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What's the Problem?

Mark Rosewater
Making Magic
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PRO TOUR-VALENCIA

There are many different aspects to card design (which is a big relief as I write a weekly column). This week, I thought I'd take a look at one of my favorites: problem solving. In many ways, designing a card set is like working on a big puzzle. No, more of a metapuzzle. Those of you that don't involve yourself in puzzle searches (one of Rules Manager Mark Gottlieb's passions, by the way) might not know the term. A metapuzzle is a puzzle made up of lots of smaller puzzles. The solution of each puzzle then form the clues needed to solve the metapuzzle. Note that some metapuzzles have more than two layers (although I've been told that each time you add a level you add a "meta"; for example, three layers is a metametapuzzle). A classic pop culture example of a metapuzzler would be Batman's archnemesis The Riddler. He often asked a series of riddles that Batman had to piece together to solve a larger riddle.



My point is that **Magic** expansions are like metapuzzles (or metametapuzzles, or metametametapuzzles, etc.). They have a series of smaller puzzles that are solved to help piece together the solutions to larger puzzles that are then assembled to crack the even larger puzzle and so on. What this means is that the skills required to solve problems are valuable ones for a designer to possess. In today's column I thought I'd walk all of you through some classic puzzles (which aren't specifically about **Magic** but which I've added a **Magic** flavor to). Note that for today I am restricting myself to logic puzzles, that is these are all puzzles that can be solved by reasoning out the answer. There are many other types of puzzles and **Magic** design tends to hit most all of them, but today's column to keep focused is going to just use logic puzzles.

For each one I will start by presenting the puzzle. I will then give the answer for those that think they've figured it out on their own. If you haven't figured it out though, I recommend you skip it (the solution will be hidden) and go to the next section where I will walk you through how to solve the puzzle. Finally, I will talk about how **Magic** design often uses the same tricks to solve its problems. Sound like fun? (If not, you might want to bail on this week's column and come back next week; I promise no puzzles.)

Puzzle #1 – Man O' Mana

You're playing **Magic** Online and you get exactly three lands in play: a Mountain, a Forest, and a Chaotic **Taiga**. The Mountain taps for . The Forest taps for . The Chaotic **Taiga** taps randomly for either or . Then a bug occurs that reassigns the card title, art and frame from each card to a different card. No card has its own title, art and frame. The bug then shuffles their position so you don't know which card is which.

Here's the challenge. Tapping only one land of your choice, can you figure out the true identity of each of the three cards?

Solution

Click [here](#).

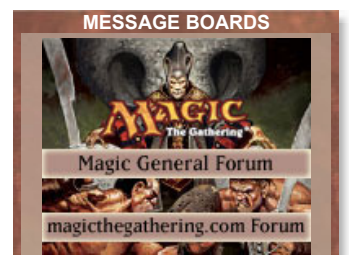
Tap the land labeled Chaotic **Taiga**. If it produces , it is the Mountain, the card labeled Mountain is the Forest and the card labeled Forest is the Chaotic **Taiga**. If it produces , it is the Forest, the card labeled Forest is the Mountain, and the card labeled Mountain is the Chaotic **Taiga**.



How To Solve It



Click [here](#).

The key to problem solving starts with figuring out what you know. In the case of this puzzle, you know two things. One, you know what type of mana each of the three lands produces. And two, and this is the important one, you know that each land is labeled with a name that isn't its own. Why is this so important? Because the stumbling block in solving the puzzle is that two different lands produce each color. In particular, the Chaotic **Taiga** is a pain because you can never know what it is by blindly tapping it.

This means that the solution to the problem is to find a way to tap a land that you know isn't the Chaotic **Taiga**. How do you do that? Look above at the second piece of information. No land is labeled correctly. That means that the land labeled Chaotic **Taiga** is not the Chaotic **Taiga**. It has to be either the Mountain or the Forest. And each of



those lands taps for a different color. Thus by tapping the card labeled Chaotic Taiga we are able to learn its identity. If it produces  then it is the Mountain and if it produces  then it is the Forest.

We can then use this piece of information to learn the rest. Let's suppose the land labeled Chaotic Taiga produces . We now know that it is the Mountain. That means one of the two other lands must be the Forest. All the lands are labeled incorrectly thus the land labeled Forest cannot be the Forest. By process of elimination, the land labeled Mountain must be the Forest. And if the land labeled Chaotic Taiga is the Mountain and the land labeled Mountain is the Forest then the land labeled Forest has to be the Chaotic Taiga. Obviously if the land labeled Chaotic Taiga produces  just work in the opposite direction to solve the puzzle.

What This Has To Do With Magic Design

Magic design by its nature is very disorienting. Why? Because we are constantly trying to do things we've never done before. We revel in finding new veins of design that throw old convention to the wind. Part of what keeps the game fresh is that R&D keeps shifting how elements of the game are relevant. Things that are important can become unimportant and vice versa. Things that have synergy stop working so well together while things that never had any potency can suddenly rise in power. With each new environment, **Magic** design gets to rewrite whatever it wants.

I'll be honest. This aspect of design is one of the most liberating and exciting. But, and this is a pretty big but, it can cause a lot of internal confusion. It's much easier to create a new environment than it is to understand it. Often, especially in early design, we find ourselves having to solve problems that we've never had before. That is where the skills of this puzzle come in. How do you figure out the truth when everything is topsy turvy? Well, you start by figuring out what truths you do know and then you logically construct outward.

As an example let's look at the design of the flashback mechanic. Here's a popular flashback card from the *Time Spiral* block in case you're unfamiliar with flashback.



Flashback came about because while watching a feature match at the Pro Tour (back in the day when I attended all the Pro Tours, I used to run the feature match area) I thought up the idea of a spell that could be played exactly twice. I liked that it was a different way to add value to a card yet in a way that didn't become too repetitive. The problem was how exactly do you logistically allow a spell to only be played twice.

I began in the most obvious place. What if the spell returned to your hand (a la buyback) but only the first time you played it. That idea was wrought with problems. The biggest two of which were that it relied on hidden information to determine how the card would play and that it had huge memory issues. So I started looking for other answers.

The key to solving the puzzle was to examine what I did know. The spell had to go to the graveyard as keeping it in the hand caused too many problems. Could I solve my problem by dealing with what happens to the card after it goes to the graveyard? Yes, I could. I could allow the mechanic to play the card out of the graveyard. If it then removed itself from play, it would naturally restrict the play to two uses. Yes, it meant that I'd have to limit the mechanic to instants and sorceries (and pseudo-creatures using token-making technology) but that was an acceptable sacrifice as the solution so elegantly solved the other problems.

The key here is that I solved the problem by focusing on what I did know and then used logic to walk me through what other options were available.

Puzzle #2 – Atoga Party



A planeswalker is traveling with a Mirari, an Atog and the Atogatog. He comes to a river. (**Bad, Raging, Rushing, Underground**—take your pick). In the river is a boat capable of holding up to two passengers. Here's the problem, Atogs are notoriously horrible boat rowers, which means that the planeswalker must always be in the boat to guide it. But if the **Atog** is ever left alone with the **Mirari**, he'll eat it. If the **Atogatog** is ever left alone with the **Atog**, he'll eat the **Atog**. How can the planeswalker get all three items across the river?



Solution

Click [here](#).

The planeswalker puts the **Atog** in the boat and ferries him across. The planeswalker then comes back and gets the **Mirari** and ferries it across. The planeswalker then takes the **Atog** back to the initial side of the river. The planeswalker leaves the **Atog** and then ferries the **Atogatog** across. Finally, he comes back and gets the **Atog** ferrying him across.

How To Solve It

Click [here](#).

The key to solving this puzzle is to understand what has to be avoided. As stated above, there are two pairings that cause problems if left alone: the **Mirari** and the **Atog**; and the **Atog** and the **Atogatog**. This means that there is only one safe pairing to leave alone—the **Mirari** and the **Atogatog**. Here's the problem. You have to leave the **Atog** when you transport the **Mirari** and the **Atogatog** across the river. How can you do such a thing without ever leaving the **Atog** alone with something else?

To solve this problem, let's start by figuring out if there are any things that have to be done. Okay, the planeswalker begins with all three items on the first side of the river. If the planeswalker takes the **Mirari** across, the **Atogatog** eats the **Atog**, and if the planeswalker takes the **Atogatog** across, the **Atog** eats the **Mirari**. This means that the first step has to be for the planeswalker to ferry the **Atog** across.

The planeswalker then goes back. He must now take the **Mirari** or the **Atogatog** across. No matter which the planeswalker takes, though, the following problem will occur. If he leaves it alone with the **Atog** it will either be eaten by the **Atog** or eat the **Atog**. But we can't backtrack. Each step so far was the only step that could be taken. This means that we have to see if there are steps at this point that we haven't considered. (For the sake of explaining the options, I'm going to assume the **Mirari** was taken second.)

The **Mirari** and the **Atog** are on the second side of the river. If the planeswalker leaves them alone, bye bye **Mirari**. Thus, not an option. If the planeswalker takes back the **Mirari**, then he has only undone his last step and is back to a place with no other options. But there does exist a third option. The planeswalker could take back the **Atog**. This doesn't undo anything and avoids the **Atog** eating the **Mirari**. As this is the only option that advances us, we take it. Once the planeswalker is back on the first side of the river, his next step is obvious. He takes over the **Atogatog**. This is acceptable, because as we've discussed it's okay to leave the **Mirari** and **Atogatog** alone. The planeswalker then leaves the **Atogatog** on the far side with the **Mirari** and comes back to get the **Atog**. Puzzle solved.

What This Has To Do With Magic Design

Much of **Magic** design involves walking down certain paths. The act of doing A often forces you to do B, which leads to C and so on. Why is this? Because **Magic** is a very mature game that has a lot of intricacies. In order to

keep the weight of fourteen years from collapsing the game, **Magic** has built a very solid substructure; order to keep chaos at bay. While this substructure is most noticeable in something like the rules, design has its share of guidelines that shape what it can and cannot do.

This doesn't mean that design can't break its own rules, but it does mean that doing so comes with a substantial cost. It's a cost we often choose to pay but doing so does cause numerous headaches. That is where the skills to solving this type of puzzle come in handy. The goal to this type of puzzle is trying to find a solution within the parameters. I call this "in the box" thinking. How can you make something new work only using known parameters from the past?

The trick, as this puzzle's solution demonstrates, is figuring out what the rules actually are. Often the thing that is blocking your solution is a restriction you've added that you didn't have to. This can be at such a basic level that you don't even realize you've added unnecessary complication. For example, this puzzle never tells you that you can't backtrack, but the forward momentum of trying to solve the puzzle often fools many puzzle solvers into ignoring that option as an acceptable choice.

An example of where this type of puzzle solving led to a particular keyword design is morph. Although for the record, this happen not in design but rather a rules meeting. The Rules Team (back in the day, there was a formal team that got together to discuss any and all rules issues) was trying to find a solution that allowed the *Alpha* card **Illusionary Mask** to work.



The way they solved the problem was to start at the beginning and find solutions to each problem as they faced it. **Illusionary Mask** needed to turn the cards face down, so they did that. This led to the next problem, which was that most qualities of the card were hidden information. This led to conversations like this one.

Heckle: Okay, I'll put a creature into play face down with **Illusionary Mask**.

Jeckle: Once it's in play, I'll **Terror** it.

Heckle: Sorry, you can't do that.

Jeckle: Why?

Heckle: I'm not required to tell you that.

Jeckle: Is it black?

Heckle: Can't say.

Jeckle: Is it an artifact creature?

Heckle: Can't say.

Jeckle: Untargetable?

Heckle: Can't say.

Jeckle: What can you say?

Heckle: Not much really. Um, when it hits you you'll find out its power. Well, at least its power at the time it hits you.

The rules team figured out that having qualities that weren't known to everyone was a problem so they found a solution. What if being face down gave you a set of stats and qualities? Define the state of being face down such that everyone knows what it is. The rules team realized they had stumbled onto something big and came to R&D with their idea. With minor tweaking on R&D's end, that mechanic became morph.

The key to cracking this problem was understanding that a card's characteristics didn't have to be defined by what is printed on the card. Once this "mental block" was removed, the rules team found a simple and straightforward answer. The lesson for design is to always understand the parameters of your problem. Often the thing holding you back most isn't the problem but the problem solver.

Puzzle #3 – It Takes Two

Yawgmoth, the utter incarnation of evil, attempts to clone himself. Unfortunately things go horribly wrong, as they so often do when cloning is involved, and Yawgmoth makes a good twin (as opposed to an evil one). The good twin of Yawgmoth looks just like him. The only difference is that he always speaks the truth and is inherently good. Yawgmoth, on the other hand, only talks in lies and is, at his core, a rotten, well, whatever he is.

The two Yawgmowths (for the sake of the puzzle we'll call them Good Yawgmoth and Evil Yawgmoth) live together, appropriately enough, in a house at a fork in a very important road. One road in this fork leads to Phyrexia (a bad, bad place) while the other leads to Lorwyn (a much kinder place). You, the puzzle goer, have come to this fork in the road. You are allowed to knock on the door. One of the two Yawgmowths will answer, but you won't be able to tell which one it is. Remember that Good Yawgmoth always tells the truth and wants to help you. Evil Yawgmoth always lies and wants to cause you harm.



You may ask one question and then upon hearing the answer you must pick a road and go down it. With only one question asked of an unknown recipient, can you find the road to Lorwyn?

Solution

Click [here](#).

Ask the Yawgmoth that opens the door, "What would the other Yawgmoth say if I asked him which road to take?". Then take the other road.

How To Solve It

Click [here](#).

The trick to this puzzle is figuring out a question that gets you information regardless of who you ask. At first blush this seems very difficult. No matter what you ask, you are going to either get a true answer or a false answer. How can these not be the opposite of one another? Figuring out the situation where the answers aren't opposite from one another is the core of the puzzle.

The key to cracking this chestnut is to look at the dynamic that's been set up. One good truth teller and one evil liar, both identical. Is there a way to ask a question that takes that relationship into account? Yes, there is. You can ask one of the Yawgmowths what he believes the other Yawgmoth would say. The good version will try to be as accurate as possible and thus give you the incorrect/lying answer. The evil version, on the other hand, will know what the good version would say and thus will say the opposite, a.k.a. the wrong answer. See what we've done? We've gotten both versions to give us the same wrong answer.

All we have to do now is tailor our question to the problem at hand. "What would the other Yawgmoth say if I asked him which road to take?" We know that the answer will be the wrong answer regardless meaning that as long as we take the opposite road from the one given, we'll end up in Lorwyn.

What This Has to Do With Magic Design

The key to solving this puzzle is understanding how the two parts interact with one another. Understanding how two things interact? There couldn't be a more relevant aspect to **Magic** design. **Magic** is a modular game; that is, it is designed such that the pieces can mix and match. Many problems are solved in design by understanding these connections.

This type of puzzle taps into the need for designers to be holistic, that is to understand the design as a complete whole rather than just the sum of its parts. A good design doesn't just lump random items together, but rather finds ways to interweave themes throughout the design. To do this effectively, you have to understand how the basic elements of your design function with one another.

A good example of this from a past design would be the guild model in *Ravnica* block. While designing *Ravnica* we knew that giving the guilds strong identities was fundamental to making the block design work. The problem (a.k.a. puzzle) that presented itself was this: if the mono-colored cards were split among guilds then there wouldn't be enough cards for Limited. Remember that *Ravnica* (I'm talking specifically about the set here as opposed to the block) was broken up into four guilds. One fourth of the cards isn't enough to have enough playable cards in almost any limited format.

This meant that the monocolored cards had to serve two masters (well, in *Ravnica*, white, black and green did). The key to solving the puzzle was to find things that monocolored cards could do that played into both guilds it was part of. Let's take green as an example. Selesnya (green-white) was all about unfettered growth of creatures. Golgari (black-green) had a recursive element that put creatures into and out of the graveyard. The puzzle was to find where the two overlapped. The most obvious overlap was that both guilds used creatures. Yes, Selesnya was building a giant army while Golgari sacrificed them, but nonetheless the two guilds overlapped in their need for more creatures. This meant that things like token creation played especially well and thus were pushed at higher levels than normal.



The walkaway lesson from this puzzle is that designers cannot look at pieces (be they cards, cycles, mechanics, etc.) in a vacuum. Trading card games are all about interconnection. Part of designing an expansion is understanding what happens when your various pieces start combining with one another.

Riddle Me This

That's all the puzzles I have for today. If you liked this column and want to see more like it (or if you hated it and want to see less), let me know. I get email all the time asking how one becomes an R&D member, so I've decided to take more time talking about different qualities that go into being a designer. Is this an interesting topic for you, the reader? Please let me know.

As a final note, I should point out that if you have aspirations to become a game designer, puzzles are a good way to start sharpening certain necessary skills.

Join me next week when the onslaught begins.

Until then, may you enjoy the search as much as the destination.

Mark Rosewater

*Mark Rosewater is Head **Magic** Designer. What this fancy title means is that he's in charge of **Magic** design. This gets him a lot of mail (which he actually reads). When not alternatively destroying and saving **Magic**, he likes to spend time with his family, do stereotypically geeky things (play games, read comics, watch a lot of science fiction, etc.) and write about himself in third person.*



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