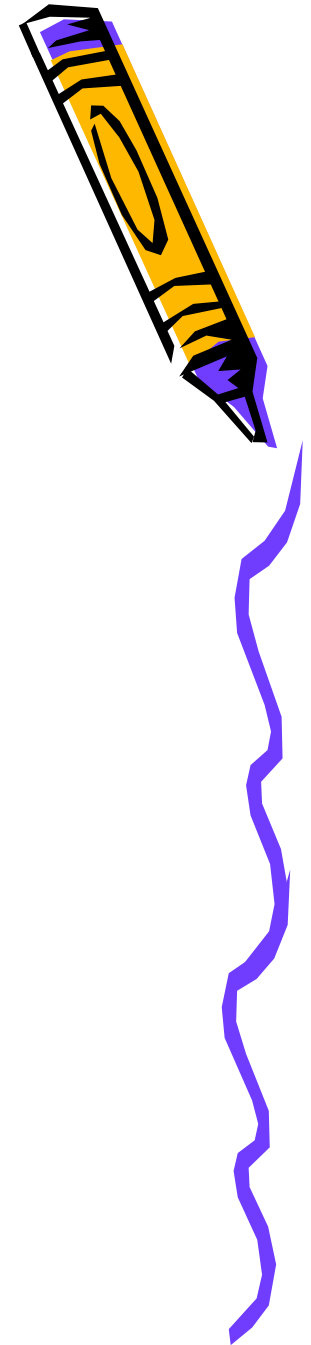




The Game Begins with  
an Idea



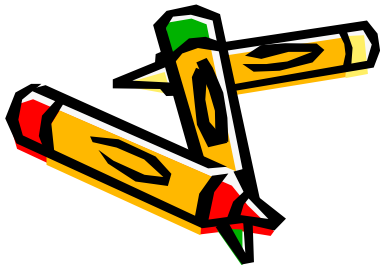
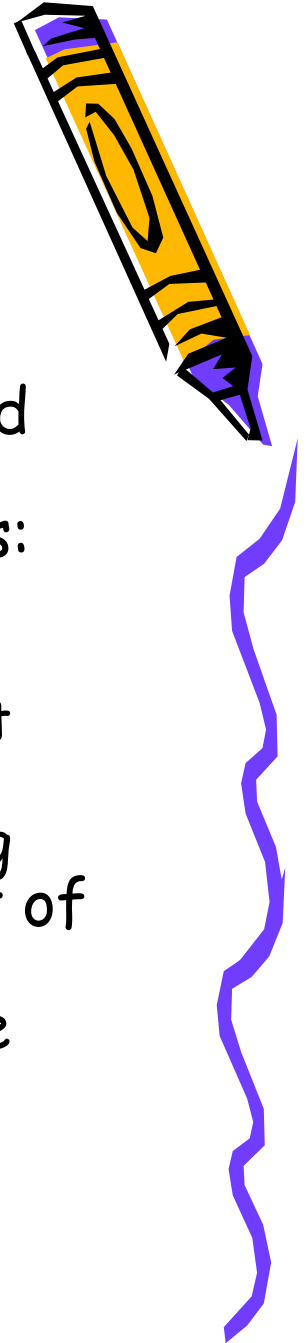
# The Game Begins with an Idea





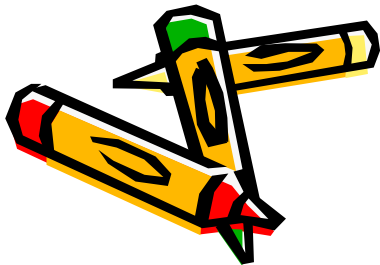
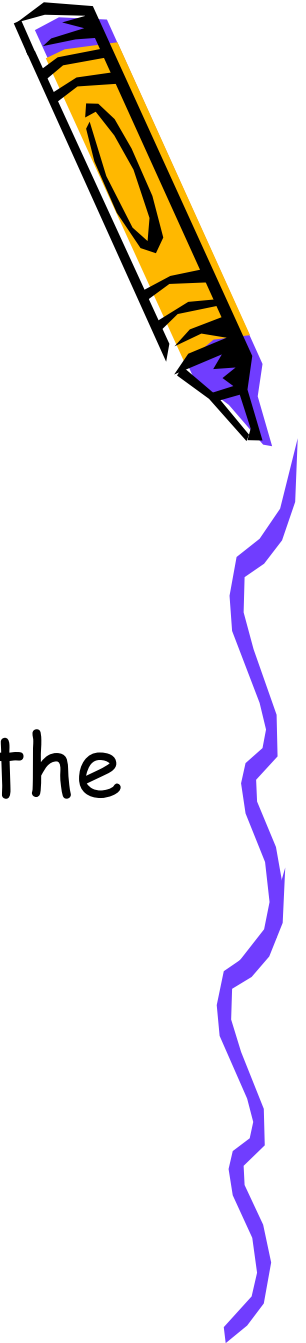
# Lens: The Lens of Infinite Inspiration

- To use this lens, stop looking at your game, and stop looking at games like it. Instead, look everywhere else. Ask yourself these questions:
  - What is the experience I have had in my life that I would want to share with others?
  - In what small way can I capture the essence of that experience and put it into my game?
- Using this lens requires an open mind and a big imagination. Could you capture the excitement of a swordfight with the roll of a die? Could a videogame make the players feel afraid of the dark?



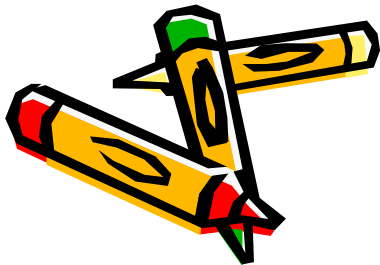
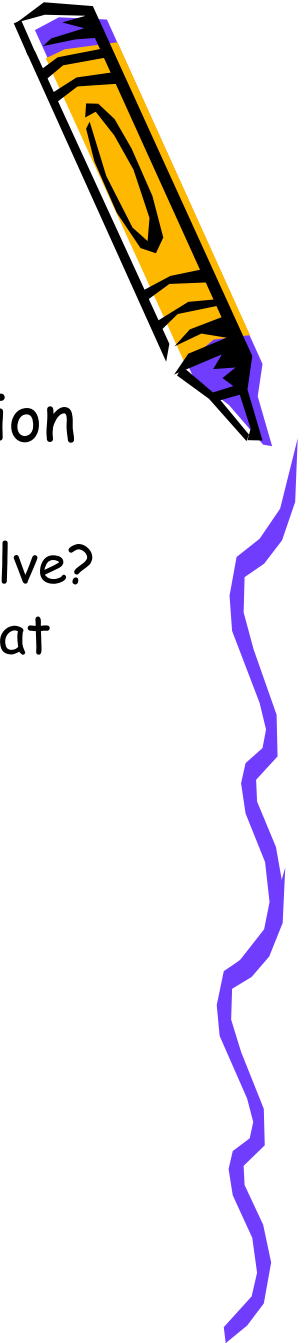
# State the problem

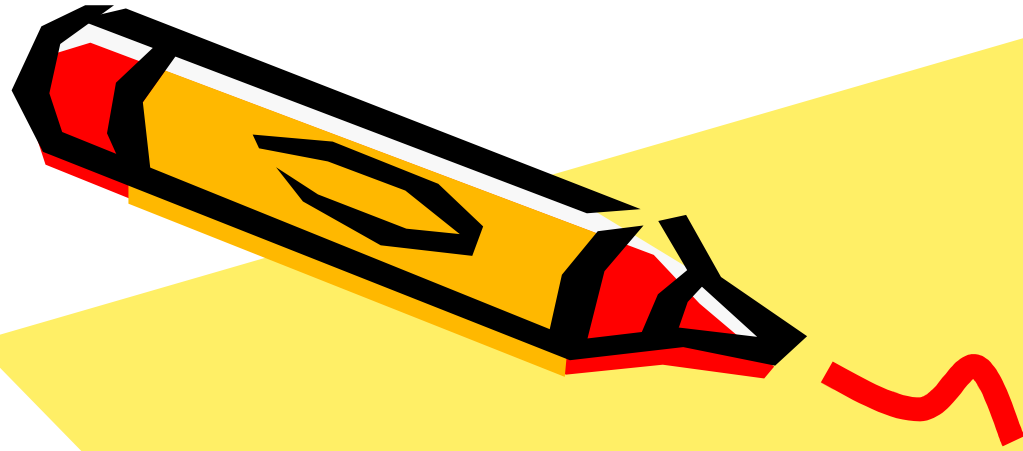
- The purpose of design is to solve problems, and game design is no exception.
- Don't focus on solutions. Focus on the problem.
- Clearly state your problem.



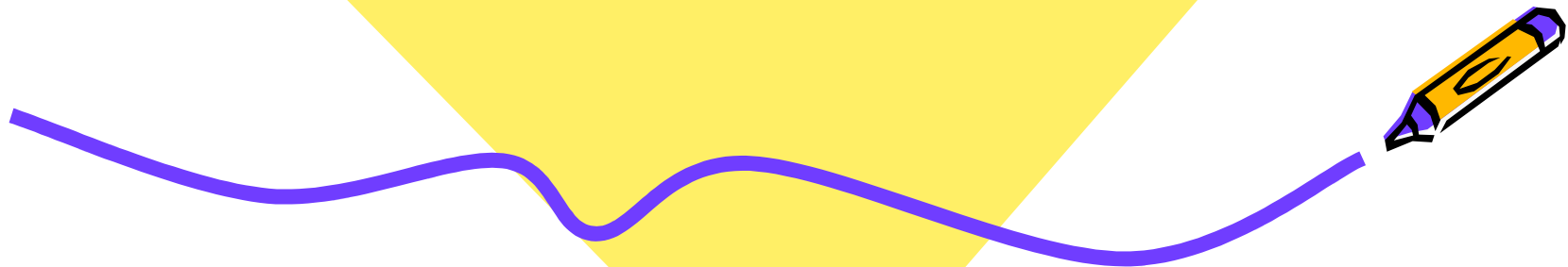
# Lens: The Lens of the Problem Statement

- To use this lens, think of your game as a solution to a problem. Ask yourself these questions:
  - What problem, or problems, am I really trying to solve?
  - Have I been making assumptions about this game that really have nothing to do with its true purpose?
  - Is a game really the best solution? Why?
  - How will I be able to tell if the problem is solved?

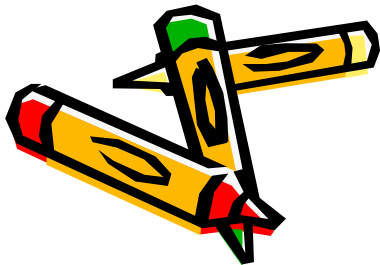
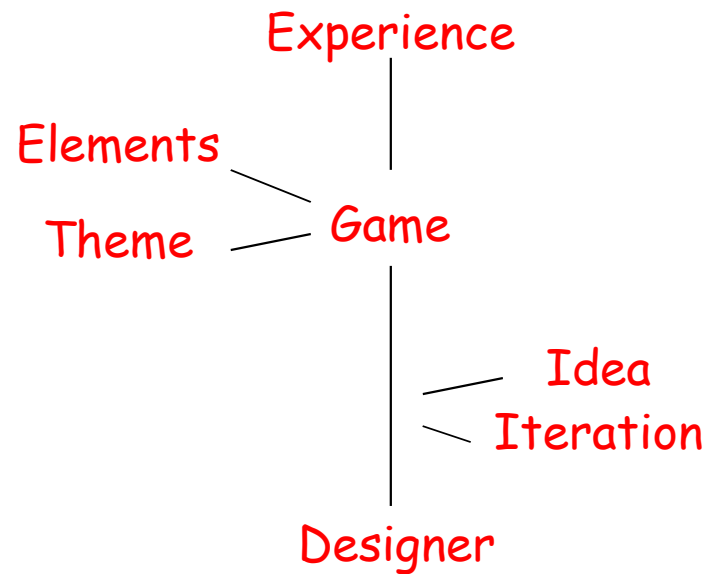
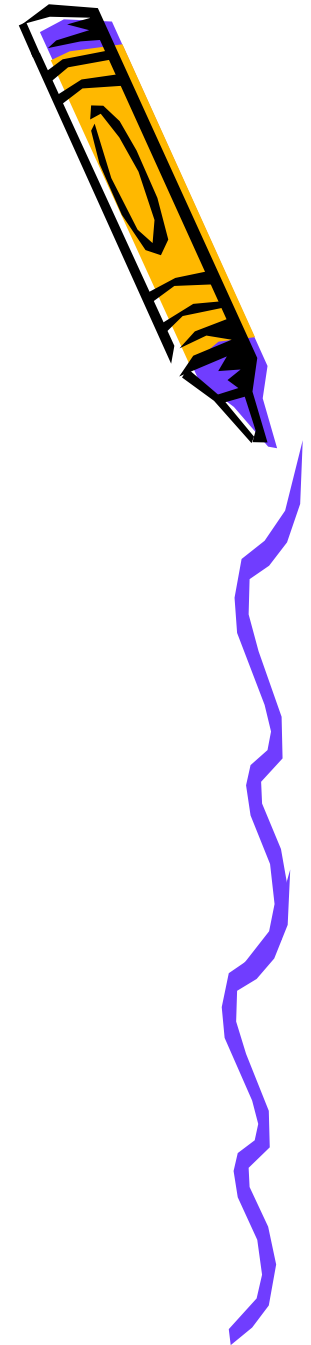




The Game Improves  
Through Iteration

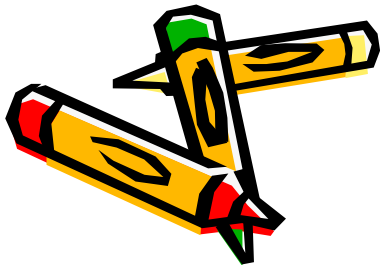
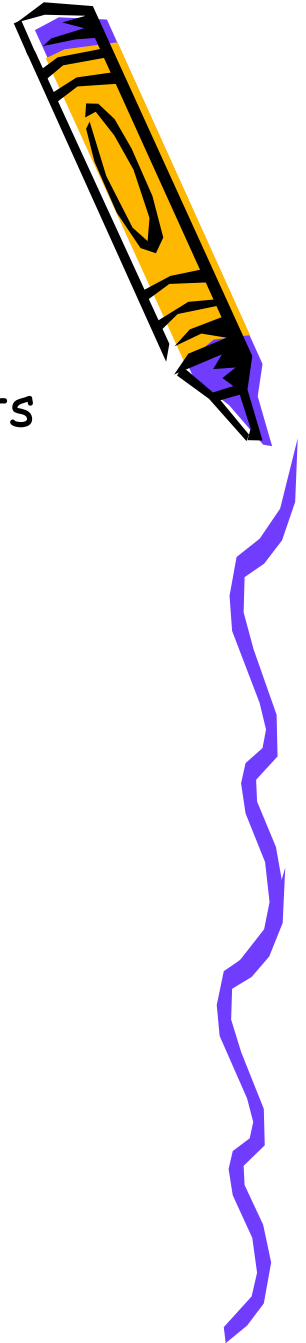


# The Game Improves Through Iteration



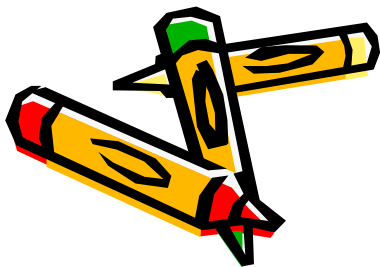
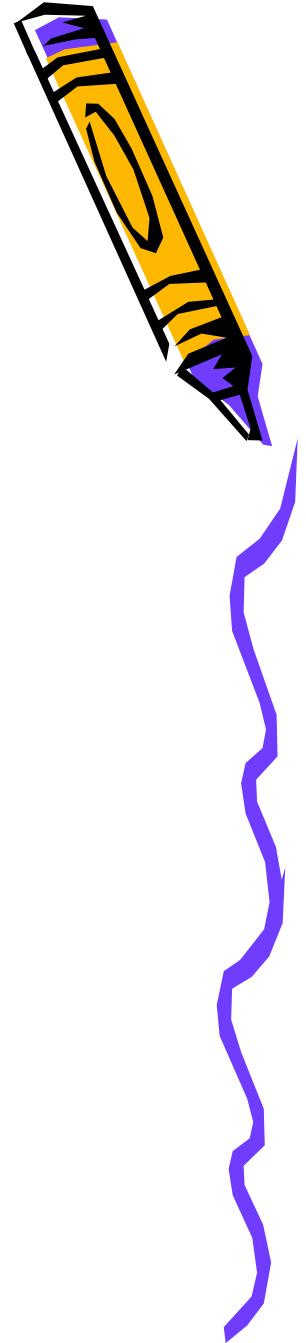
# Lens: The Lens of the Eight Filters

- To use this lens, you must consider the many constraints your design must satisfy. Ask yourself the eight key questions:
  - Does this game feel right?
  - Will the intended audience like this game enough?
  - Is this a well designed game?
  - Is this game novel enough?
  - Will this game sell?
  - Is it technically possible to build this game?
  - Does this game meet our social and community goals?
  - Do the playtesters enjoy this game enough?
- More filters may be required.

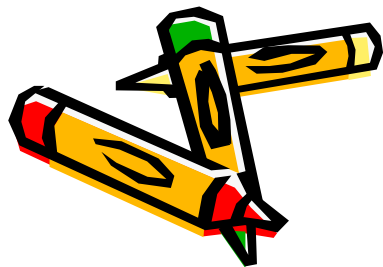
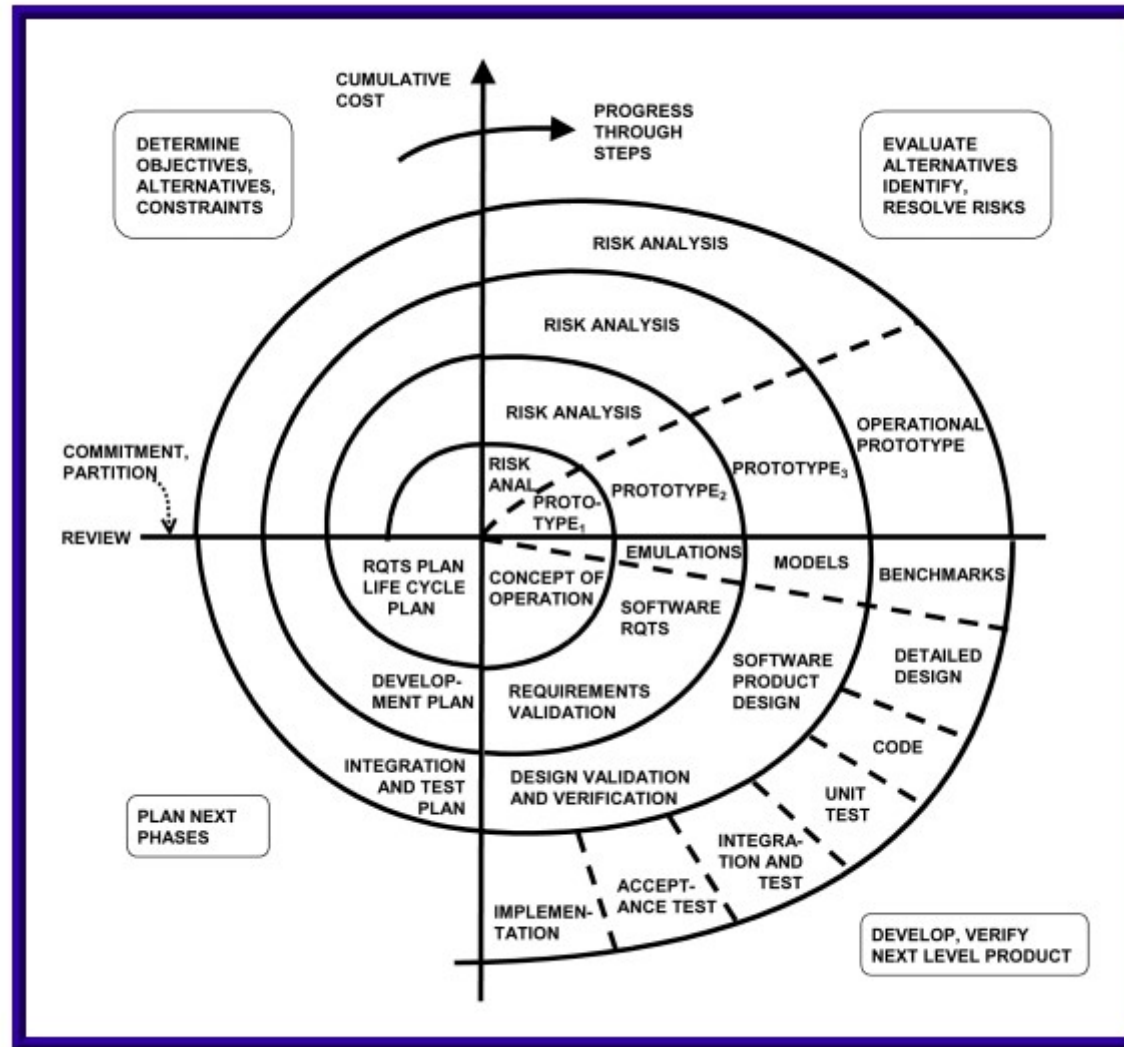
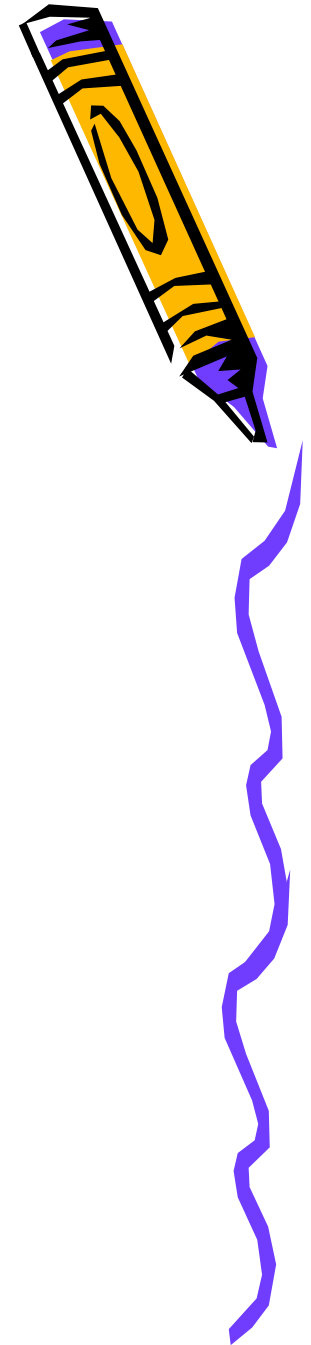


# The Rule of the Loop

- The old way: Waterfall
- Spiral model
  - How can I make every loop count?
    - Assess your risks and mitigate them
  - How can I loop as fast as possible?
    - Build many rough prototypes



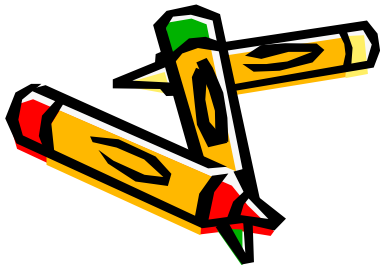
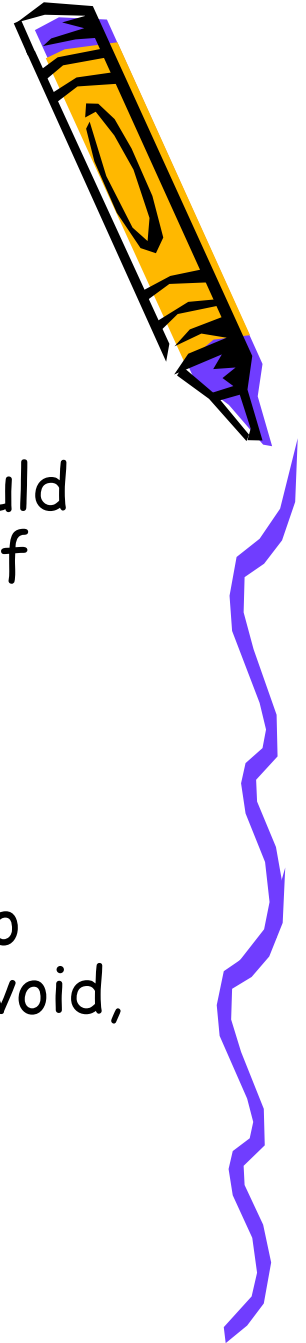
# Barry Boehm Loves You





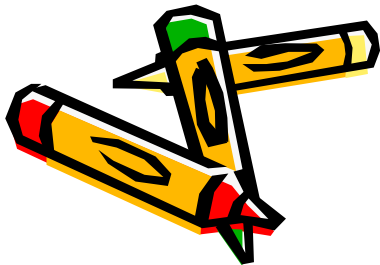
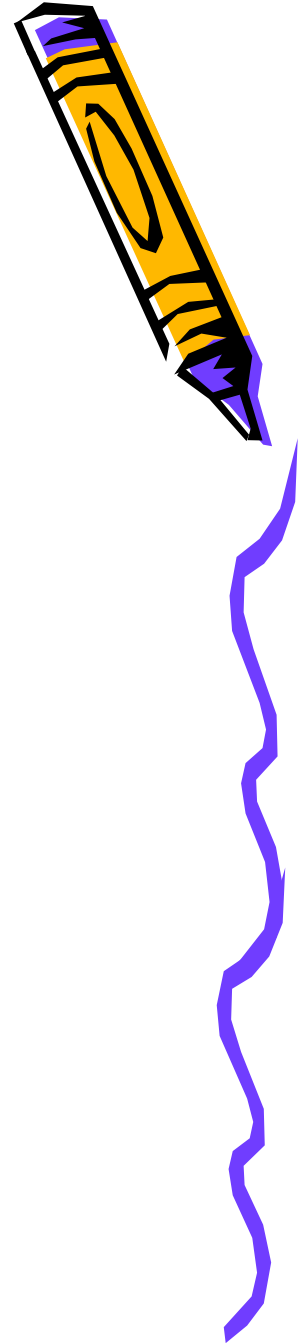
# Lens: The Lens of Risk Mitigation

- To use this lens, stop thinking positively, and start seriously considering the things that could go horribly wrong with your game. Ask yourself the questions:
  - What could keep this game from being great?
  - How can we stop that from happening?
- Risk management is hard. It means you have to face up the problems you would most like to avoid, and solve them immediately.



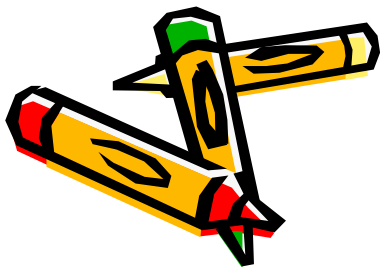
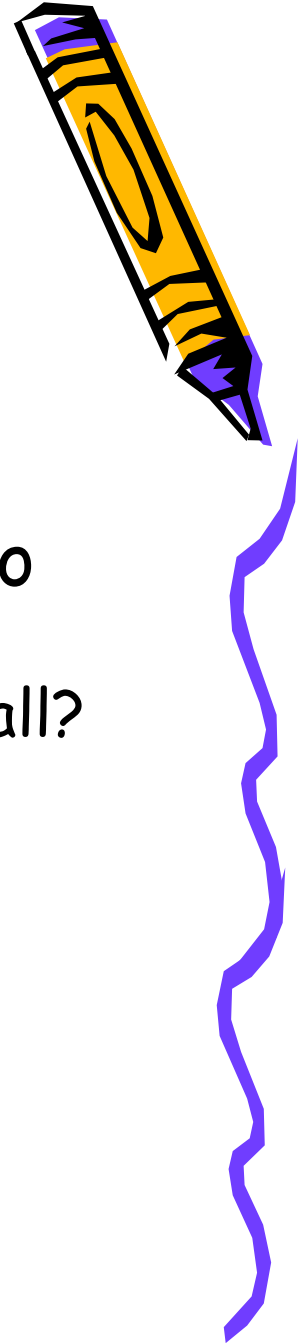
# Productive Prototyping

- Answer a Question
- Forget Quality
- Don't Get Attached
- Prioritize Your Prototypes
- Parallelize Prototypes Productively
- It Doesn't Have to be Digital
- Pick a "Fast Loop" Game Engine
- Build the Toy First



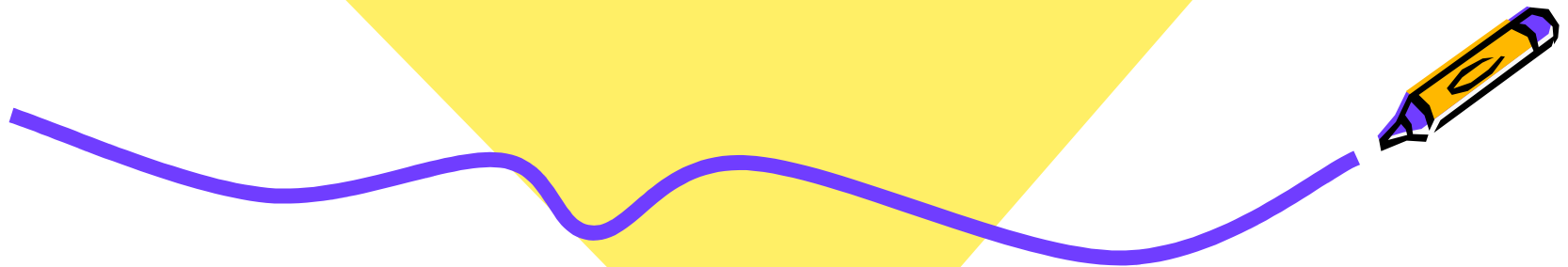
# Lens: The Lens of the Toy

- To use this lens, stop thinking about whether your game is fun to play, and start thinking about whether it is fun to play with. Ask yourself the questions:
  - If my game had no goal, would it be fun at all? If not, how can I change that?
  - When people see my game, do they want to start interacting with it, even before they know what to do? If not, how can I change that?

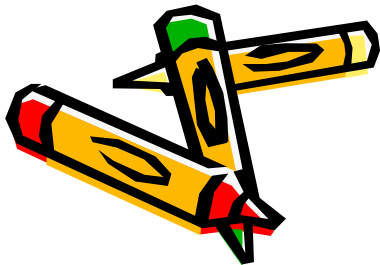
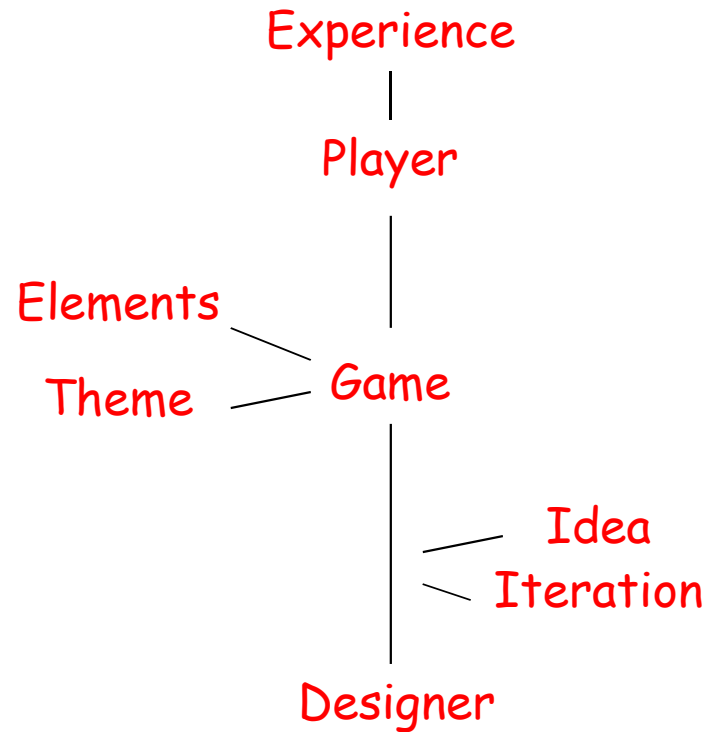
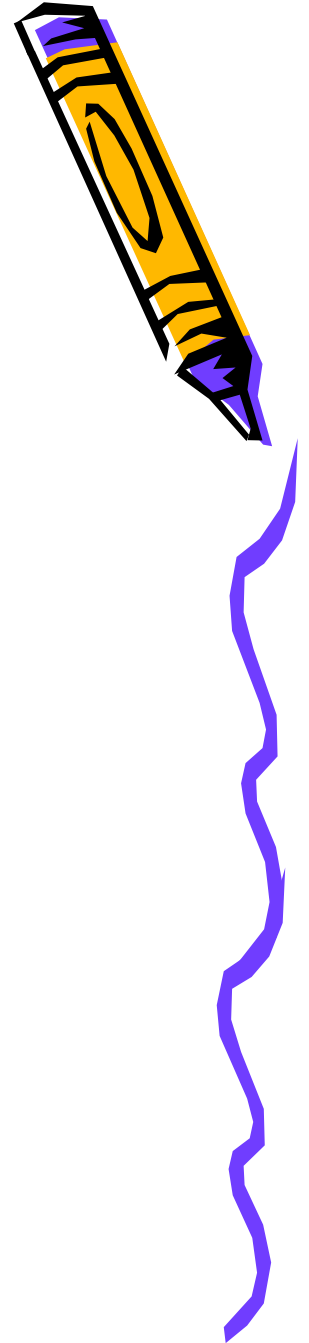




The Game is Made for  
a Player

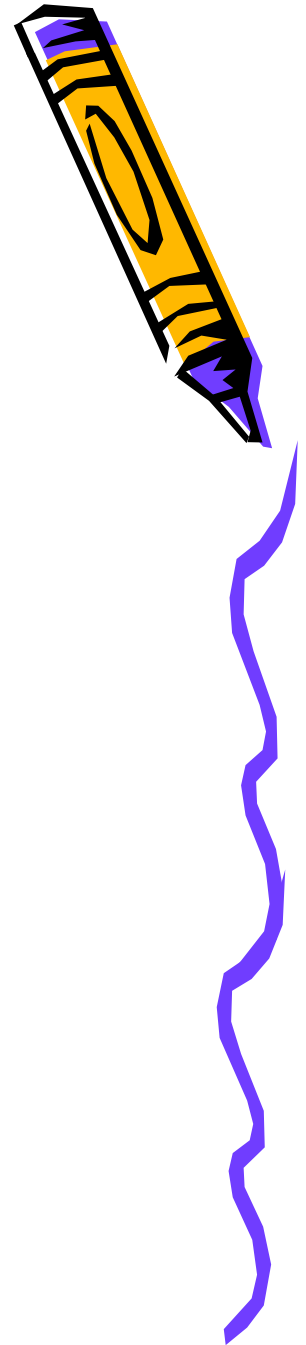
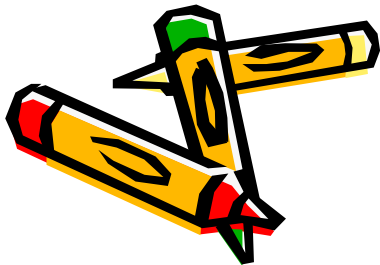


# The Game is Made for a Player



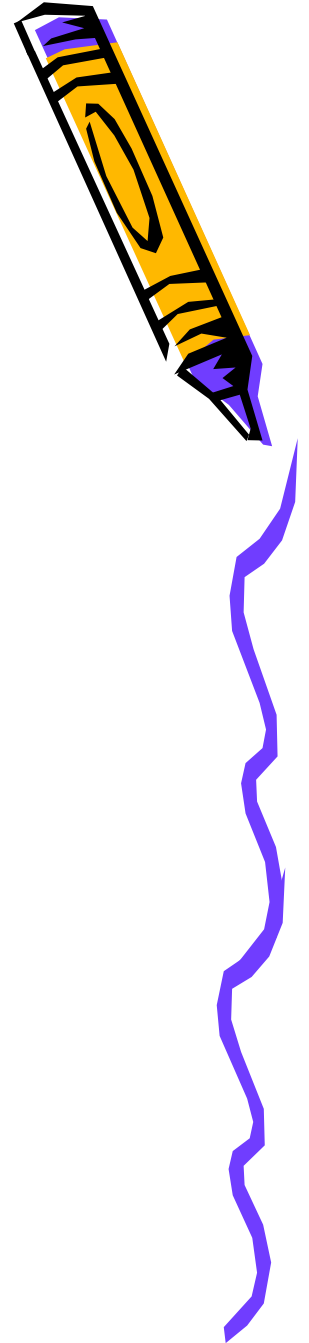
# Demographics

- 0-3: Infant/Toddler
- 4-6: Preschooler
- 7-9: Kids
- 10-13: Preteen
- 13-18: Teen
- 18-24: Young Adult
- 25-35: Twenties and Thirties
- 35-50: Thirties and Forties
- 50+: Fifties and Up



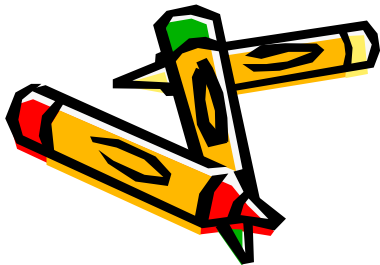
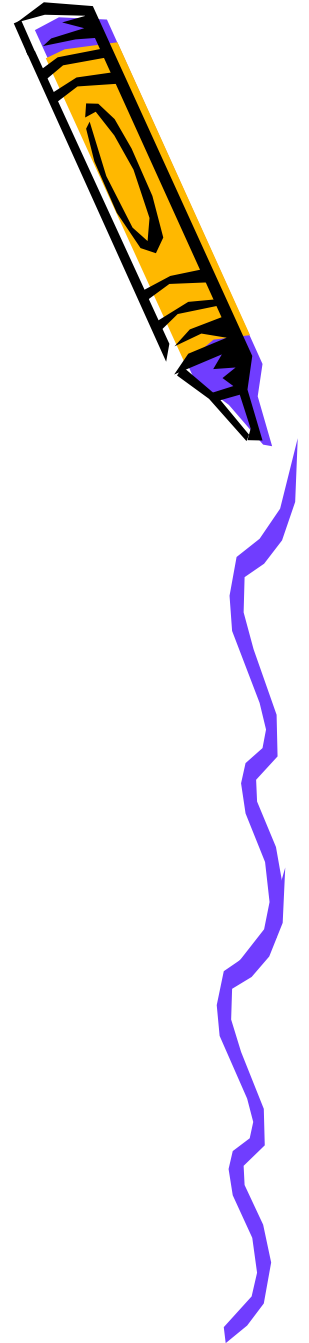
# 5 things Males Like to See in Games

- Mastery
- Competition
- Destruction
- Spatial Puzzles
- Trial and Error



# 5 things Females Like to See in Games

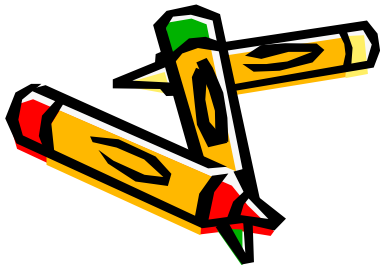
- Emotion
- Real World
- Nurturing
- Dialog and Verbal Puzzles
- Learning by Example





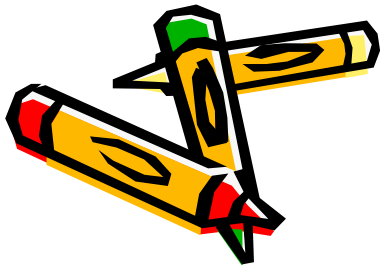
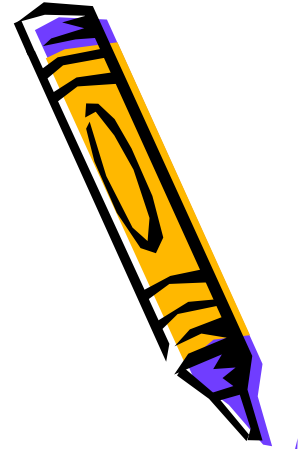
# Lens: The Lens of the Player

- To use this lens, stop thinking about your game, and start thinking about your player. Ask yourself these questions about the people who will play your game.
  - In general, what do they like?
  - What don't they like? Why?
  - What do they expect to see in a game?
  - If I were in their place, what would I want to see in a game?
  - What would they like or dislike about my game in particular?
- A good game designer should always be thinking of the player, and should be an advocate for the player. Skilled designers hold the Lens of the Player and the Lens of the Holographic Design in the same hand, thinking about the player, the experience of the game, and the mechanics of the game all at the same time. Thinking about the player is useful but even more useful is watching them play your game. The more you observe them playing the more easily you'll be able to predict what they are going to enjoy.



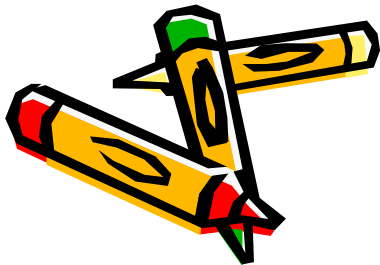
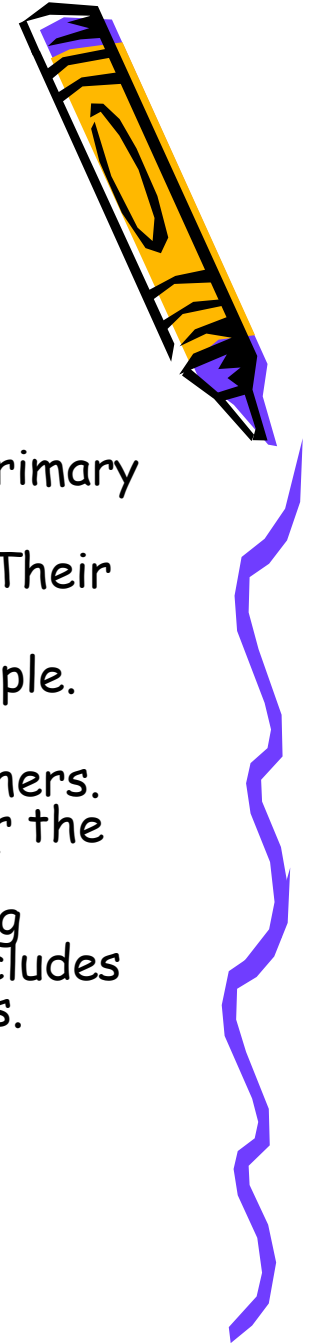
# Psychographics

- LeBlanc's Taxonomy of Game Pleasures:
  - Sensation
  - Fantasy
  - Narrative
  - Challenge
  - Fellowship
  - Discovery
  - Expression
  - Submission

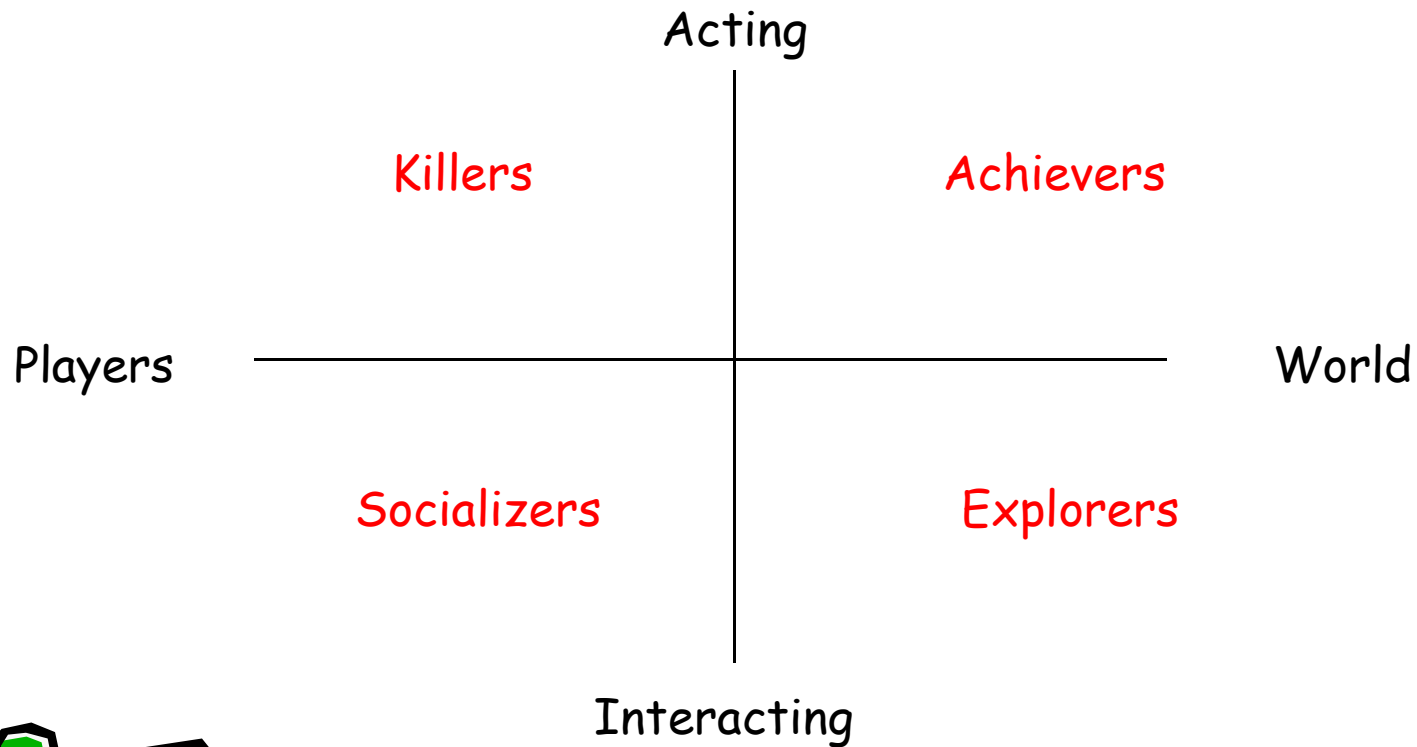
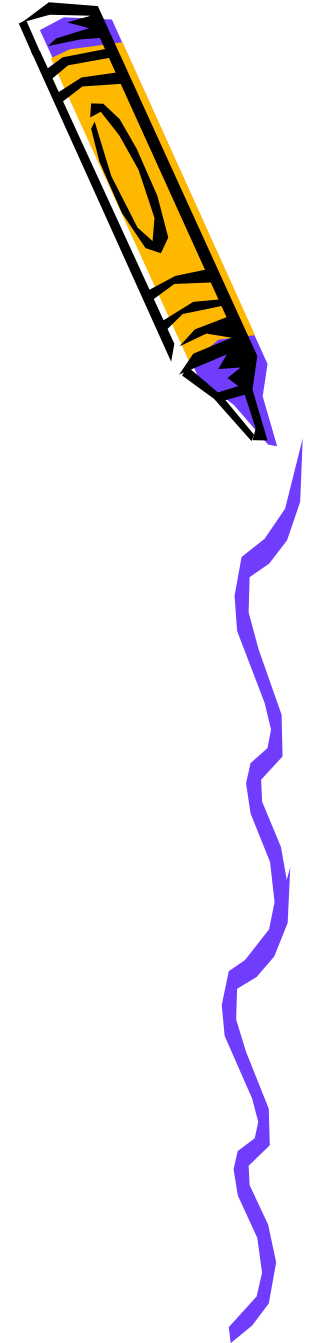


# Psychographics

- Bartle's Taxonomy of Player Types
  - Achievers want to achieve the goals of the game. Their primary pleasure is Challenge.
  - Explorers want to get to know the breadth of the game. Their primary pleasure is Discovery.
  - Socializers are interested in relationships with other people. Their primary pleasure is Fellowship.
  - Killers are interested in competing with and defeating others. This category doesn't map well to LeBlanc's taxonomy. For the most part it seems killers enjoy a mix of the pleasures of competition and destruction. Interestingly, they "imposing themselves to others" which means that this category includes also people that are primarily interested in helping others.

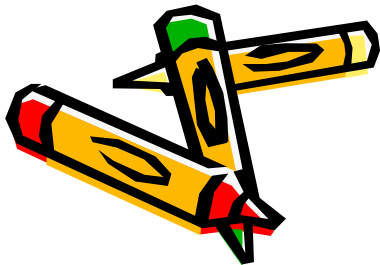
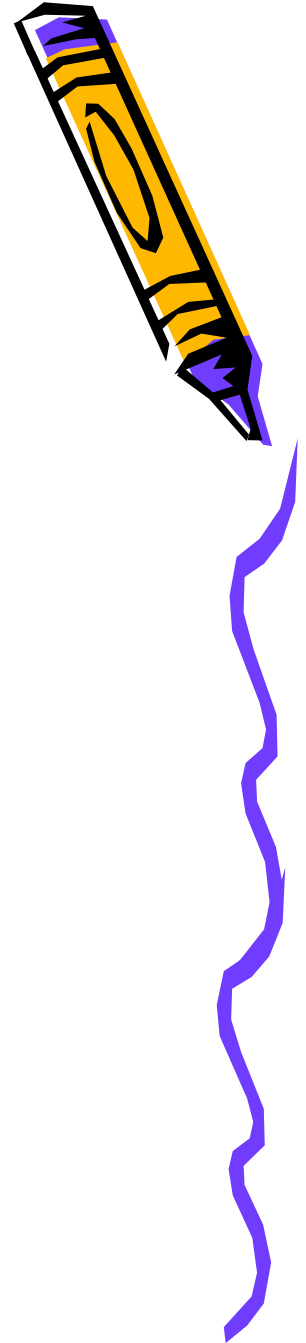


# Bartle's Taxonomy of Player Types



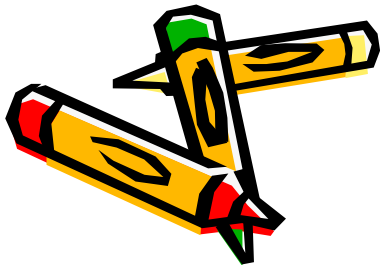
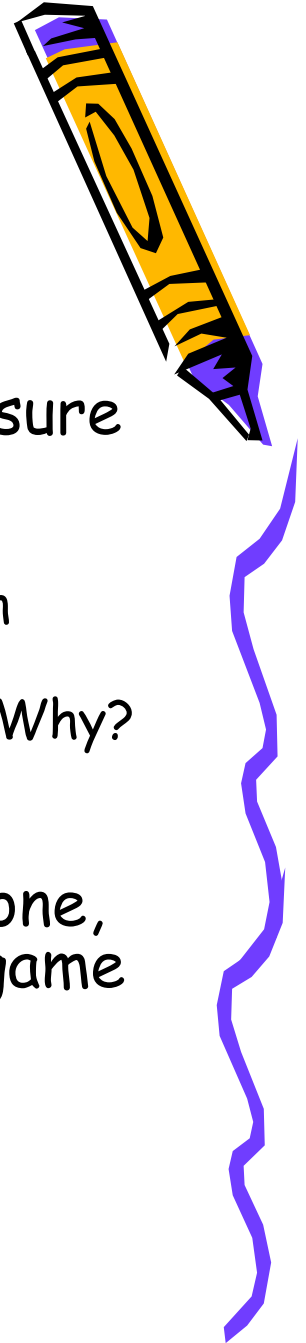
# Psychographics

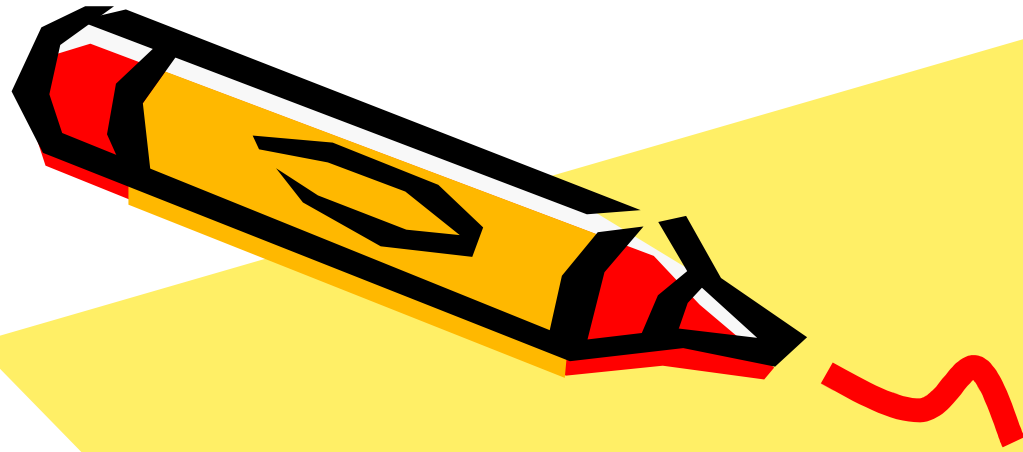
- A list of a few more pleasures:
  - Anticipation
  - Delight in Another's Misfortune
  - Gift Giving
  - Humor
  - Possibility
  - Pride in an Accomplishment
  - Purification
  - Surprise
  - Thrill
  - Triumph over Adversity
  - Wonder



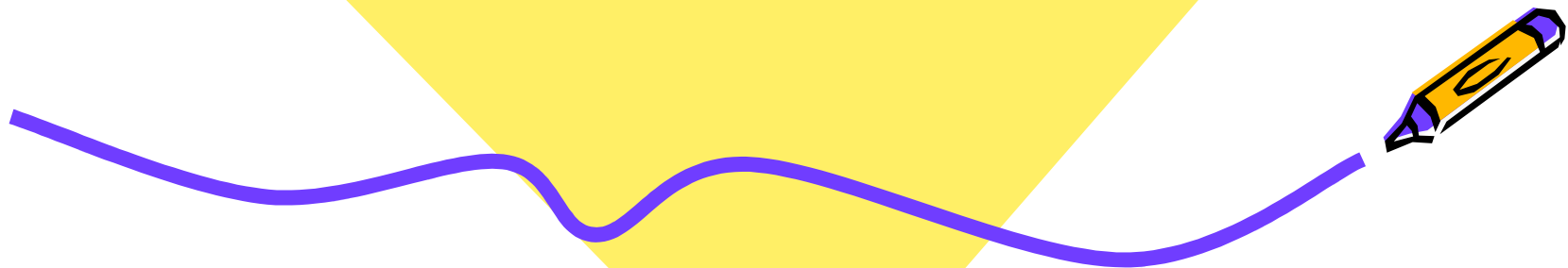
# Lens: The Lens of Pleasure

- To use this lens, think about the kinds of pleasure your game does and does not provide. Ask yourself these questions:
  - What pleasures does your game give to players? Can these be improved?
  - What pleasures are missing from your experience? Why? Can they be added?
- By going through lists of known pleasures, and considering how well your game delivers each one, you may be inspired to make changes to your game that will increase your players' enjoyment.

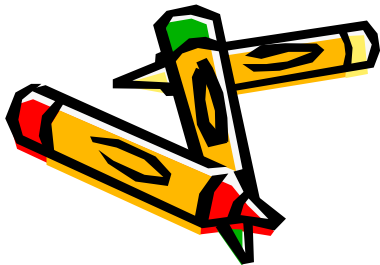
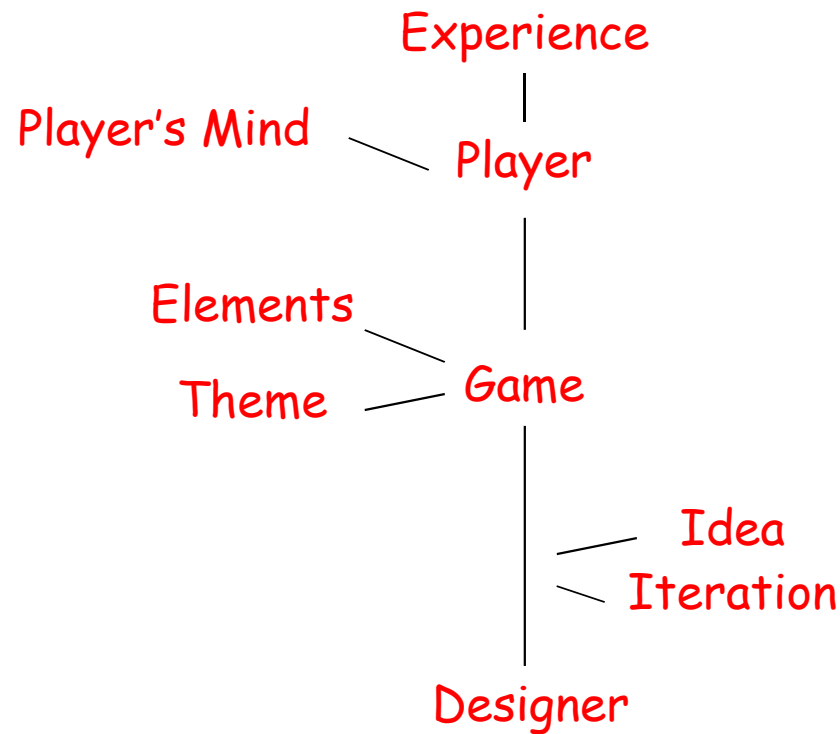
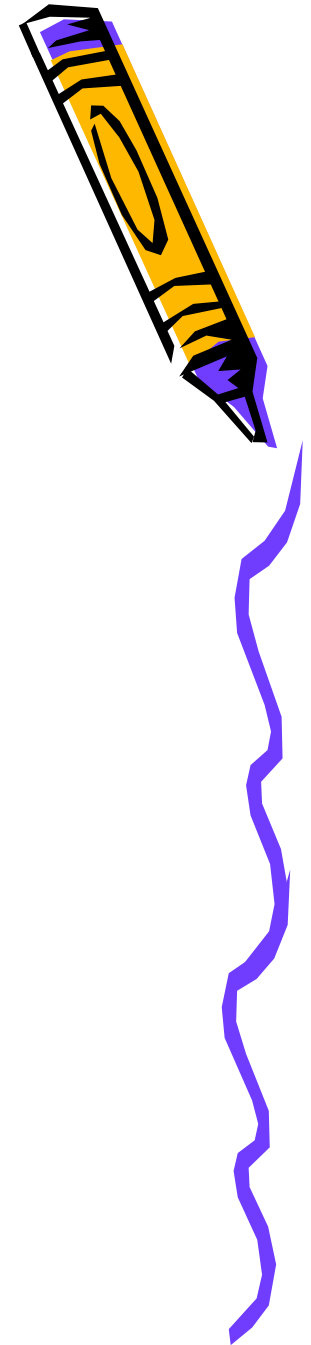




The experience is in  
the Player's Mind



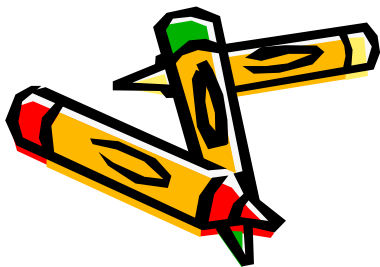
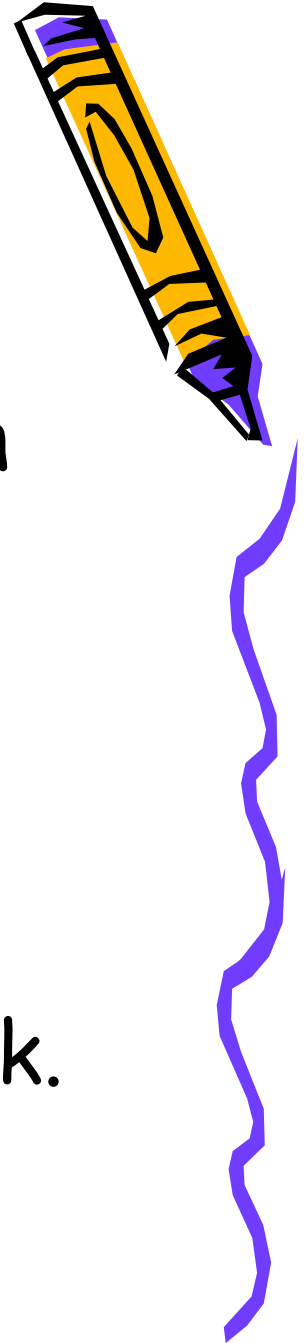
# The experience is in the Player's Mind





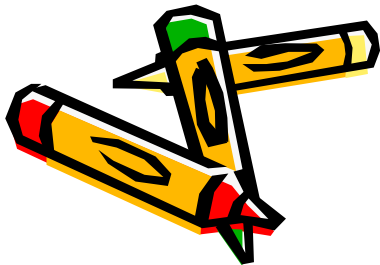
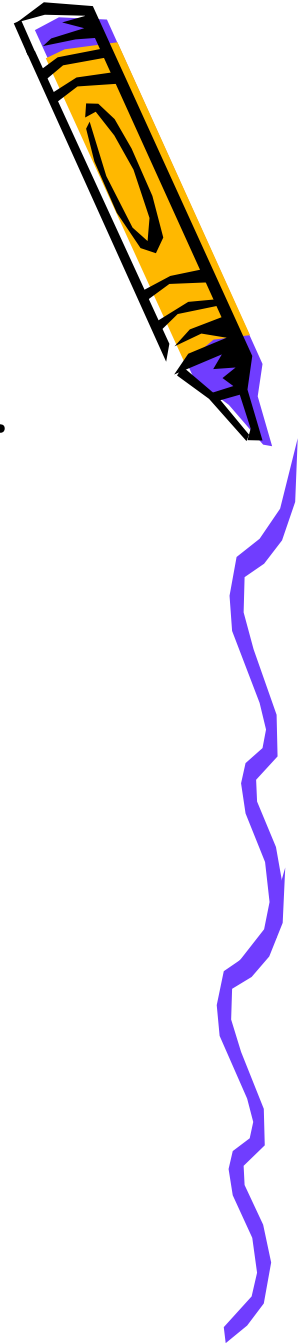
# Subconscious processes

- The majority of what is going on in our brains is hidden from the conscious mind. Psychologists are gradually making progress toward understanding these subconscious processes, but generally, we are in the dark as to how they really work.



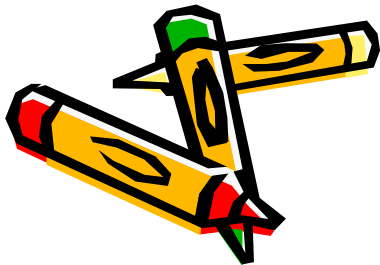
# Mental abilities and Gameplay

- Four principal mental abilities that make gameplay possible.
  - Modeling
  - Focus
  - Imagination
  - Empathy



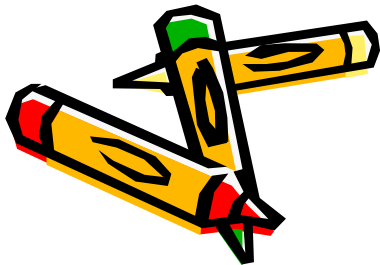
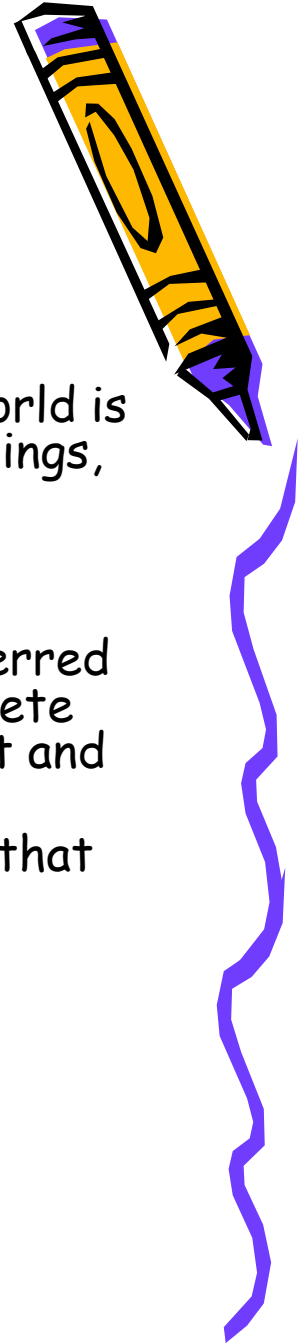
# Modeling

- Reality is amazingly complex. The only way our minds are able to get by at all is by simplifying reality so that we can make some sense of it.
- Our brains do a tremendous amount of work to boil down the complexity of reality into simpler mental models that can be easily stored, considered and manipulated.
- Games, with their simple rules, are pre-digested models that we can easily absorb and manipulate.



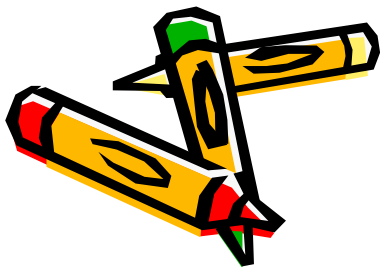
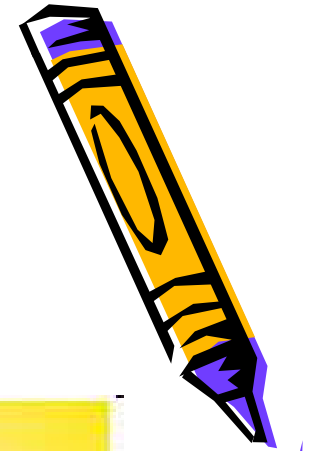
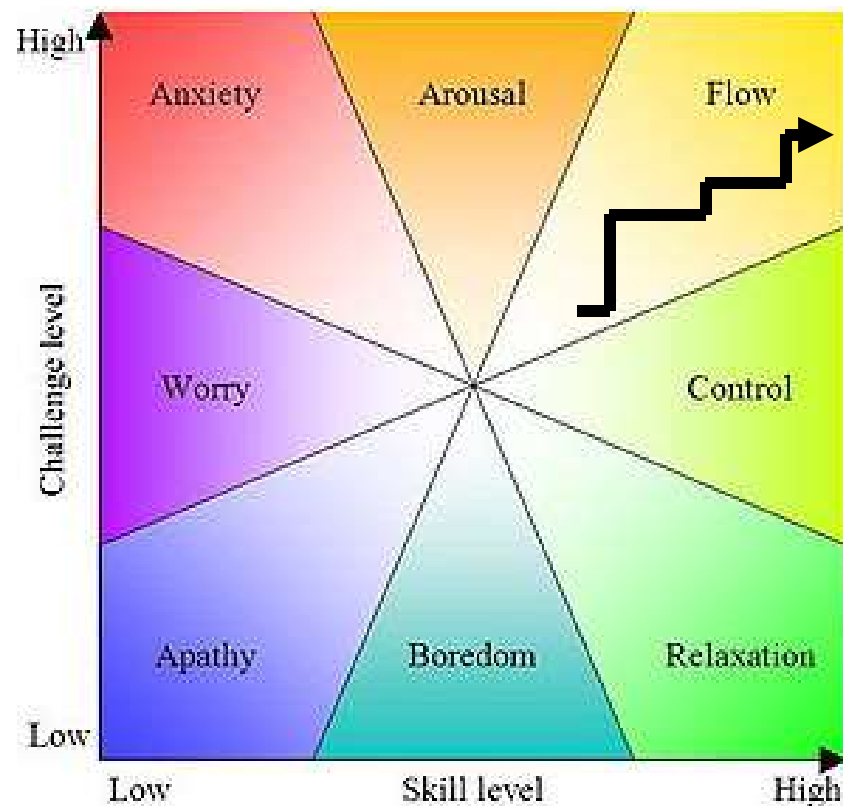
# Focus

- One crucial technique our brains use to make sense of the world is the ability to focus its attention selectively, ignoring some things, and devoting more mental power to others.
- What we focus on at any given moment is determined by our unconscious desires and our conscious will.
- The state of sustained focus, pleasure, and enjoyment is referred to as "Flow". Flow is sometimes defined as "a feeling of complete and energized focus in a activity, with high level of enjoyment and fulfillment".
- Some of the key components necessary to create an activity that puts a player into a flow state are:
  - Clear goals
  - No distractions
  - Direct feedback
  - Continuously challenging



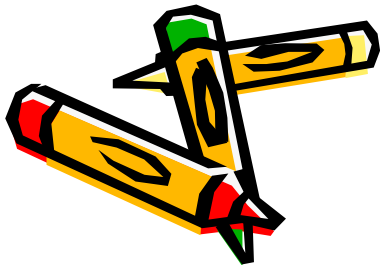
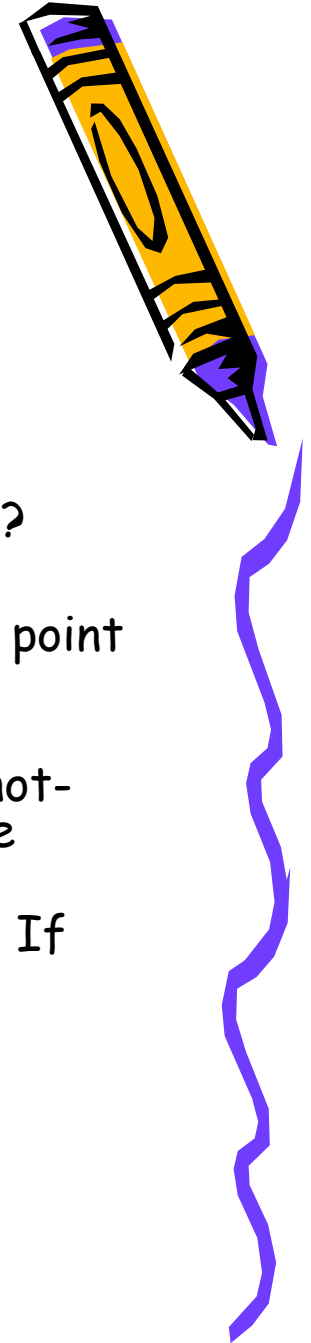
# Challenge vs Skill

- This is a diagram of mental states, as developed by Mihaly Csikszentmihalyi, showing how challenge level and skill level contribute to various mental states.
- The skill of the player will increase but the game designer must manage to stay in the narrow margin "flow channel".



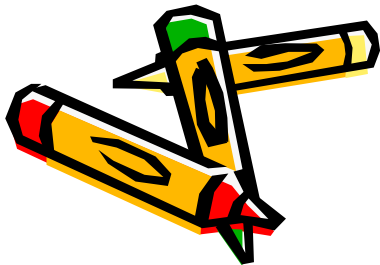
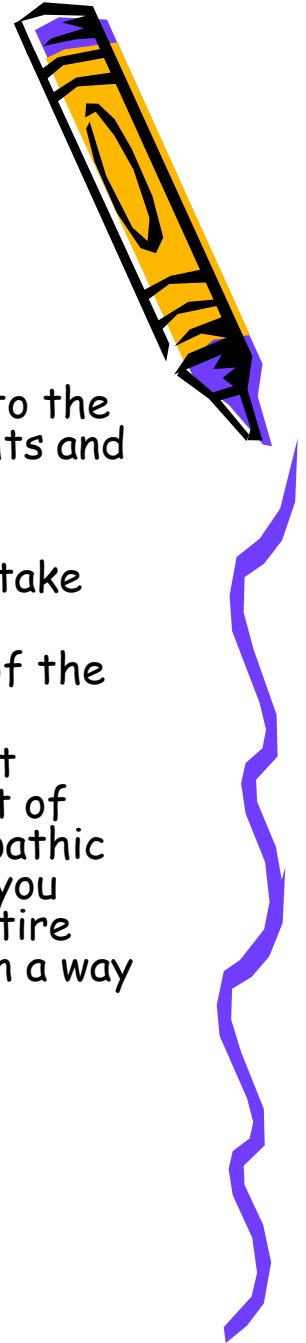
# Lens: The Lens of Flow

- To use this lens, consider what is holding your player's focus. Ask yourself these questions:
  - Does my game have clear goals? If not how can I fix that?
  - Are the goals of the player the same goals I intended?
  - Are there parts of the game that distract players to the point they forget their goal? If so, can these distractions be reduced, or tied into the game goals?
  - Does my game provide a steady stream of not-too-easy, not-too-hard challenges, taking into account the fact that the player's skills may be gradually improving?
  - Are the player's skills improving at the rate I had hoped? If not, how can I change that?



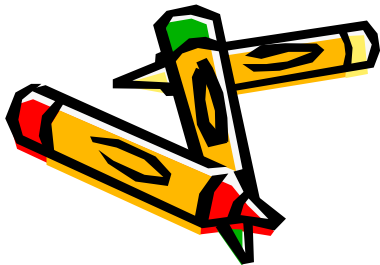
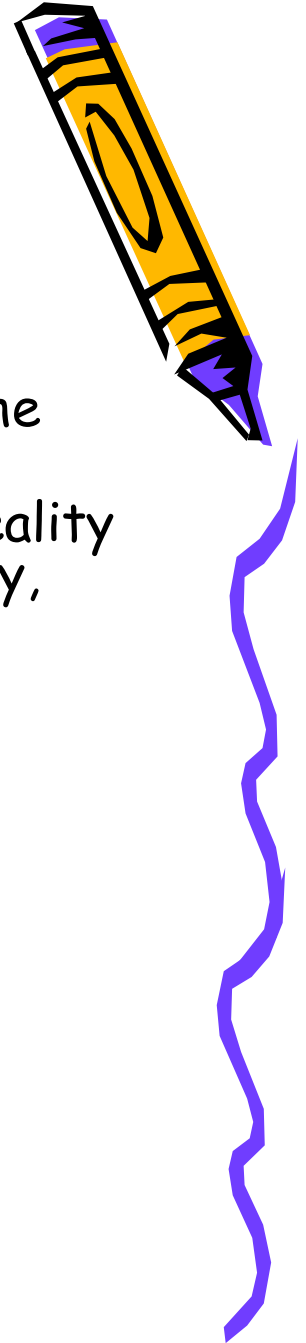
# Empathy

- As human beings, we have the amazing ability to project ourselves into the place of others. When we do this, we think the other person's thoughts and feel their feeling, to the best of our ability. An integral part of the gameplay.
- The power of empathy is strong. If someone projects an emotion we take on the emotion ourselves even if consciously we don't want to.
- Entertainers use our power of empathy to make us feel we are part of the story-world they are creating.
- As game designers we will make use of empathy in the same ways that novelists, graphic artists, and filmmakers do, but we have our own set of new empathic interactions. Games are about problem solving, and empathic projection is a useful method of problem solving. Moreover in games you don't just project your feelings into a character, you project your entire decision-making capacity into that character, and can become them in a way that isn't possible in non-interactive media.



# Imagination

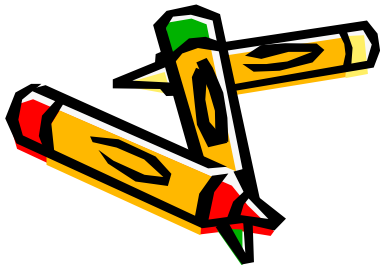
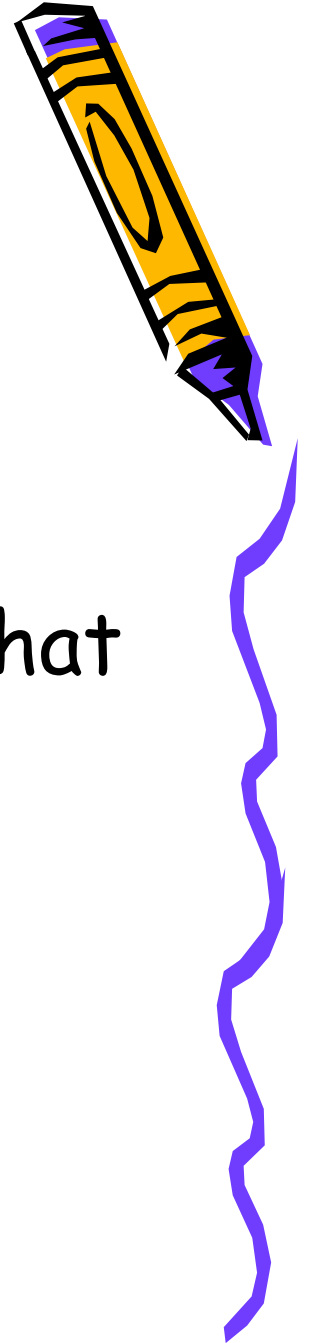
- Imagination puts the player into the game by putting the game into the player.
- The fact that our brains deal in simplified models of reality means that we can manipulate these models effortlessly, even into situations that wouldn't be possible in reality.
- Imagination uses two crucial functions:
  - Communication (often for storytelling)
  - Problem solving
- Games feature both of these, so the designers must understand how to engage the player's imagination as a storytelling partner, as well as having a sense of the problems it will and will not be able to solve.



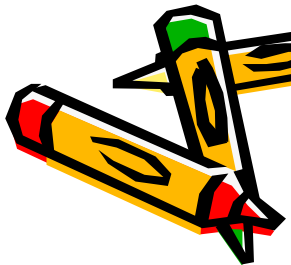
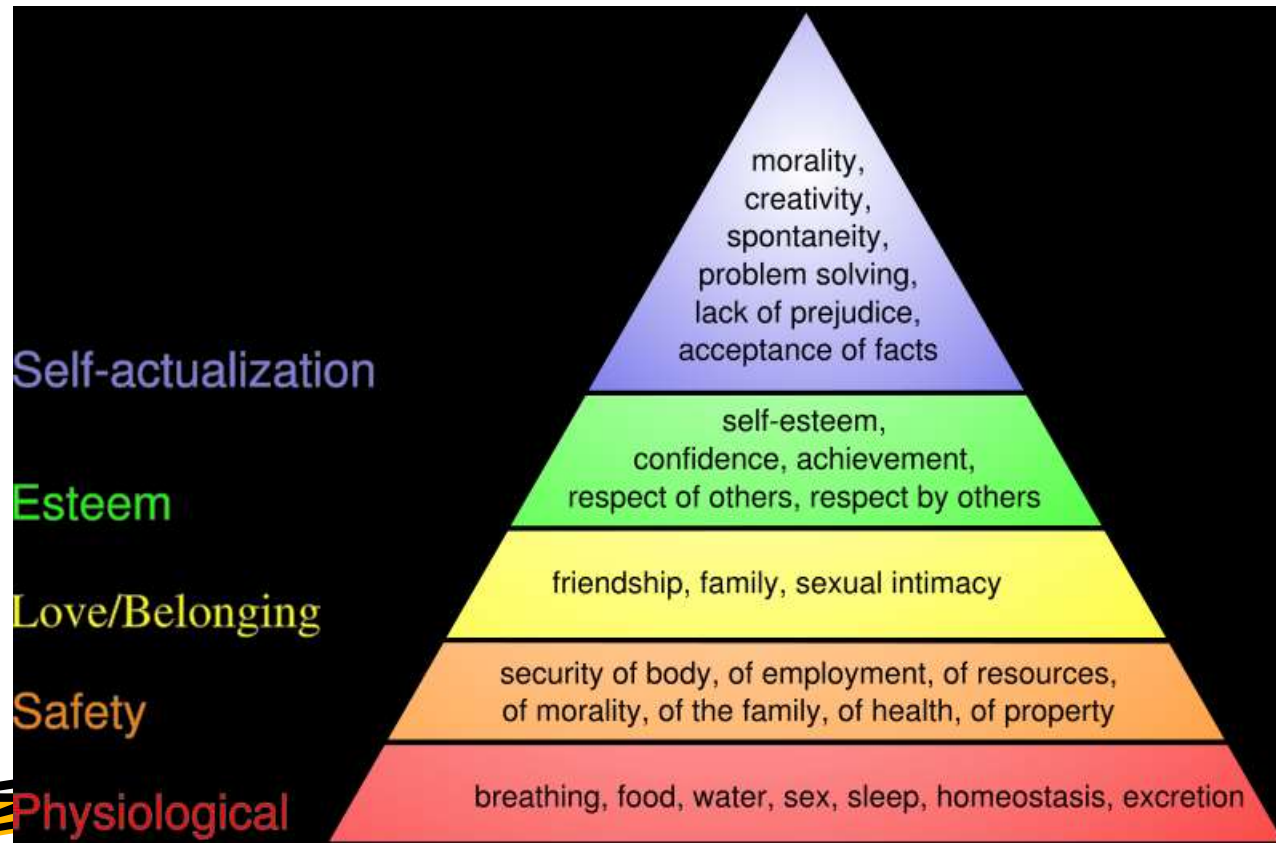
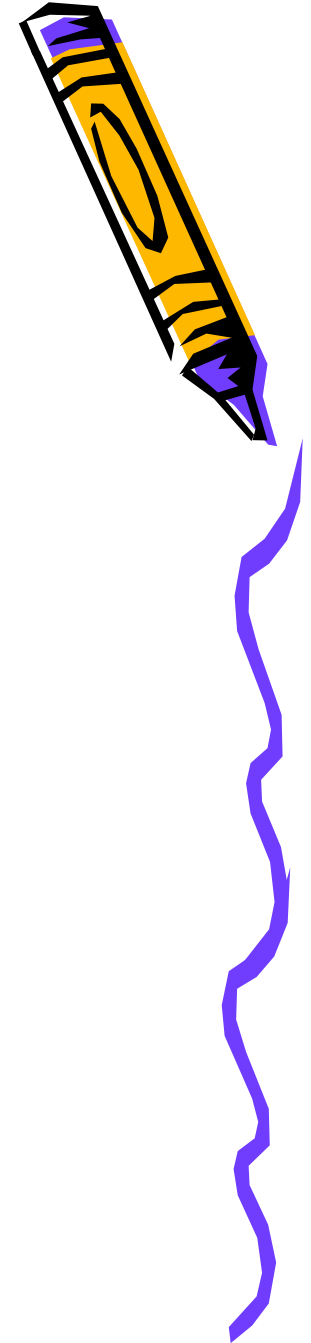


# Motivation

- Why the brain is motivated to use the key mental abilities (modeling, focus, empathy, and imagination) that make gameplay possible?

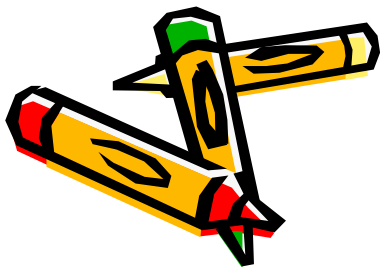


# Maslow's Hierarchy of Needs



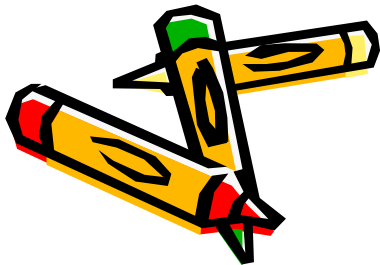
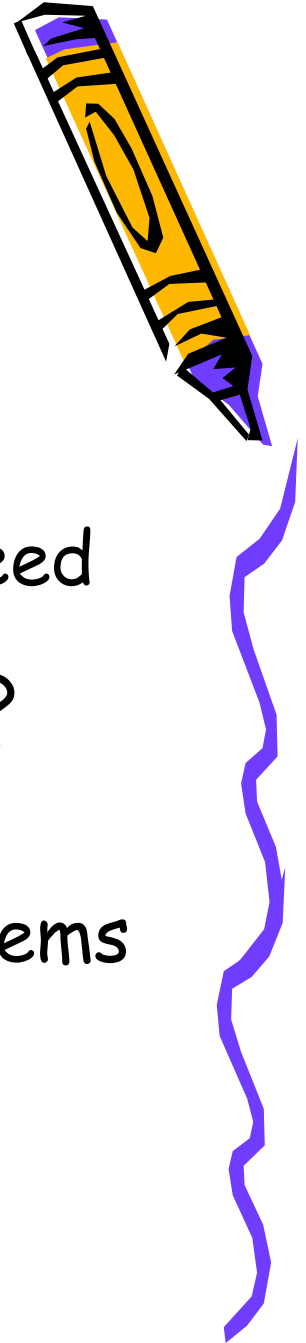
# Lens: The Lens of Needs

- To use this lens, stop thinking about your game, and start thinking about what basic human needs it fulfills. Ask yourself these questions:
  - On which levels of Maslow's hierarchy is my game operating?
  - How can I make my game fulfill more basic needs that it already is?
  - On the levels my game is currently operating, how can it fulfill those needs even better?
- It sounds strange to talk about a game fulfilling basic human needs but everything that people do is an attempt to fulfill these needs in some way. And some games fulfill needs better than others.



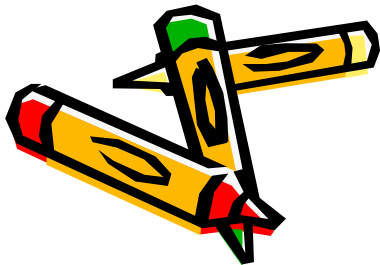
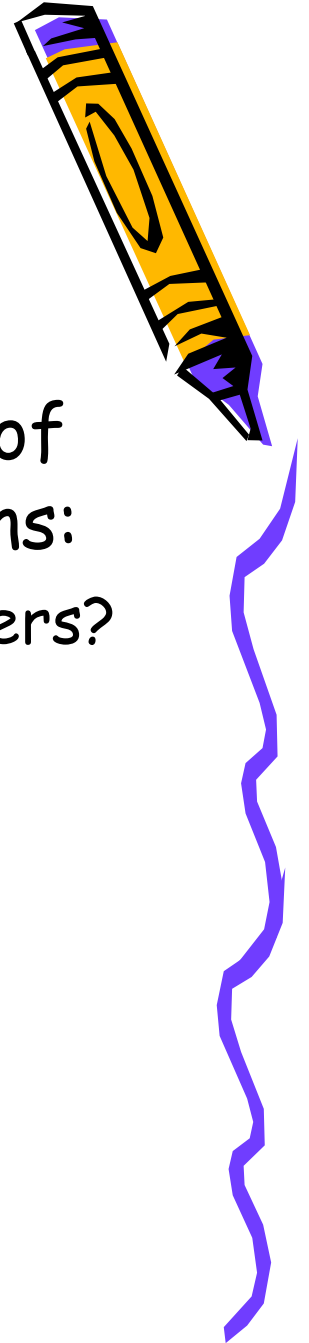
# Judgment

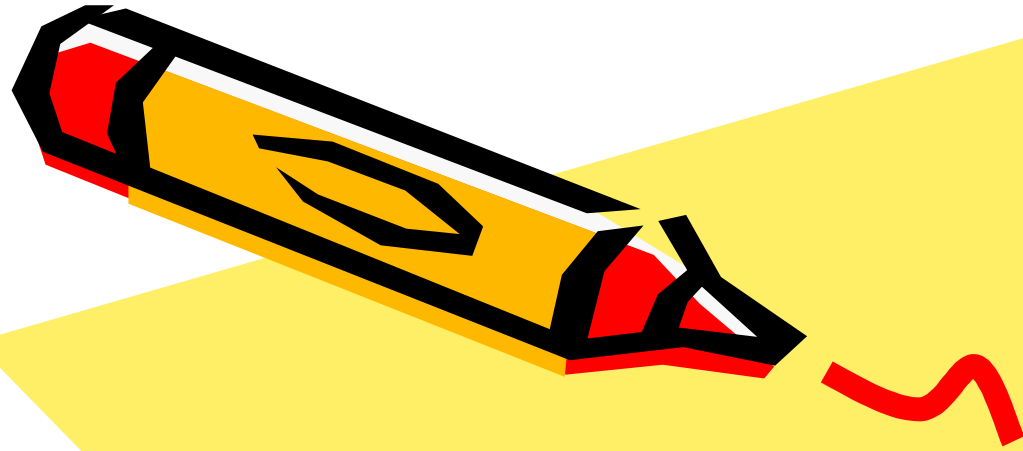
- The fourth level of Maslow's hierarchy, self-esteem, is the one most intimately connected to games. Why? One deep need common to everyone is the need to be judged. Don't people hate being judged? They don't, they only hate being judged unfairly.
- The fact that games are excellent systems for objective judgment is one of their most appealing qualities.



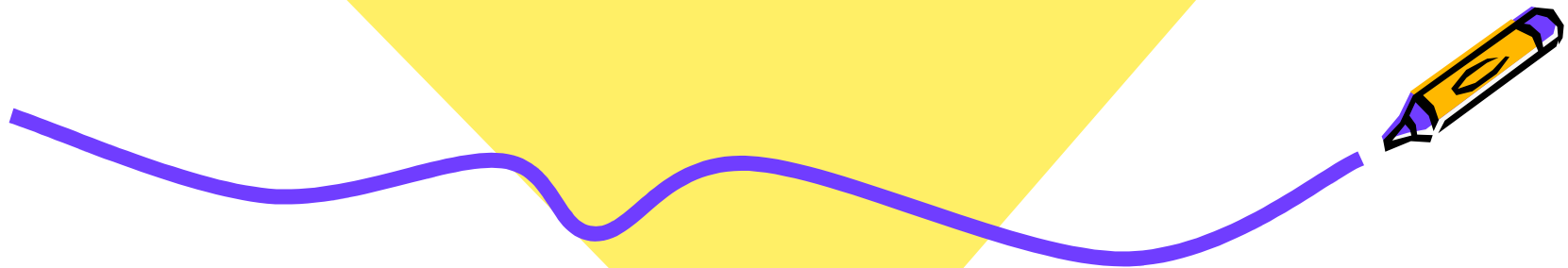
# Lens: The Lens of Judgment

- To decide if your game is a good judge of the players, ask yourself these questions:
  - What does your game judge about the players?
  - How does it communicate this judgment?
  - Do players feel the judgment is fair?
  - Do they care about the judgment?
  - Does the judgment make them want to improve?

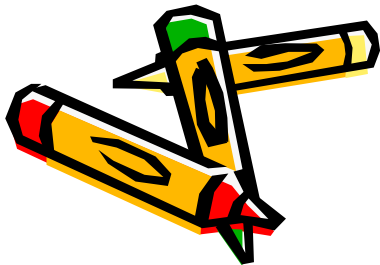
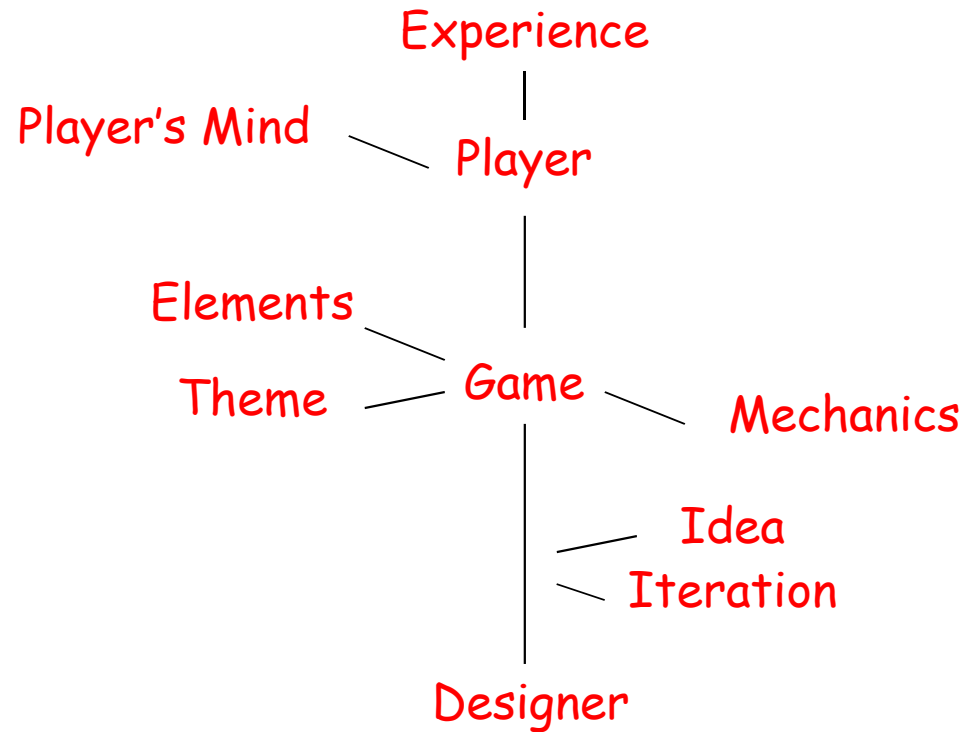
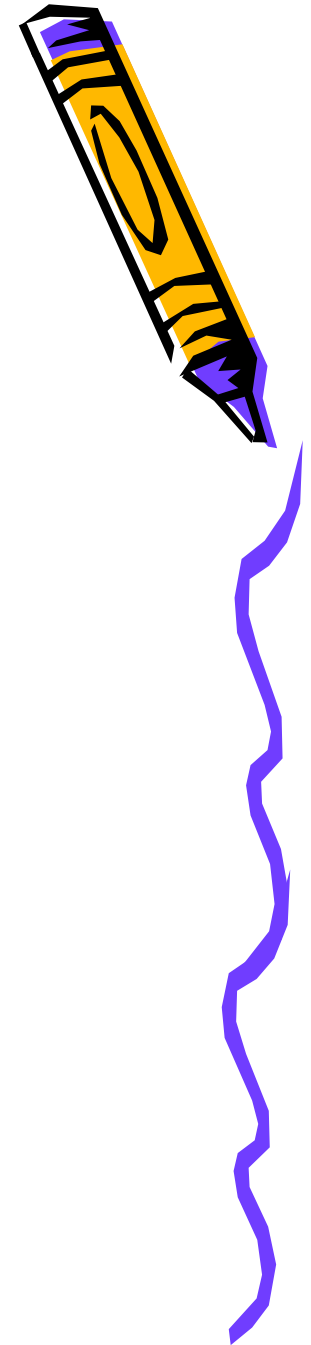




Some Elements are  
Game Mechanics

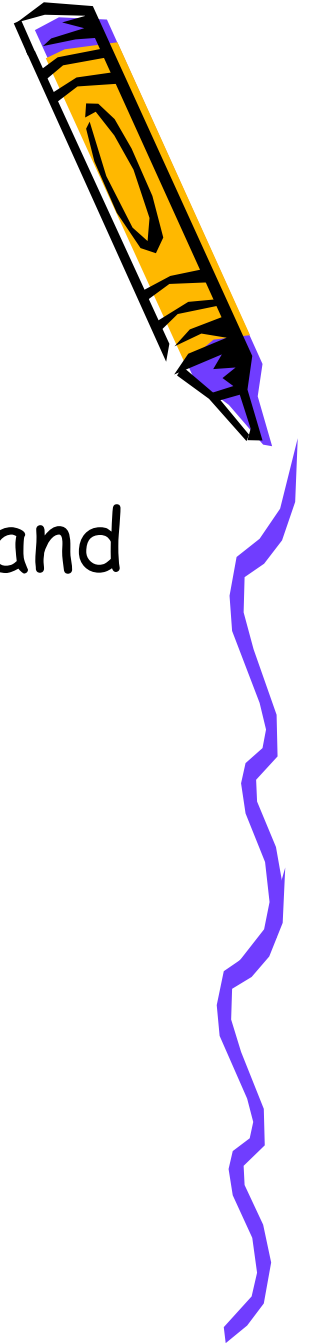


# Some Elements are Game Mechanics



# Mechanics

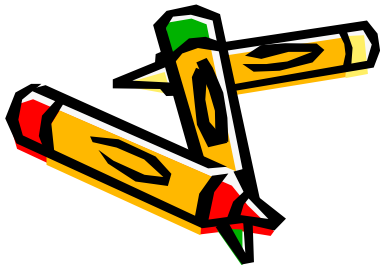
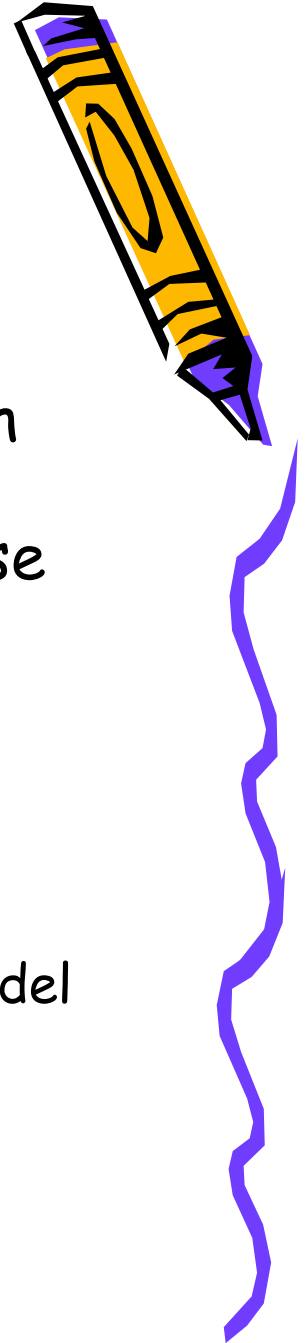
- Mechanic 1: Space
- Mechanic 2: Objects, Attributes, and States
- Mechanic 3: Actions
- Mechanic 4: Rules
- Mechanic 5: Skill
- Mechanic 6: Chance





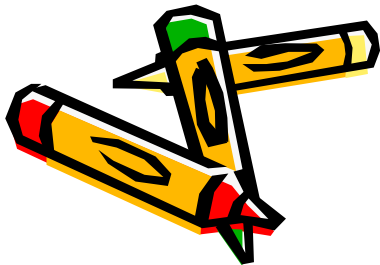
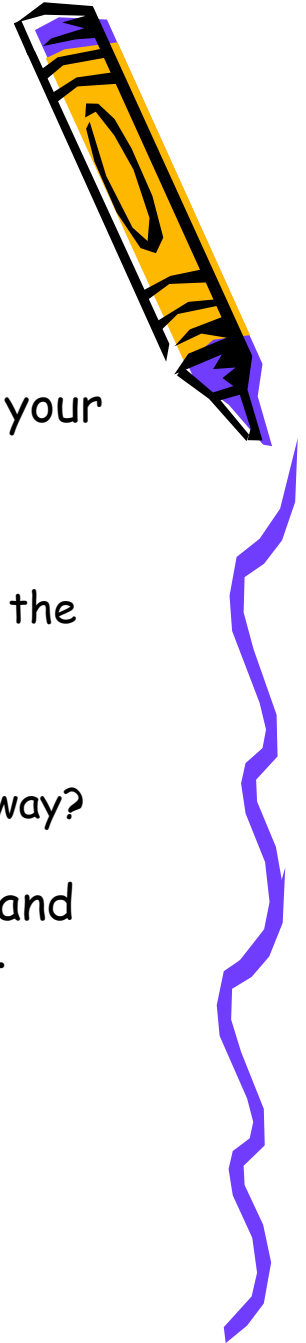
# Lens: The Lens of Functional Space

- To use this lens think about the space in which your game really takes place when all surface elements are stripped away. Ask yourself these questions:
  - Is the space of this game discrete or continuous?
  - How many dimensions does it have?
  - What are the boundaries of the space?
  - Are there sub-spaces? How are they connected?
  - Is there more than one useful way to abstractly model the space of this game?



# Lens: The Lens of Dynamic State

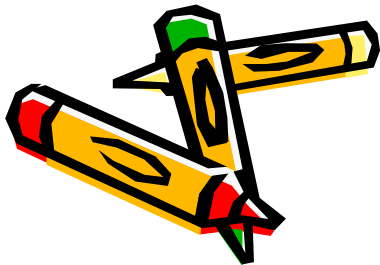
- To use this lens think about what information changes during your game, and who is aware of it. Ask yourself these questions:
  - What are the objects of my game?
  - What are the attributes of the objects?
  - What are the possible states for each attribute? What triggers the state changes for each attribute?
  - What state is known by all players?
  - What state is known by some, or only one player?
  - Would changing who knows what state improve my game in some way?
- Game playing is decision making. Decision are made based on information. Deciding the different attributes, their states, and who knows about them is core to the mechanics of your game.



# Operative and Resultant Actions

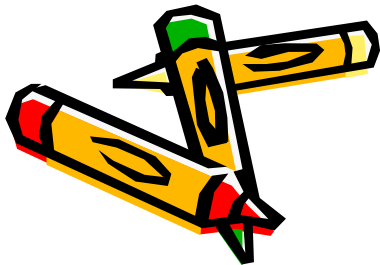
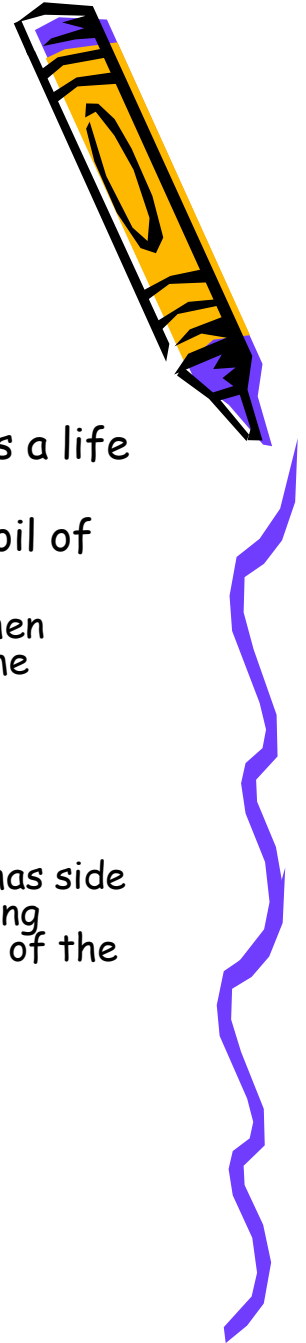


- Operative actions are simply the base actions a player can take. For example, in checkers a player can perform only three basic operations: 1. Move a checker forward; 2. Jump an opponent's checker; 3. Move a checker backwards (kings only).
- Resultant actions are meaningful in the larger picture of the game. They have to do with how the player is using operational actions to achieve a goal. Consider the possible resultant actions in checkers: 1. Protect a checker from being captured by moving another checker behind it; 2. Force an opponent into making an unwanted jump; 3. Sacrifice a checker to trick an opponent; .. And many others.
- The resultant actions are not part of the rules, per se, but rather actions and strategies that emerge naturally as the game is played. Most game designers agree that interesting emergent actions are the hallmark of a good game.



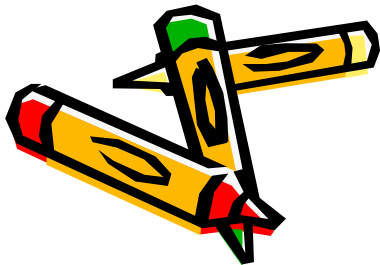
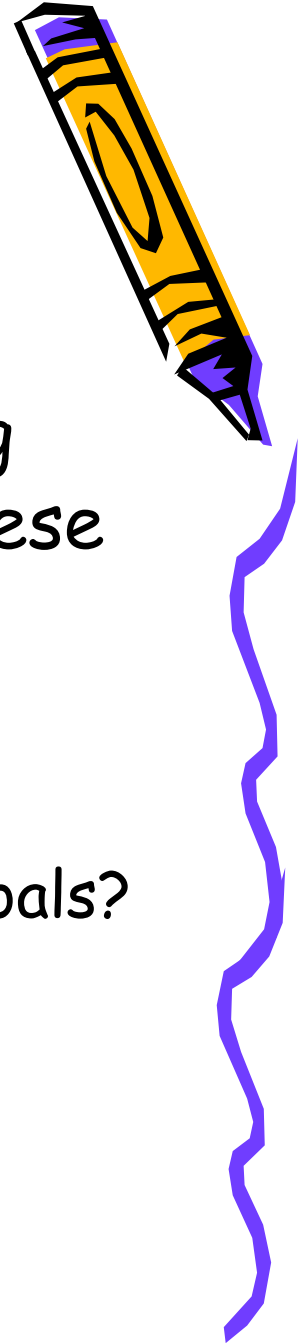
# Emergent Gameplay

- Trying to create "emergent gameplay", that is, interesting resultant actions, has been likened to tending a garden, since what emerges has a life of its own, but at the same time it is fragile and easily destroyed.
- But what makes these things spring up? Five tips for preparing the soil of your game/garden.
  - Add more verbs (more operative actions). The resultant actions appear when operative actions interact with each other, with objects, and with the game space.
  - Verbs that can act on many objects
  - Goals that can be achieved more than one way
  - Many subjects (e.g. many pieces on the board for the case of checkers)
  - Side effects that change constraints. If every time you take an action, it has side effects that change the constraints on you or your opponent very interesting gameplay is likely to result. E.g. in checkers every move change the nature of the game space.



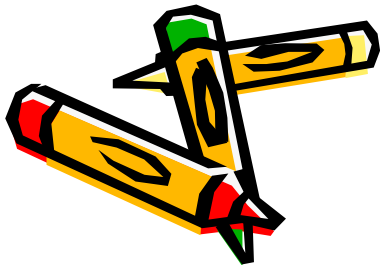
# Lens: The Lens of Emergence

- To make sure your game has interesting qualities of emergence, ask yourself these questions:
  - How many verbs do my players have?
  - How many objects can each verb act on?
  - How many ways can players achieve their goals?
  - How many subjects do the players control?
  - How do side effects change constraints?



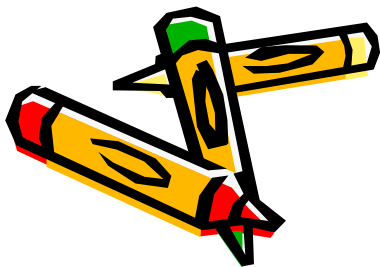
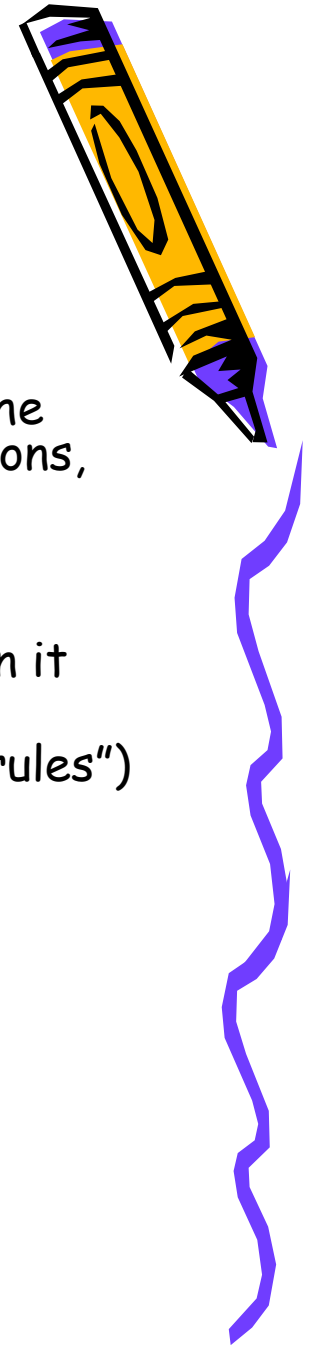
# Lens: The Lens of Action

- To use this lens, think about what your players can do and what they can't and why. Ask yourself these questions:
  - What are the operational actions in my game?
  - What are the resultant actions?
  - What resultant actions would I like to see? How can I change my game in order to make those possible?
  - Am I happy with the ratio of resultant to operational actions?
  - What actions do players wish they could do in my game that they cannot? Can I somehow enable these, either as operational or resultant actions?

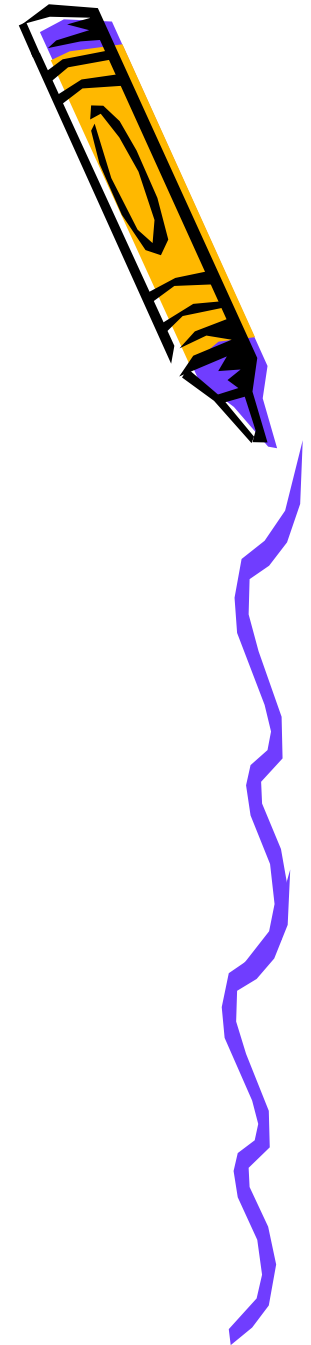
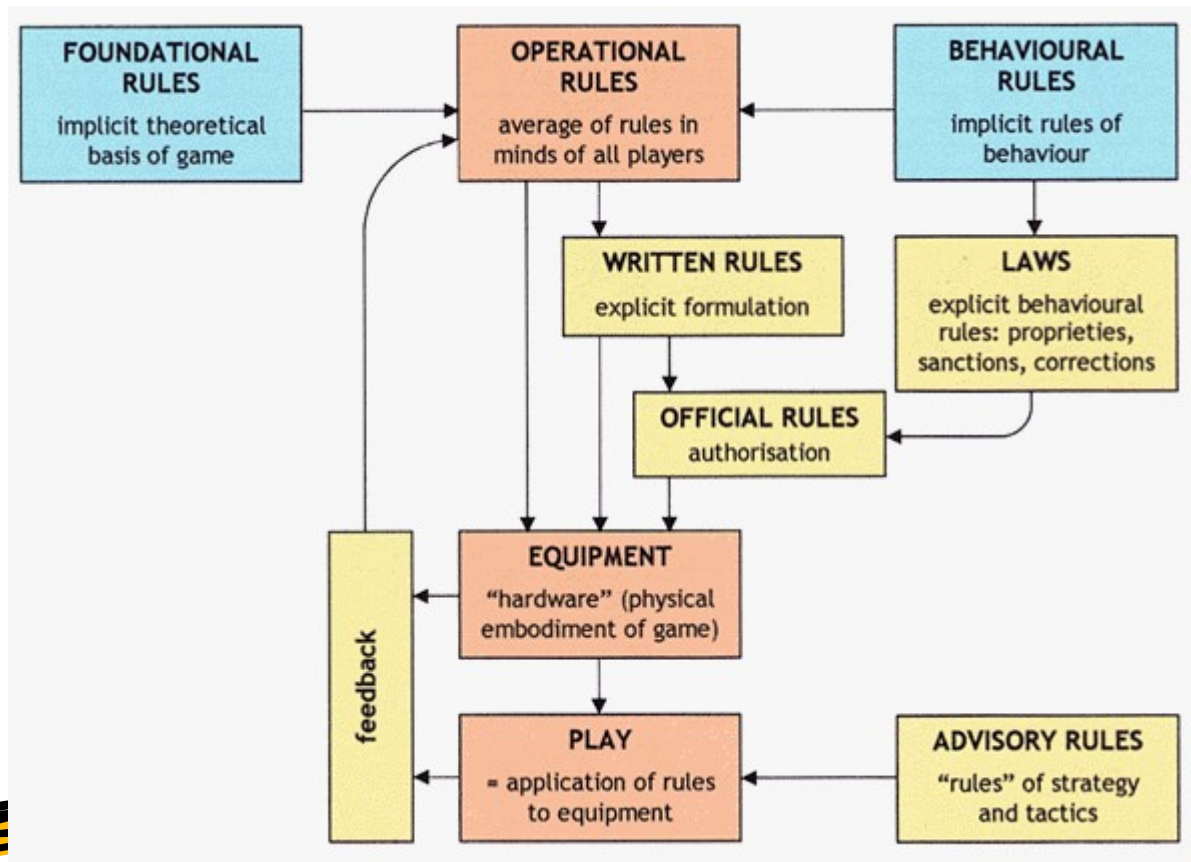


# Parlett's Rule Analysis

- The rules are the most fundamental mechanic. They define the space, the objects, the actions, the consequences of the actions, the constraints of the actions, and the goals.
- Operational rules ("What the players do to play the game")
- Foundational rules (underlying formal structure of the game, mathematical representation of game state and how and when it changes)
- Behavioral rules (implicit to gameplay, "good sportsmanship" rules")
- Written rules ("the rules that come with the game")
- Laws (in serious competitive settings, they are often called "tournament rules")
- Official rules (rules that later will become "written rules")
- Advisory rules ("rules of strategy")
- House rules (tune the operational rules)



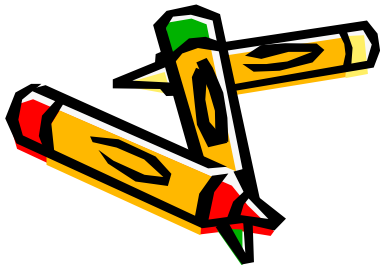
# Parlett's Rule Analysis





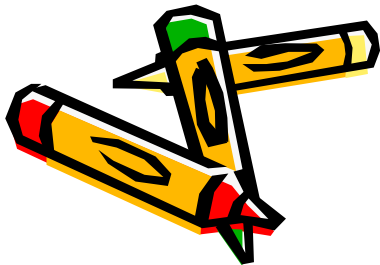
# The most important rule

- It is easy to focus on the action of the game that you forget about the goals.
- Good game goals have three important qualities:
  - Concrete
  - Achievable
  - Rewarding
- For example the goal of chess is four words:  
"Capture your opponent's King"



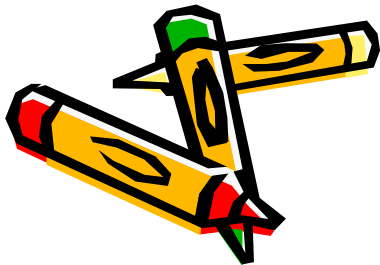
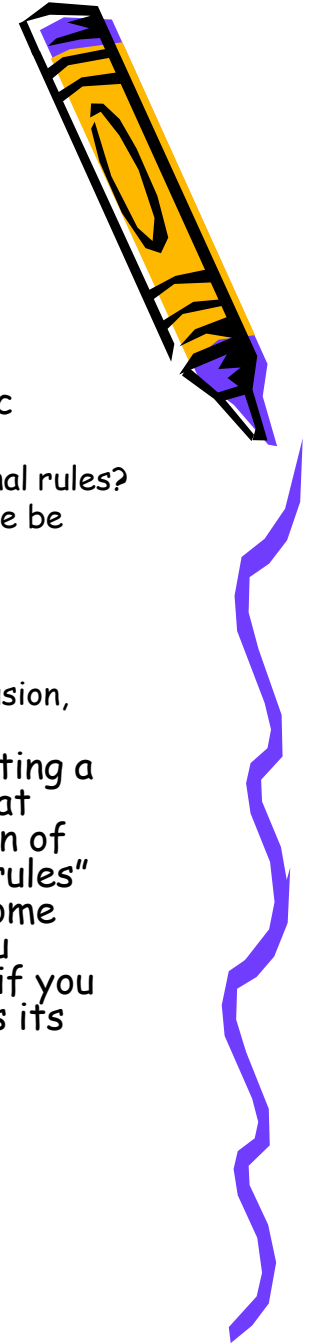
# Lens: The Lens of Goals

- To ensure the goals of your game are appropriate and well-balanced, ask yourself these questions:
  - What is the ultimate goal of my game?
  - Is that goal clear to players?
  - Is there a series of goals, do the players understand that?
  - Are the different goals related to each other in a meaningful way?
  - Are my goals concrete, achievable, and rewarding?
  - Do I have a good balance of short- and long-term goals?
  - Do players have a chance to decide on their own goals?



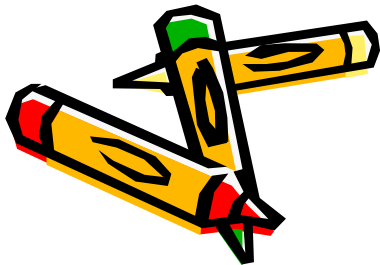
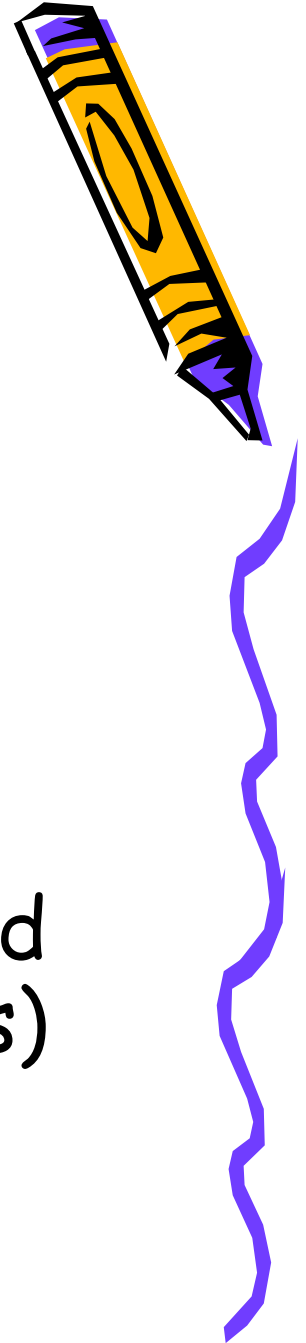
# Lens: The Lens of Rules

- To use this lens, look deep into your game, until you can make out its most basic structure. Ask yourself these questions:
  - What are the foundational rules of my game? How do these differ from the operational rules?
  - Are there "laws" or "house rules" that are forming as the game develops? Should these be incorporated into my game directly?
  - Are there different modes in my game? Do these modes make things simpler, or more complex? Would the game be better with fewer modes? More modes?
  - Who enforces the rules?
  - Are the rules easy to understand, or is there confusion about them? If there is confusion, should I fix it by changing the rules or by explaining them more clearly?
- A common misconception is that designers make games by sitting down and writing a set of rules. This usually isn't how it happens at all. A game's rules are arrived at gradually and experimentally. The designer's mind generally works in the domain of "operational rules", occasionally switching to the perspective of "foundational rules" when thinking about how to change or improve the game. The "written rules" come toward the end, once the game is playable. Be sure to take careful notes as you playtest, because it is during these tests that holes in your rules will appear - if you just patch them quickly, the same hole will just show up again later -. A game is its rules - give them the time and consideration that they deserve.



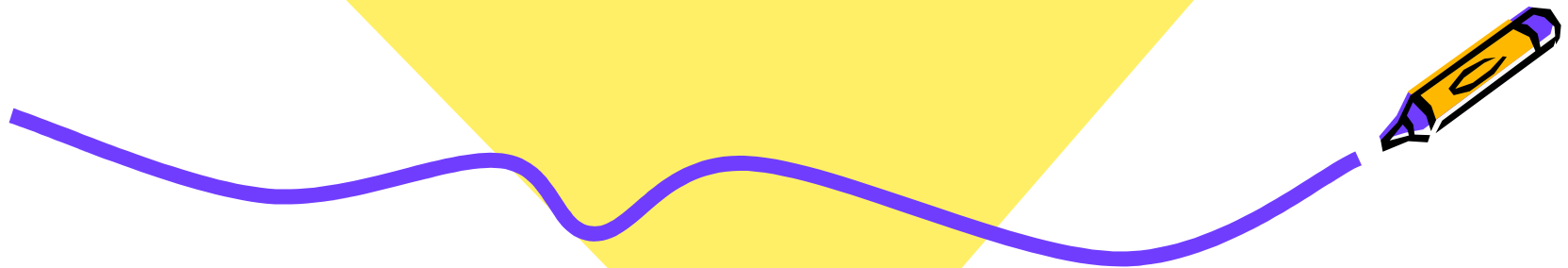
# Skills

- Every game requires players to exercise certain skills.
  - Physical skills
  - Mental skills
  - Social skills
- We are talking about Real skills and not the Virtual skills (e.g. in MMOs)

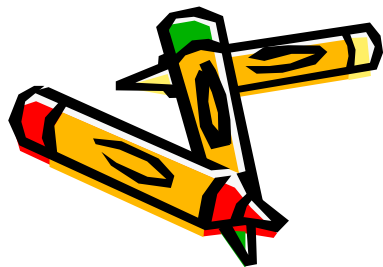
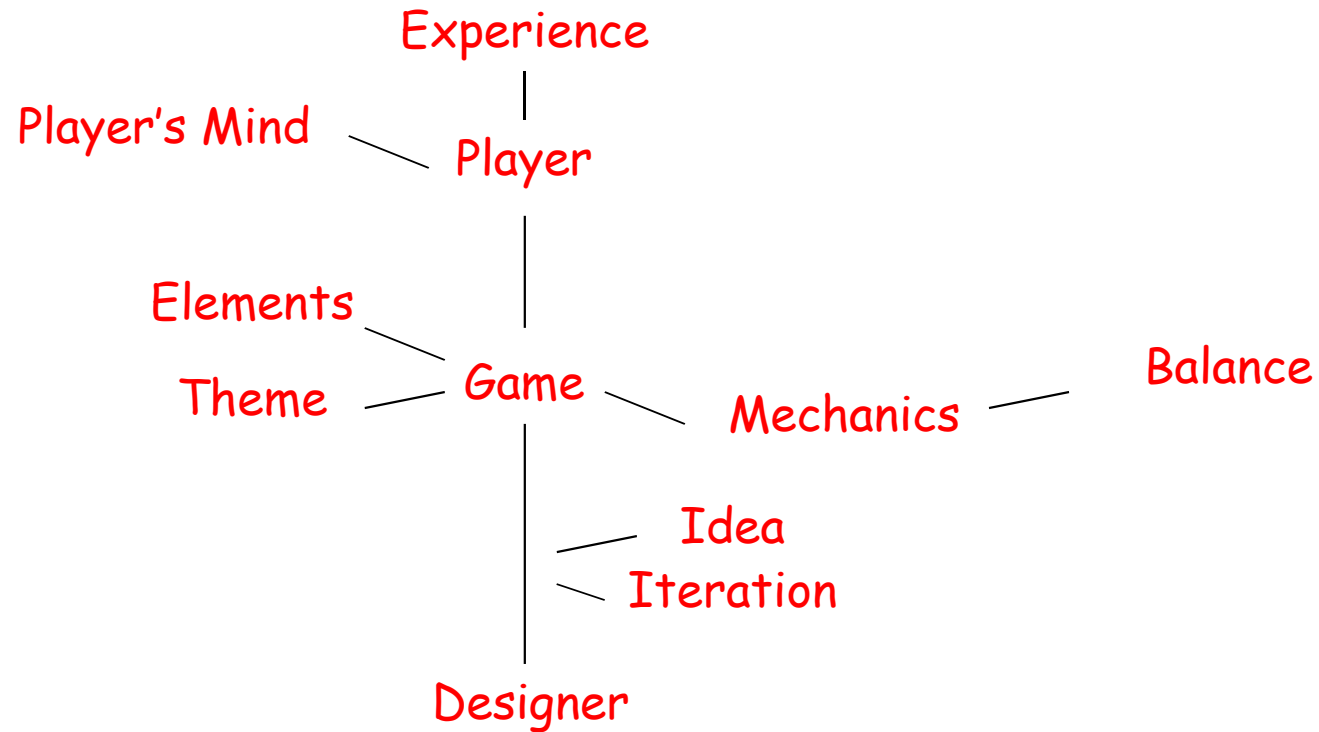
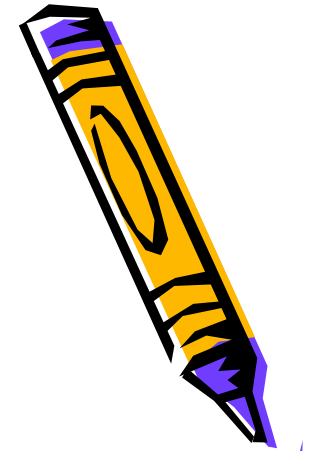




Game Mechanics Must  
be in Balance

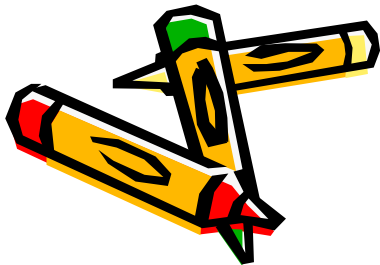
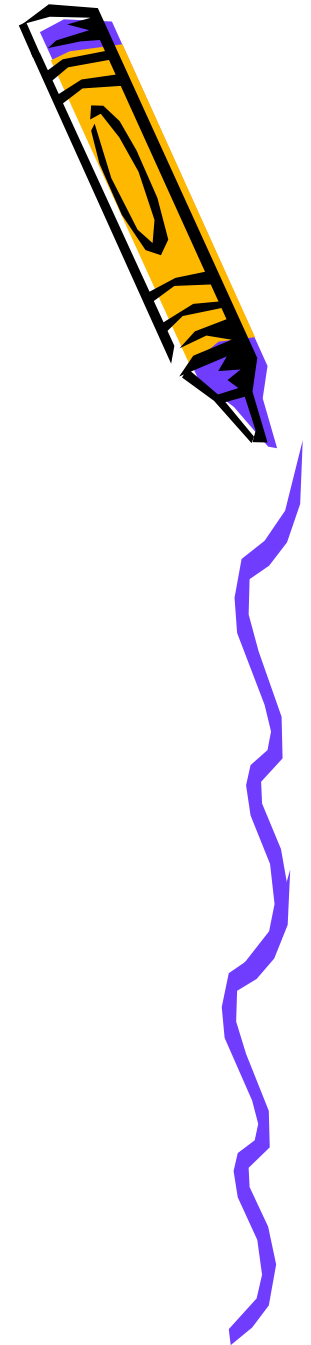


# Game Mechanics Must be in Balance



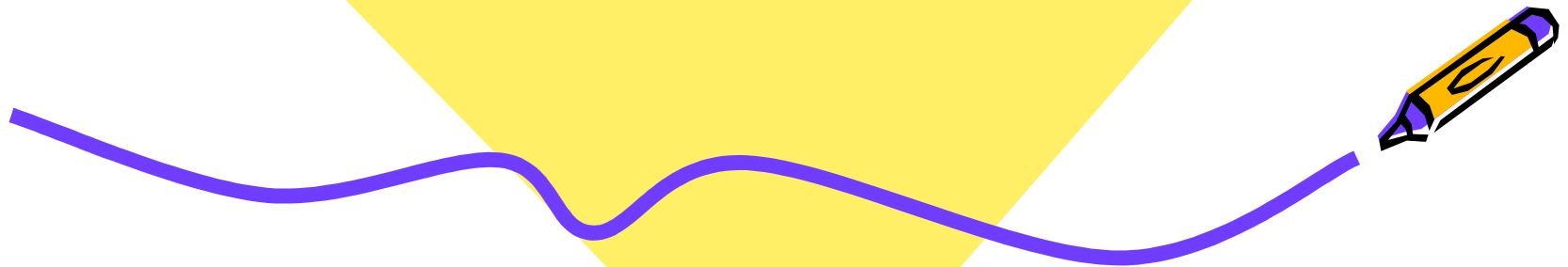
# 12 most common types of Game Balance

- Balance Type #1: Fairness (in symmetrical and asymmetrical games)
- Balance Type #2: Challenge vs. Success
- Balance Type #3: Meaningful Choices
- Balance Type #4: Skills vs. Chance
- Balance Type #5: Head vs. Hands
- Balance Type #6: Competition vs. Cooperation
- Balance Type #7: Short vs. Long
- Balance Type #8: Rewards
- Balance Type #9: Punishment
- Balance Type #10: Freedom vs. Controlled Experience
- Balance Type #11: Simple vs. Complex
- Balance Type #12: Detail vs. Imagination



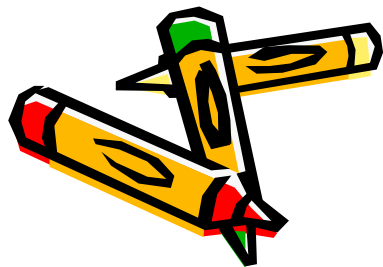
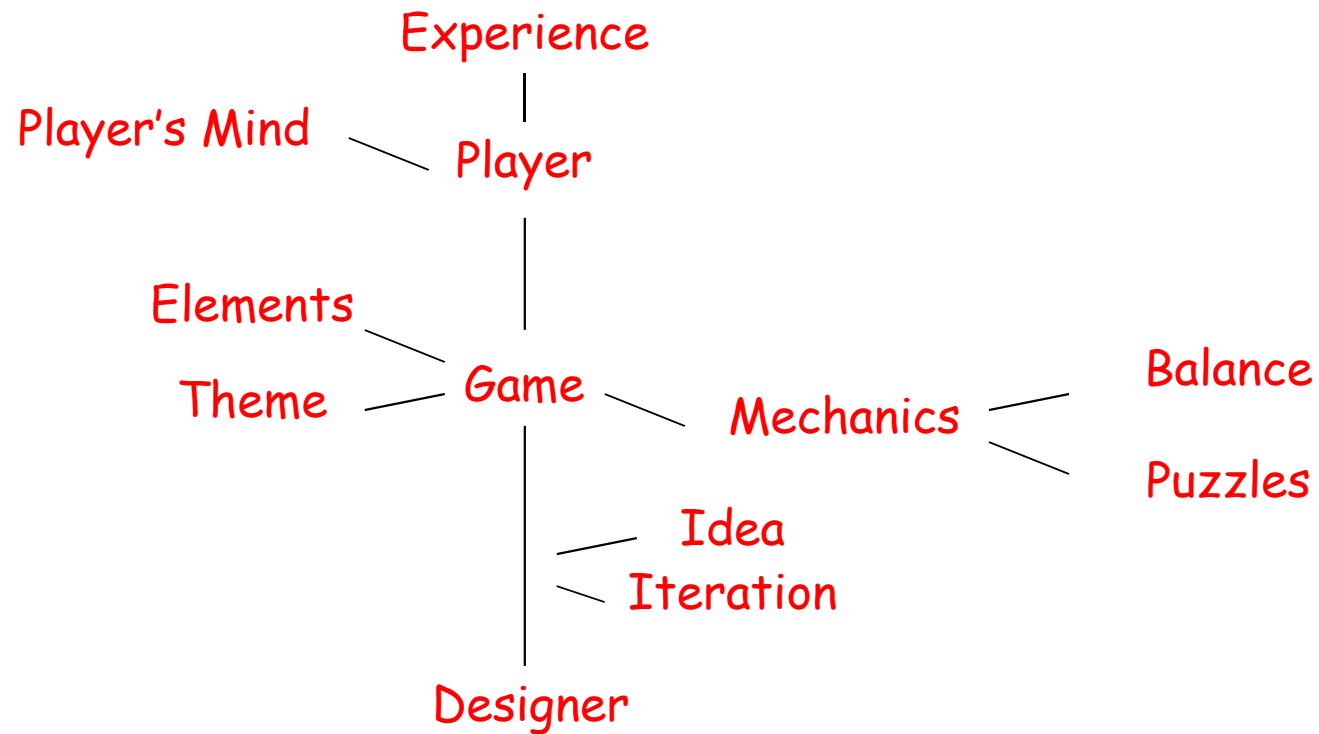
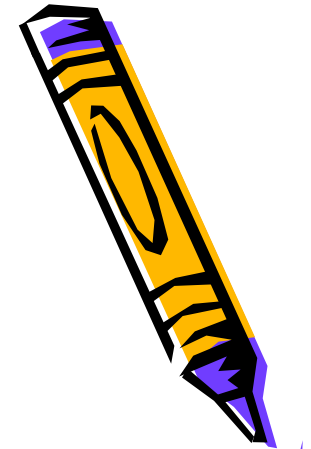


# Game Mechanics Support Puzzles



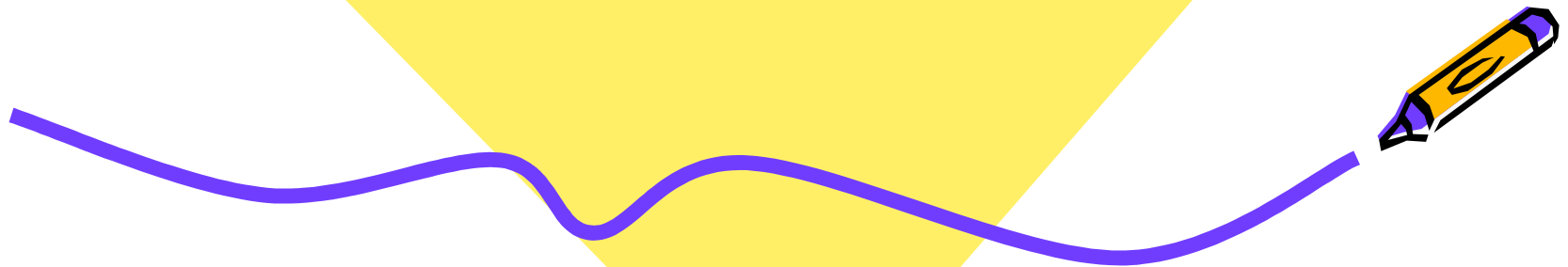


# Game Mechanics Support Puzzles

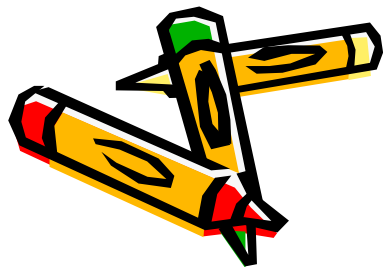
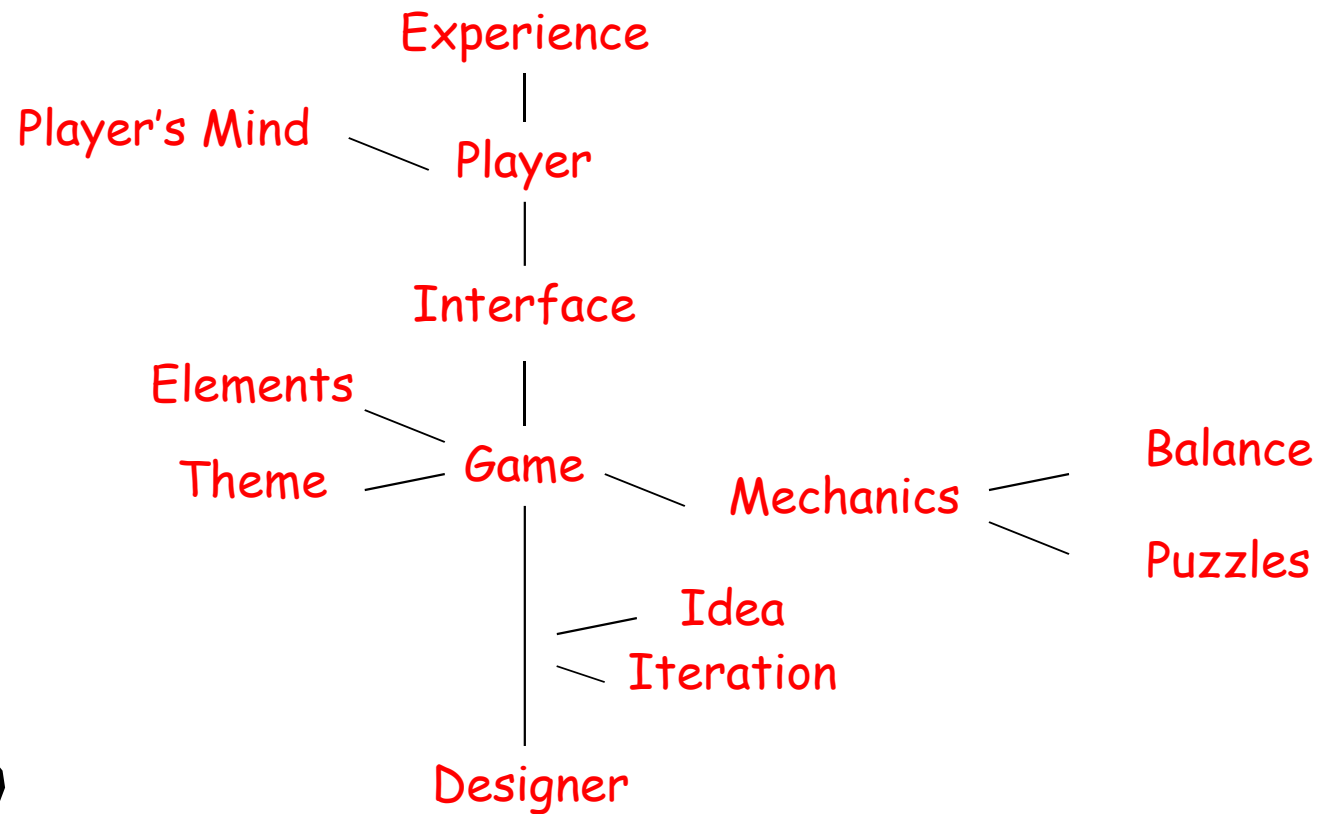
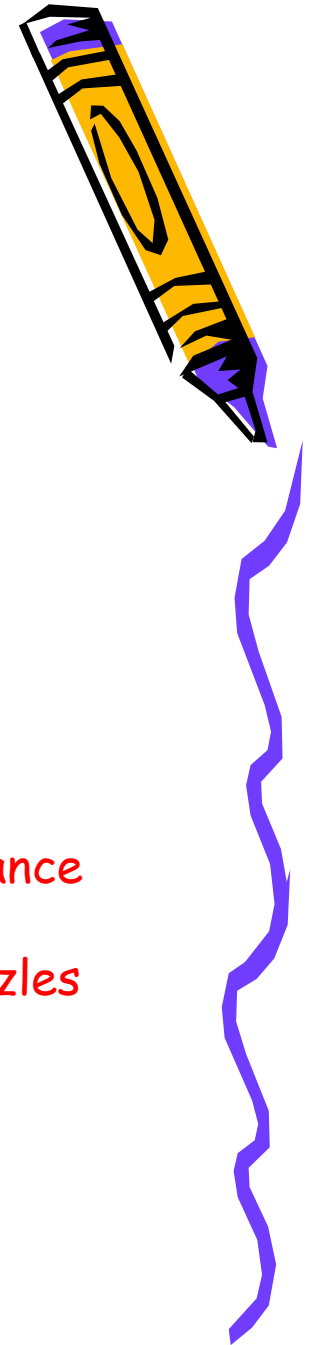




Players Play Games  
Through an Interface

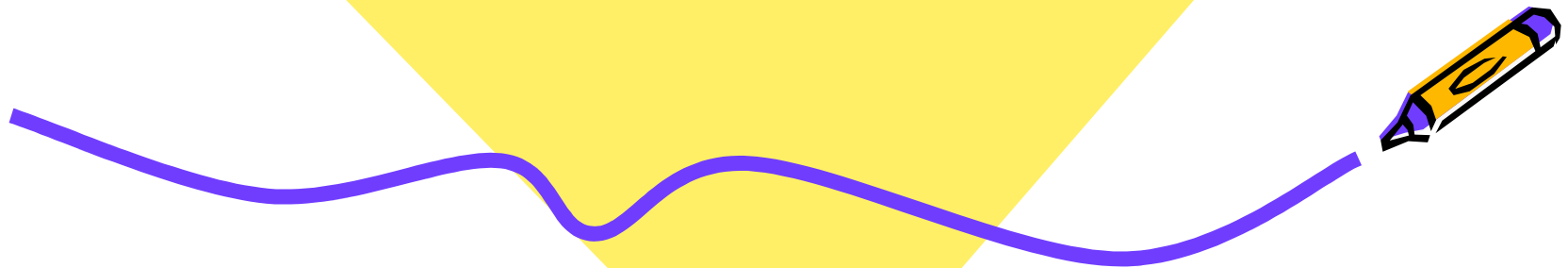


# Players Play Games Through an Interface

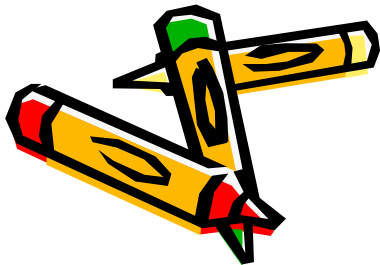
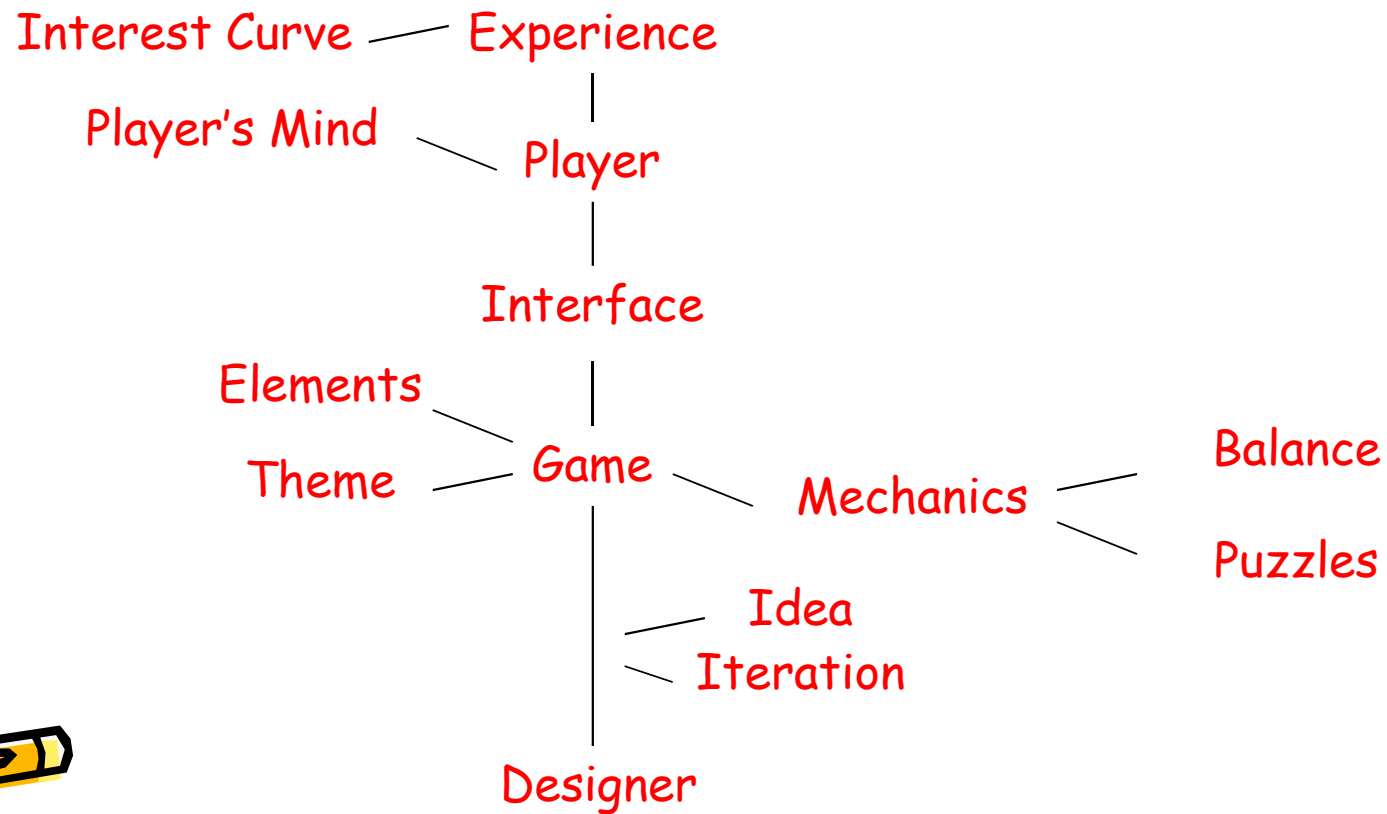
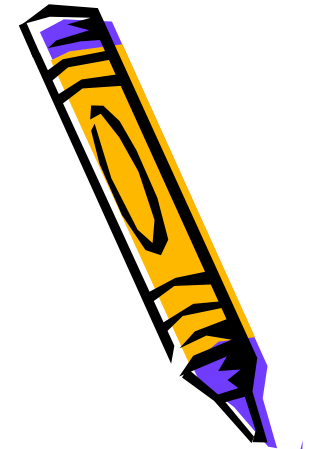


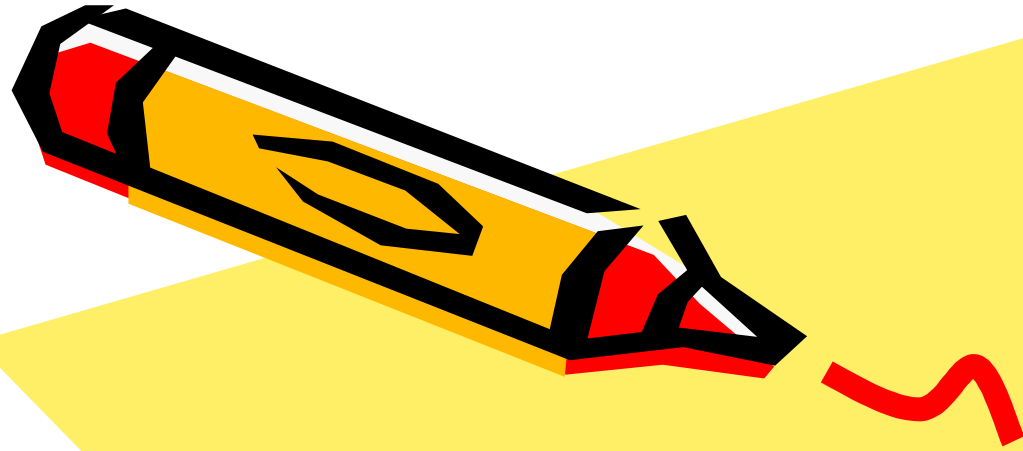


Experiences Can be  
Judged by Their  
Interest Curves

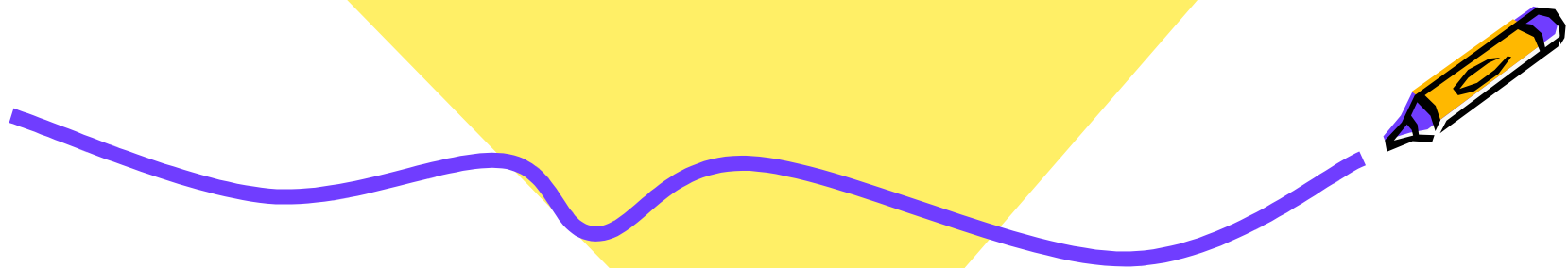


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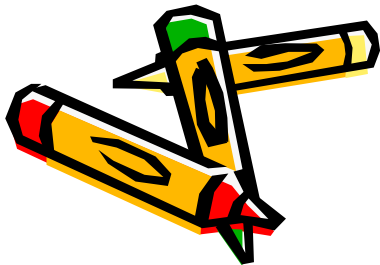
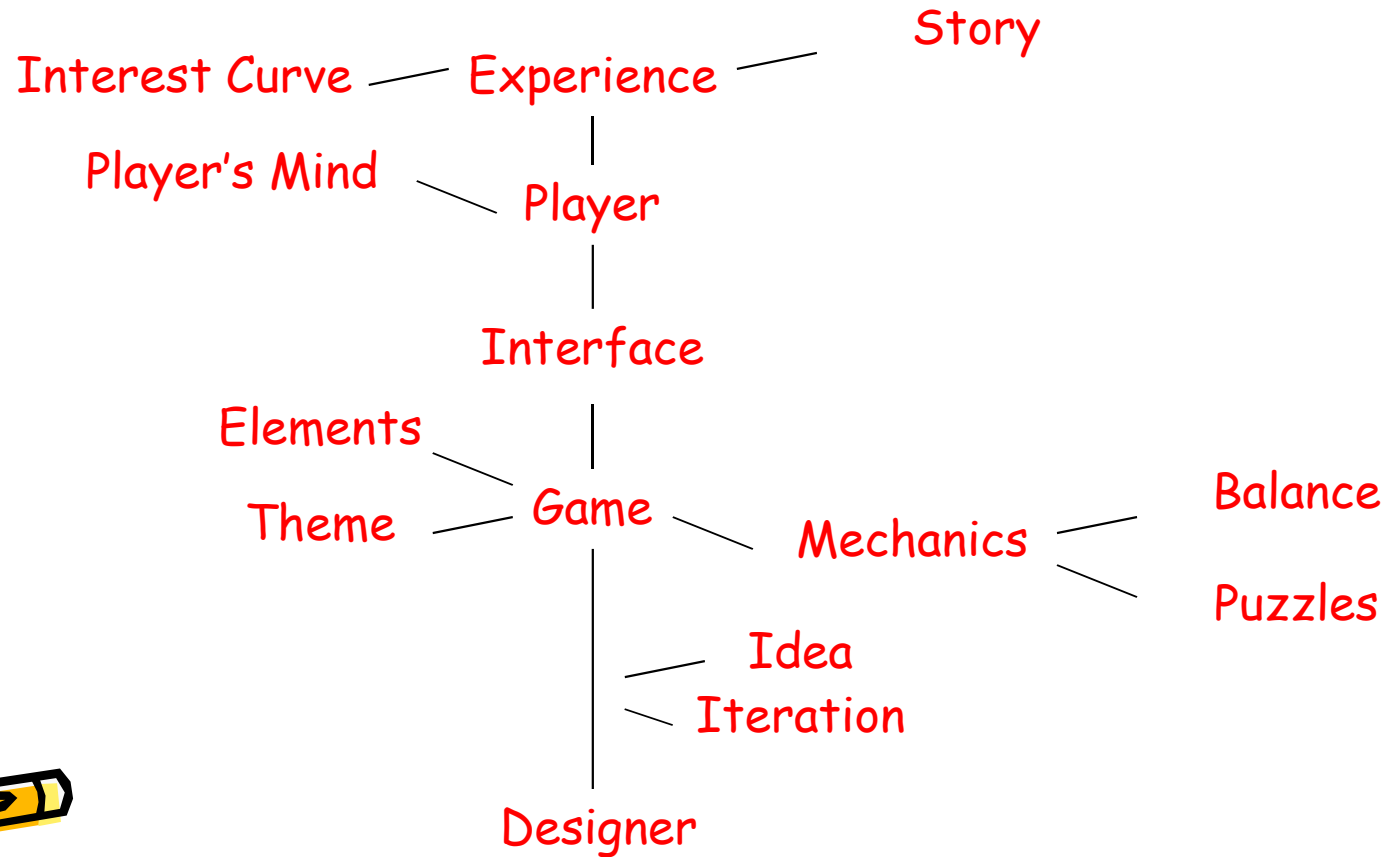
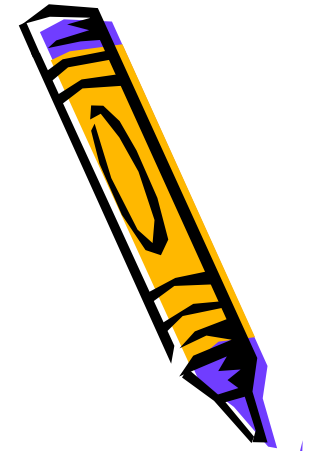




One Kind of Experience  
Is the Story

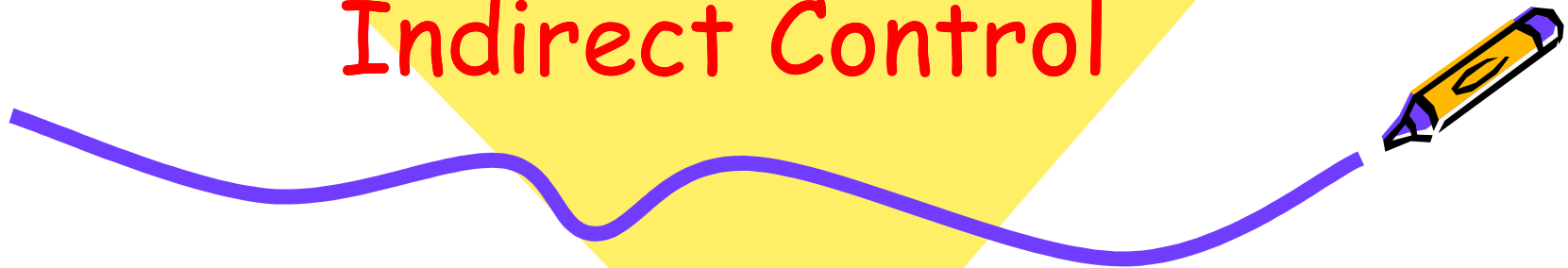


# One Kind of Experience Is the Story



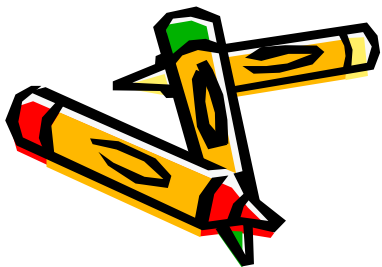
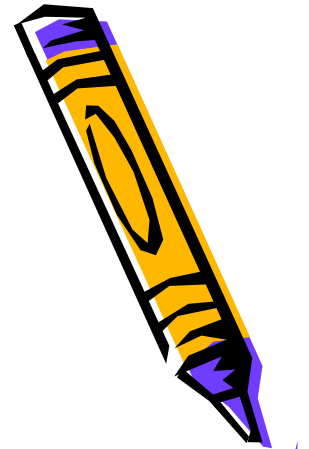
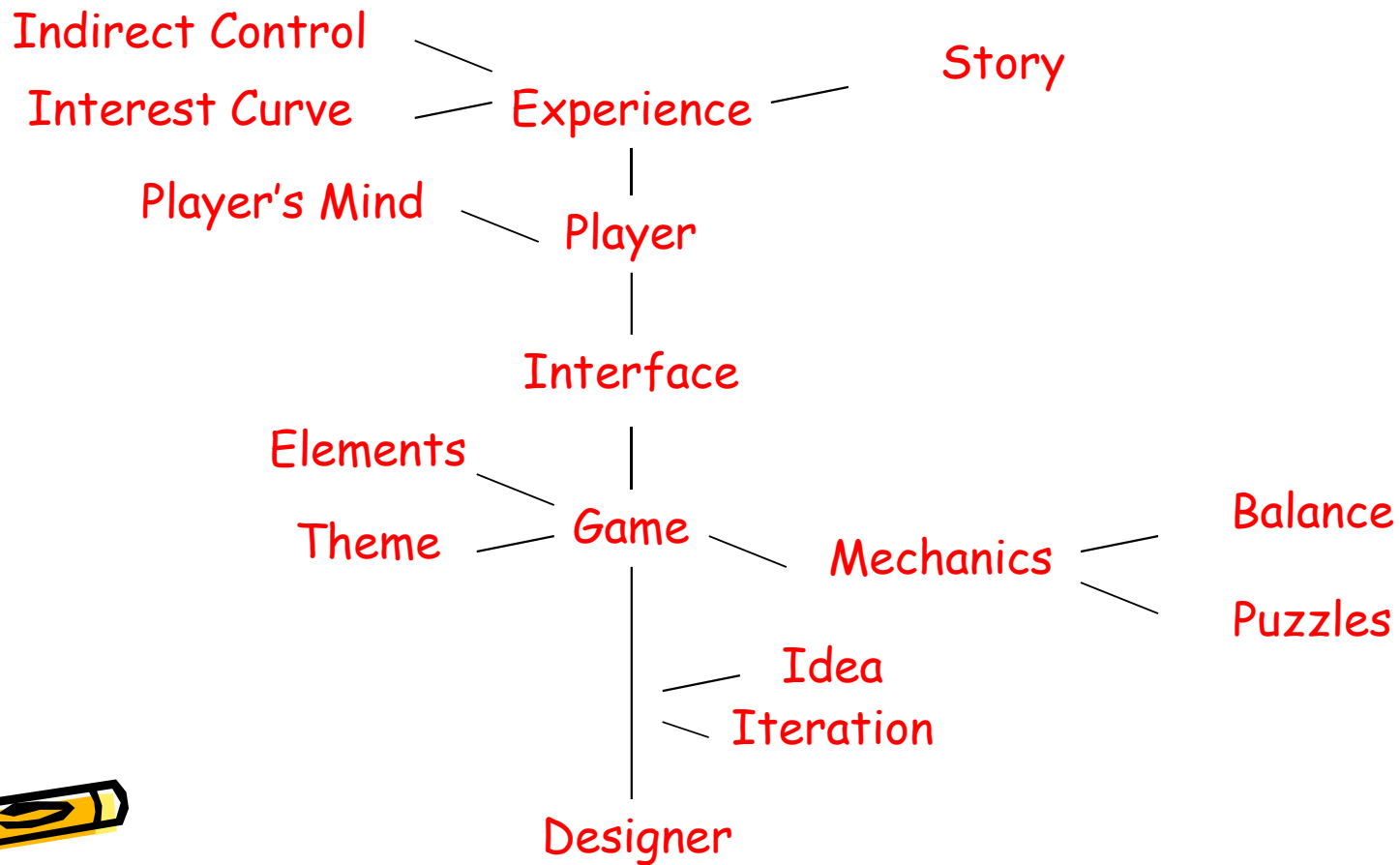


Story and Game  
Structures can be  
Artfully Merged with  
Indirect Control



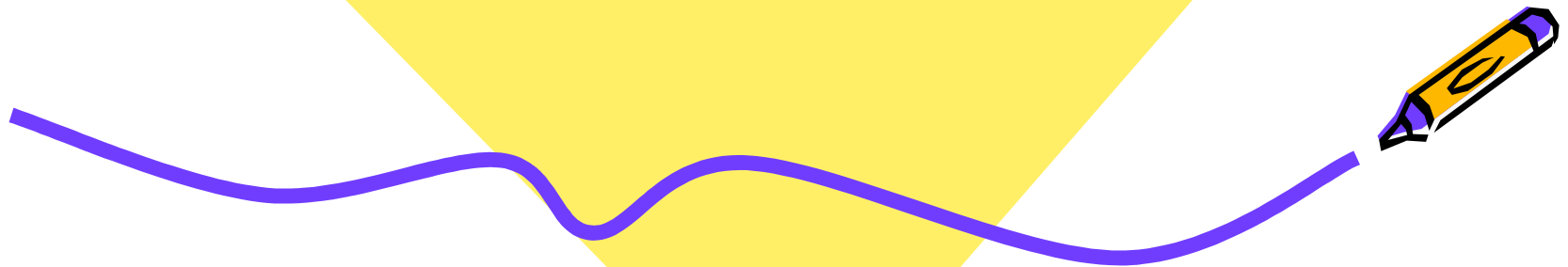


# Indirect Control

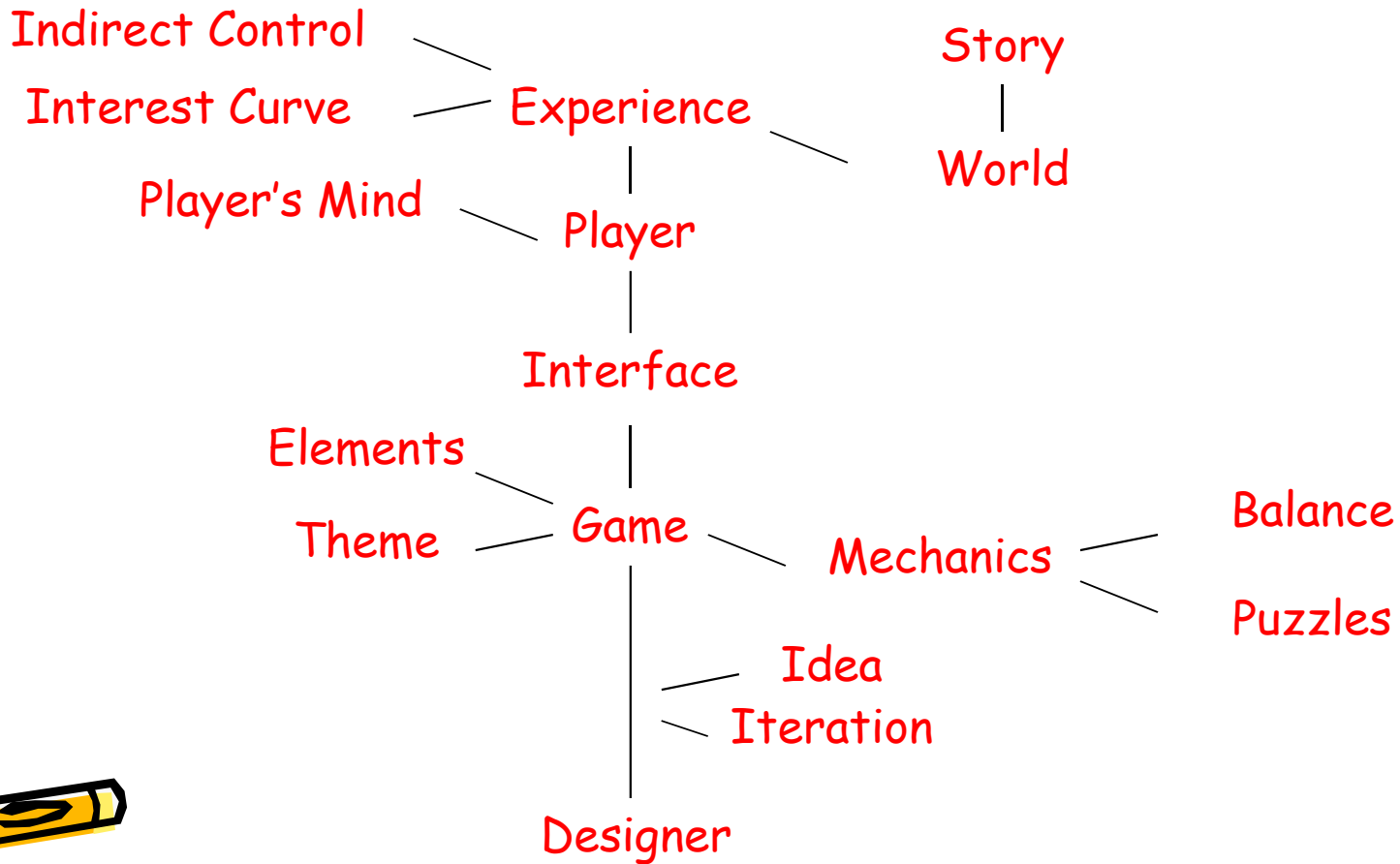
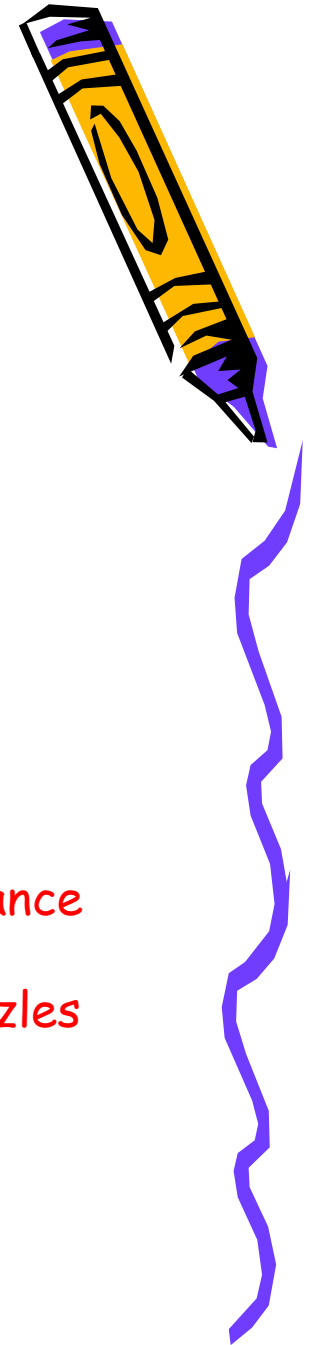


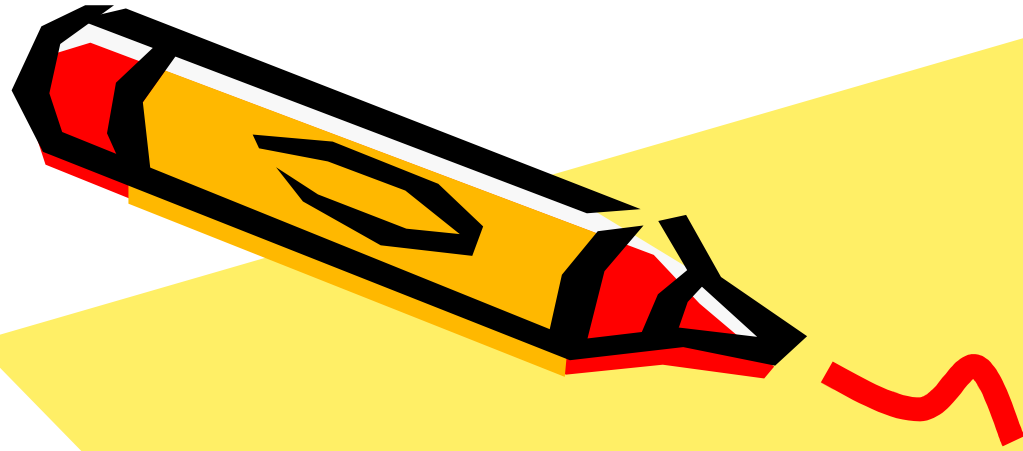


Stories and Games  
Take Place in Worlds

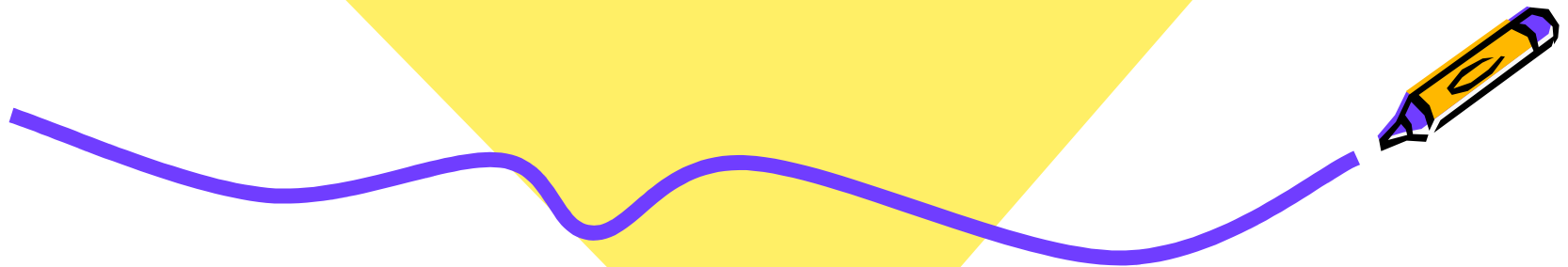


# Stories and Games Take Place in Worlds

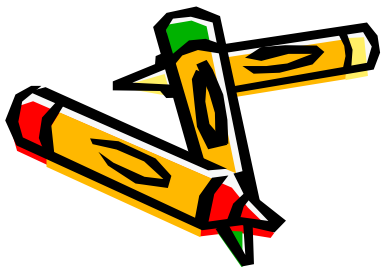
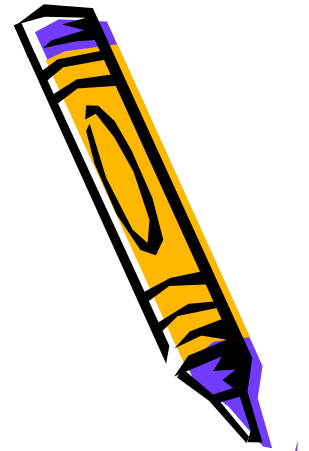
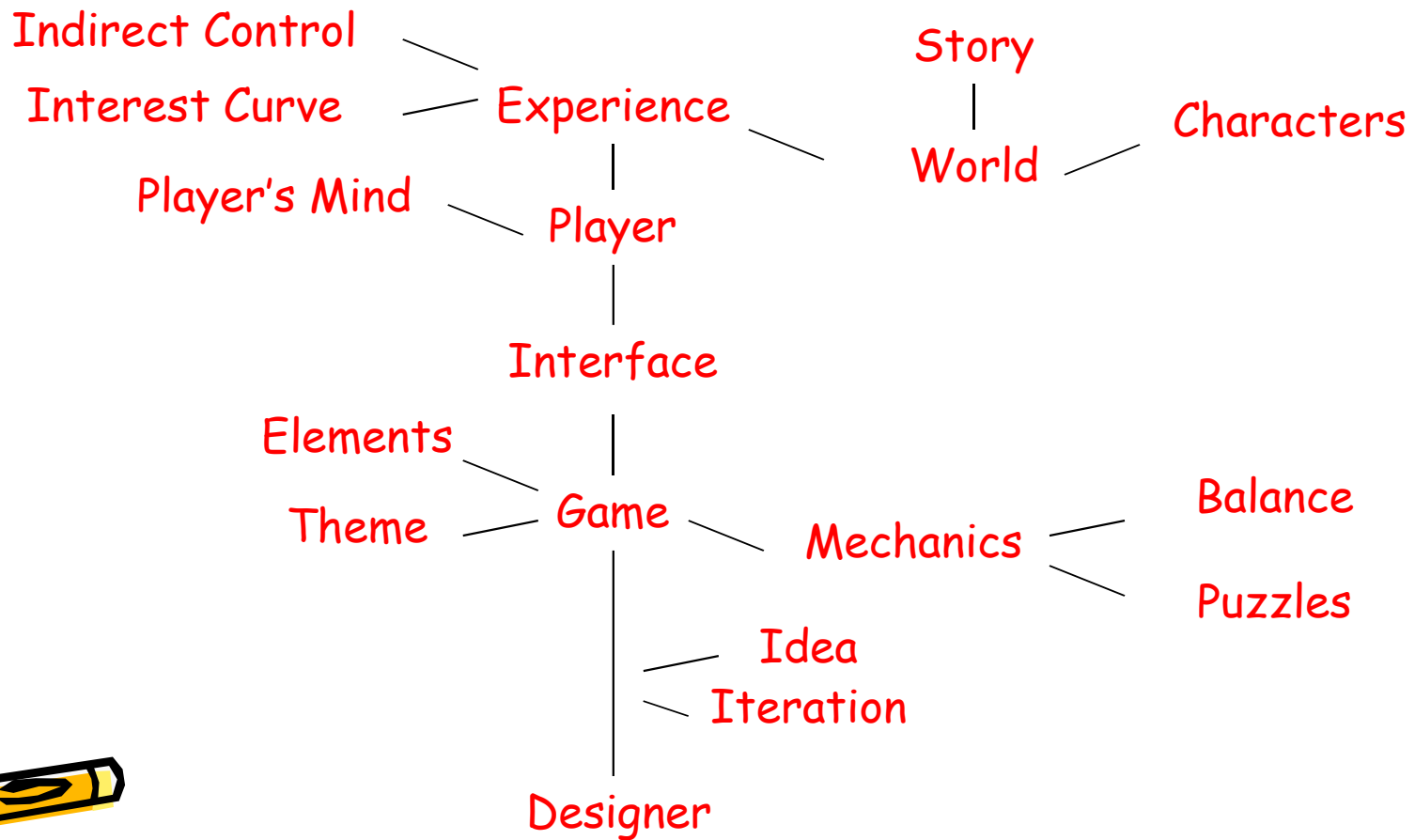




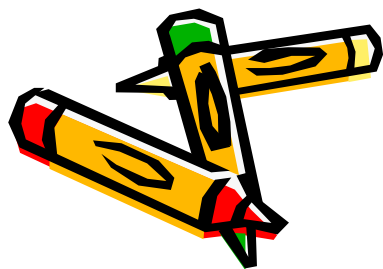
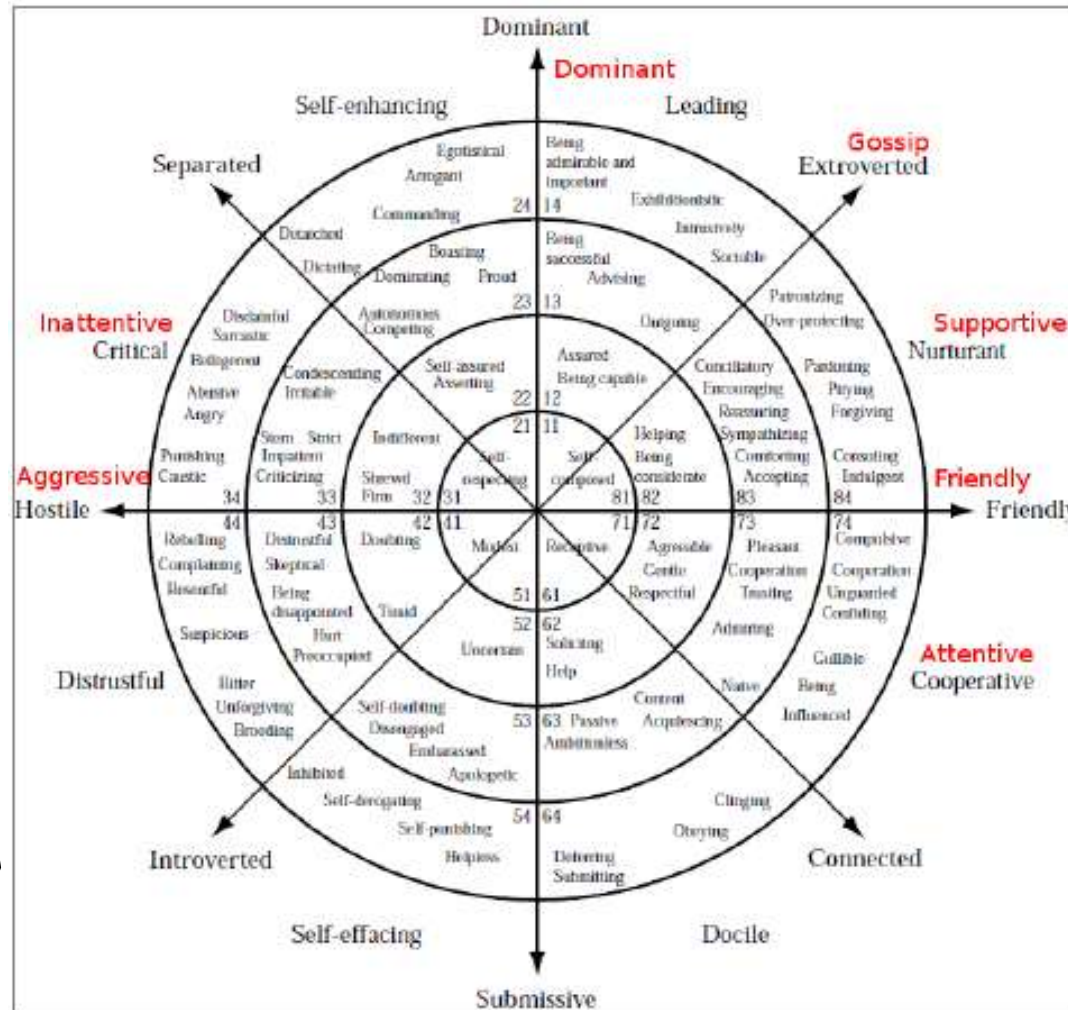
Worlds Contain  
Characters

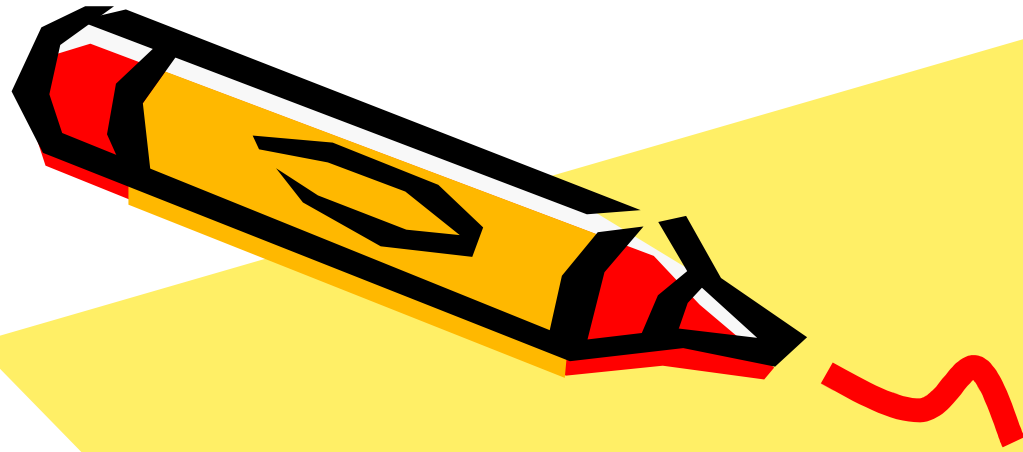


# Worlds Contain Characters

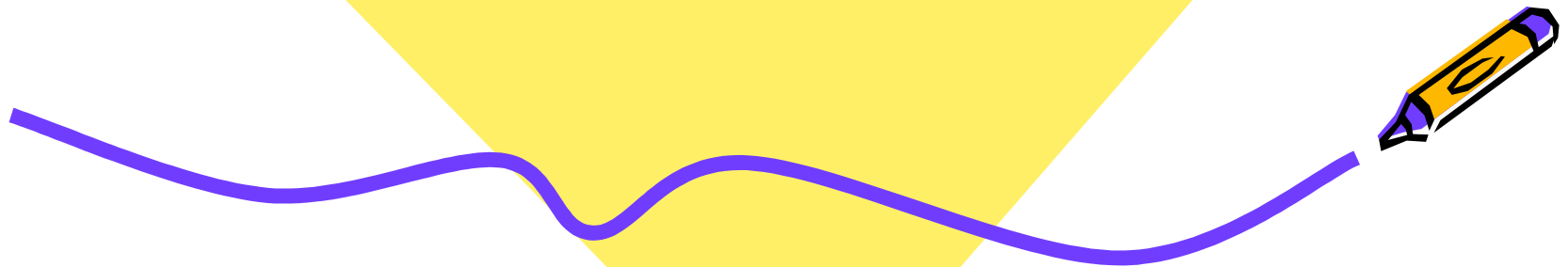


# Interpersonal Circumplex

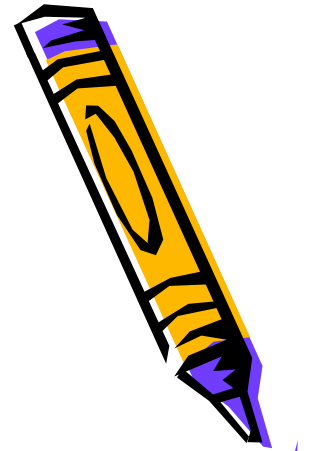
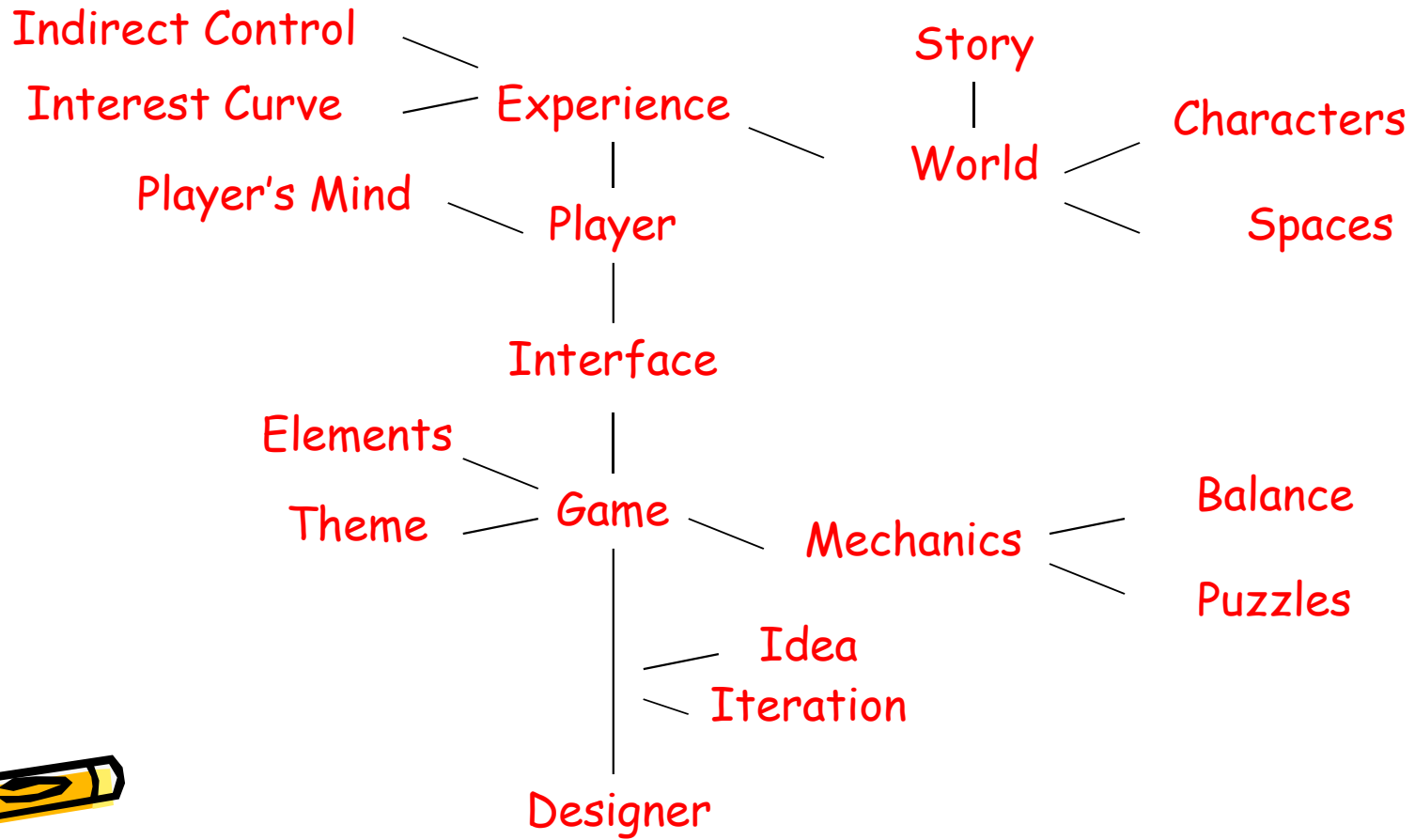




World Contain Spaces



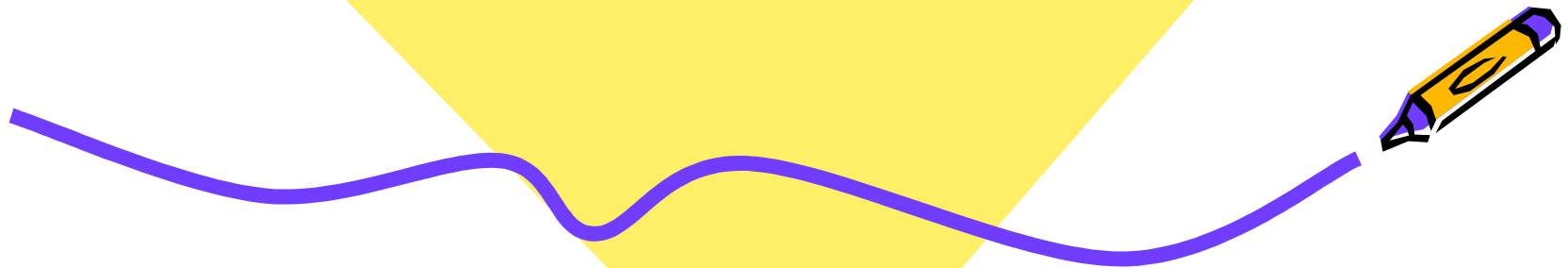
# World Contain Spaces



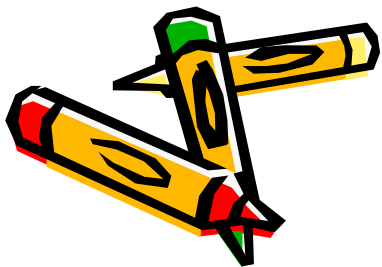
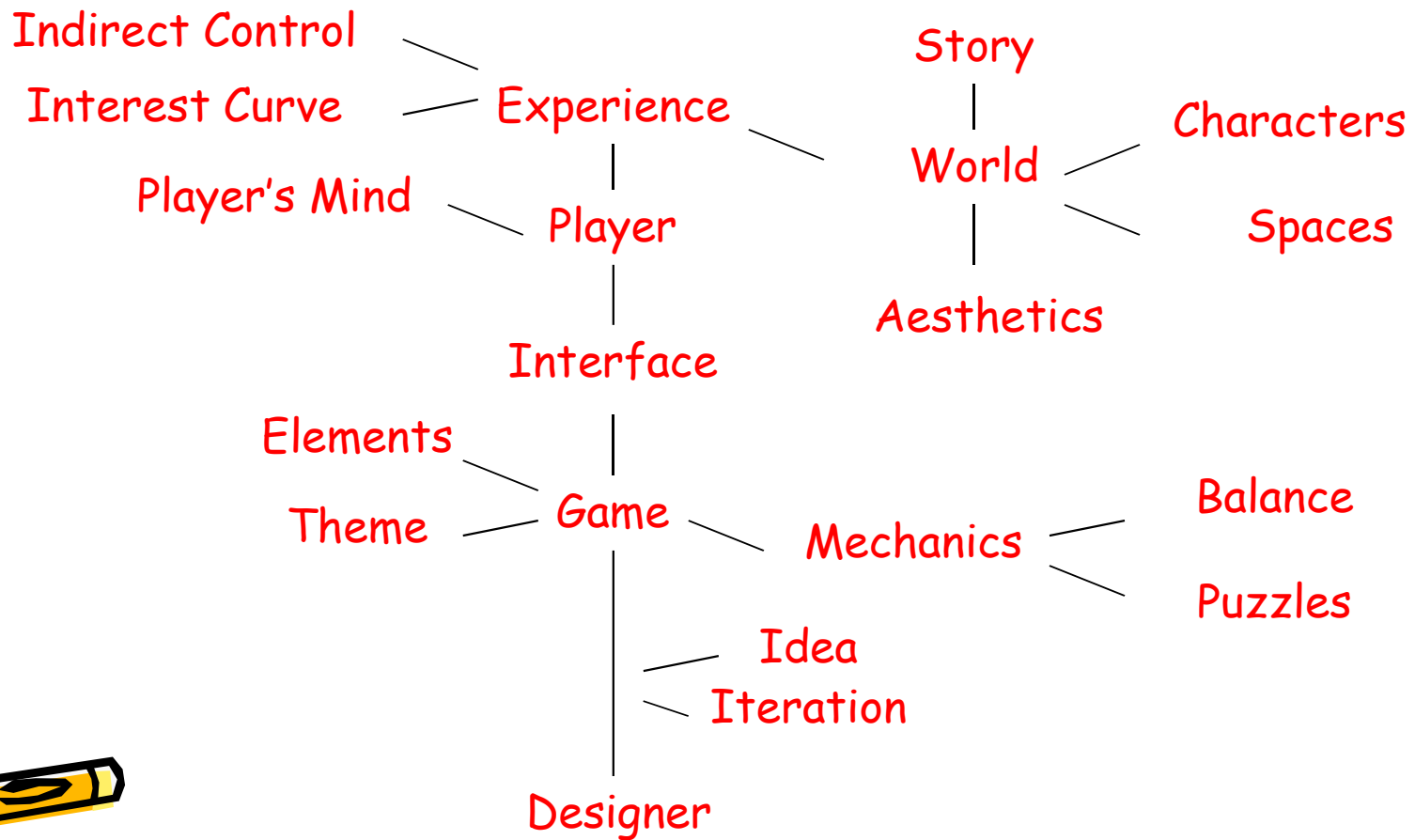
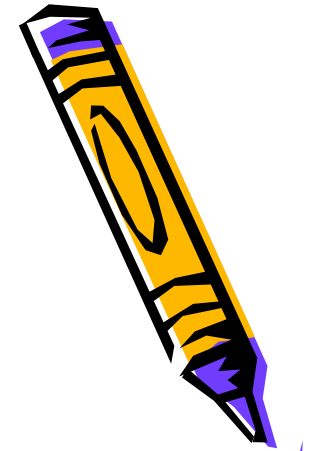


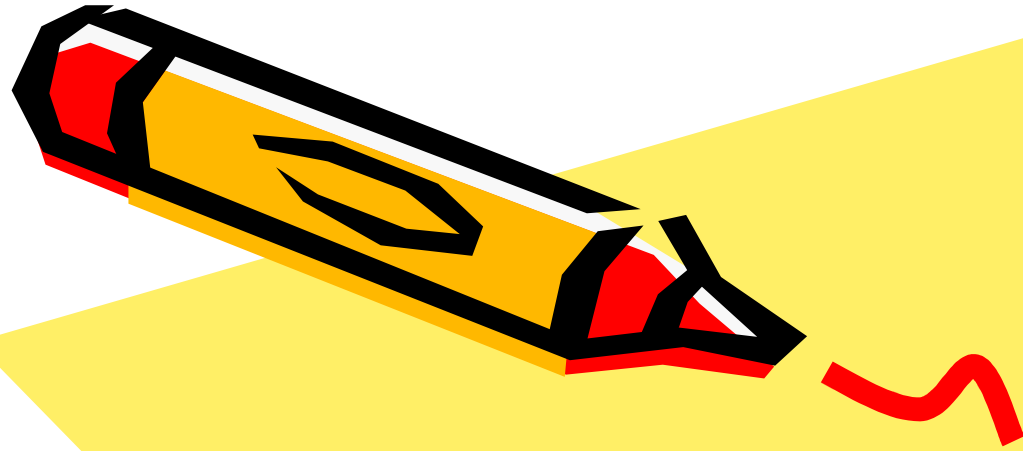


The Look ~~and~~ Feel of a  
World Is Defined by  
Its Aesthetics

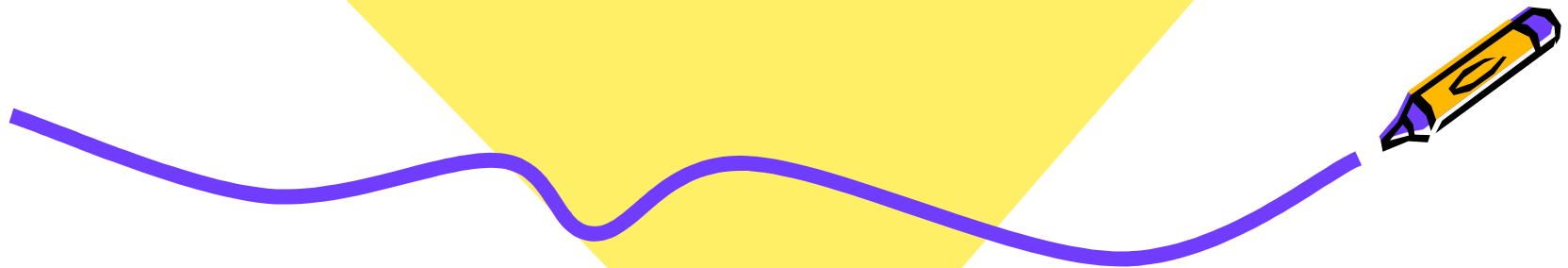


# World and Its Aesthetics



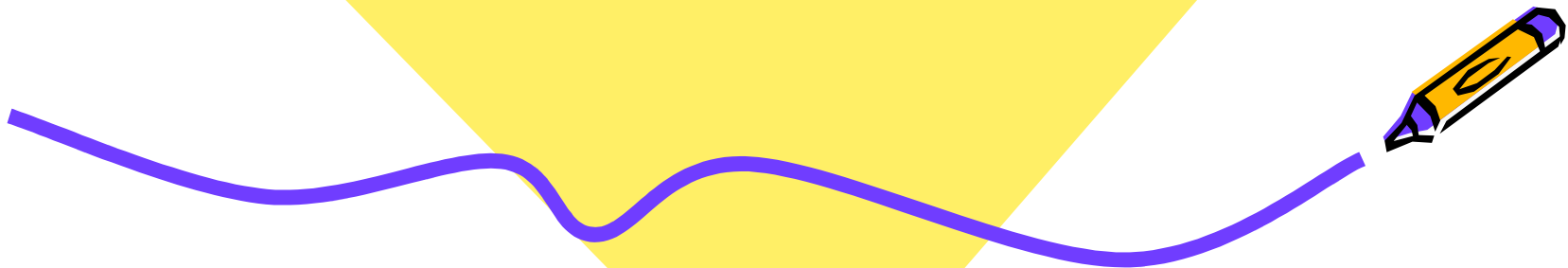


The Designer Usually  
Works with a Team





The Team Sometimes  
Communicates Through  
Documents



# Six main groups

- Management
- Design
- Writing
- Engineering
- Art
- Players

