Interaction Design for AnimMagix Prototype

Edith Ackermann, Carol Strohecker

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Abstract

This is a design document for a second entry in the Magix series of playful learning environments. In AnimMagix, children create whimsical creatures with anthropomorphic behaviors and launch them onto a field in which the creatures interact and affect one anothers behaviors. The creatures become like a dancers on an ice rink. Their movements and intentions seem to change as they glide from one partner to the next. Children can explore these emerging effects by selecting and saving creatures for further study. AnimMagix maintains the constructive-dialogic style of interaction as well as many functions introduced in PatternMagix (see MERL TR97-24).

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AnimMagix Design

In AnimMagix, children create whimsical creatures with anthropomorphic behaviors and launch them onto a field in which the creatures interact and affect one anothers' behaviors. The creatures become like a dancers on an ice rink. Their movements and intentions seem to change as they glide from one partner to the next. Children can explore these emerging effects by selecting and saving creatures for further study. AnimMagix maintains the constructive-dialogic style of interaction as well as many functions introduced in PatternMagix.

Design Rationale

The child pieces together a whimsical creature within a tripartite column that has areas for the head, the belly, and the base. The child can further individualize a creature by adding colorful masks and costumes.
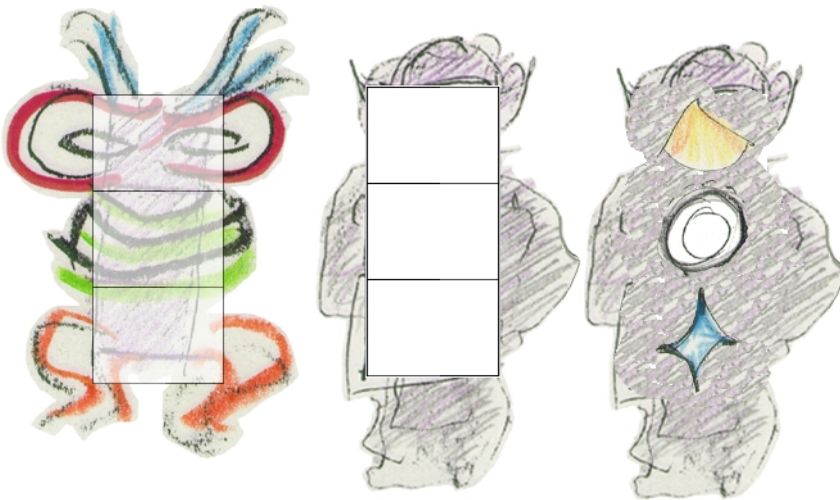
The manner of composite construction has become familiar through its use in toys, books, and software packages:

"Animal Twister" by Club Earth
Cumberland, RI

©1995 JHP China, Applause™

This animal bounds happily around in Australia. It is quite harmless but it even carries its babies around in a neat little pouch when they are very young.

K
A
N
G
A
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This creature should be able to fly. But it can't. It can however swim very well and it even carries its babies around in a neat little pouch when they are very young.

P
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Centaurs and mermaids are ancient examples of composite creatures, animals pieced together from parts of disparate beings. People have used all kinds of media to imagine new animals in this way.

From J. Riddell, Hit or Myth: More Animal Lore and Disorder. *NY: Harper and Rowe, 1949.*

The kangaroo blurb reads, "This animal bounds happily around in Australia. It is quite harmless but it even carries its babies around in a neat little pouch when they are young." The pengaroo blurb: "This creature should be able to fly. But it can't. It can however swim very well and it even carries its babies around in a neat little pouch when they are young."

SimLife's Biology Lab uses a similar approach for making new creatures, but adds features that help to make it a learning environment for ecology and genetics: users can modify the species genome, gene pool diversity, degree of difference between parental genes, and number of paternal genes.

From K. Karakotsios et al., SimLife: The Genetic Playground. *Orinda: Maxis, 1992.*
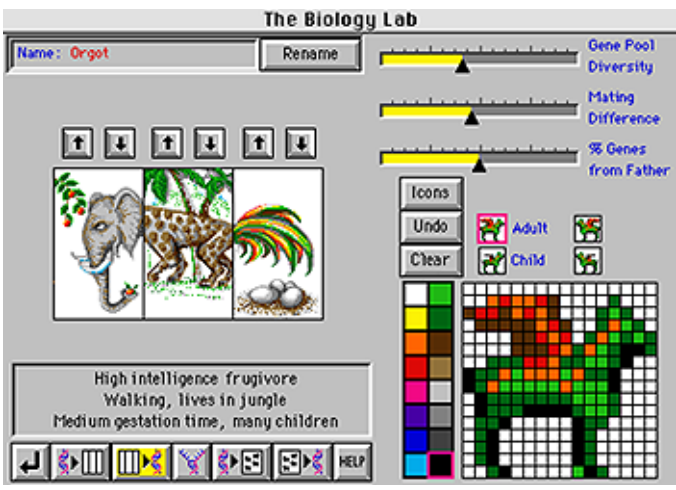
Computational media allow new ways of engaging with such composite creatures. In AnimMagix, children can endow creatures with behaviors that the computer sets into dynamic relationship.

AnimMagix Interactions

The general functions are the same as in PatternMagix:

Undo reverts to the state immediately preceding an action.

**Clone** duplicates a selection.

Remove deletes a selection.

Clear empties the active window.

Snap prints the contents of the active window, capturing the action at the moment the button is clicked.

AnimMagix has five modes in which the child can play with creatures and their behaviors: **Draw**, **Mingle**, **Enact**, **Stage**, and **Stir**. The child initiates moves to verying degrees in the different modes. Modes also vary in their focuses on creature design and the child's ability to examine creatures' behaviors and see how they effect one another.

Enact mode - To create creatures with behaviors, the child works in Enact mode. This is the mode in which the constructive-dialogic style of interaction is most pronounced. As in PatternMagix, the green area at left (the "Child Area") and the red area at right (the "System Area") grow and shrink as the child goes back and forth between them.
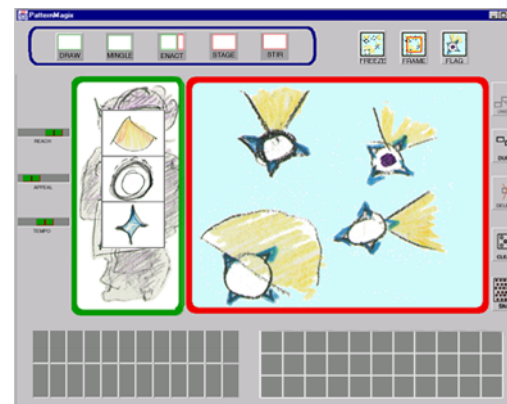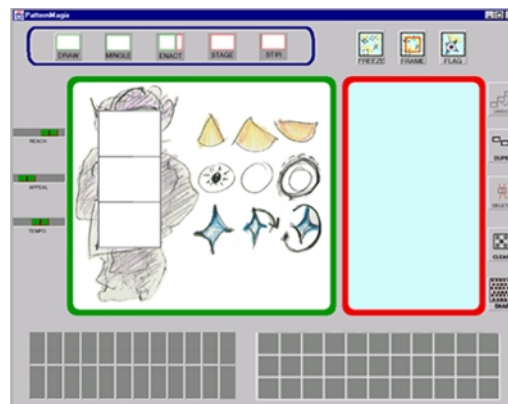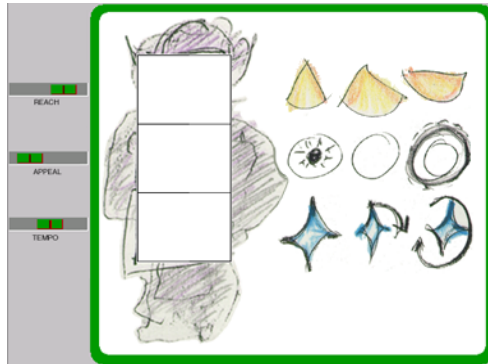
**The Child Area** includes the tripartite construction column framed by a phantom-like body form suggesting areas for the creature's head, belly, and base. Each body part has an associated set of behavioral attributes.

The head is associated with the creature's perceptual field; it embodies the creature's ability to sense aspects of its environment, including other creatures. Its metaphorical questions are "What do I notice; what's within my reach?" The creature cannot sense anything outside of its perceptual field. Perceptual fields can vary in breadth and depth.

The belly is associated with the creature's sociability; it embodies the creature's appeal in terms of distance to other creatures. A creature can attract or repel another creature. If it attracts another creature, it lets it get close; if it repels another creature, it pushes it away. The metaphorical statements are, "I am going to entice everyone I see or hear", "I am going to banish everyone I see or hear", and "I don't care".

The base is associated with the creature's motility; it embodies the creature's stubborn preference for a specific pattern of movement. A creature can maintain a heading, sway back and forth like a windshield wiper, or turn and turn in repeating circles. The child can vary the tempo. The metaphorical question is, "What is my dance?"

The attributes are represented abstractly:
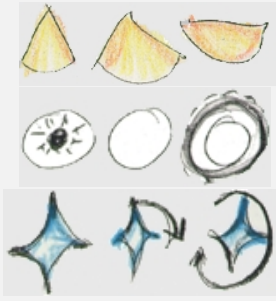
The head symbols represent breadth of the perceptual field.

The bellies represent degrees of sociability: attraction, neutral, and repulsion.
(Markings emanate inwardly on the Attract symbol and outwardly on the Repel symbol.)

The base symbols represent patterns of motility: steady, swaying, or turning.
(The symbols for swaying and swirling move accordingly in the interface.)

The child clicks on a symbol to select it as a behavior for the corresponding body part:
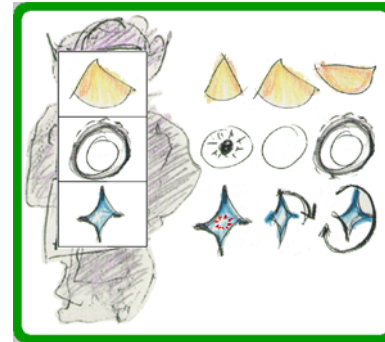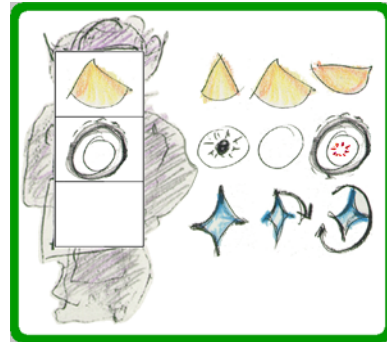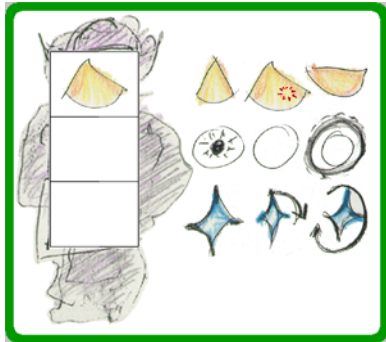
Here, the child has constructed a creature who has a mid-range periphery in the perceptual field, who repels other creatures in its field, and who maintains a constant heading.

If the child clicks anywhere in the box containing a body part, the part is selected and can be removed (but not cloned).

The green sliders to the left of the Child Area provide operations for adjusting the behavioral attributes:

The Reach slider changes the depth of the perceptual field. As the slider moves, the perceptual field gets longer or shorter.

Similarly, with the Appeal slider, the child can augment or inhibit degrees of attraction and repulsion. (The slider goes gray if the sociability is neutral.) As the slider moves, the belly markings fade or increase in color intensity. Likewise, the Tempo slider enables changes the pace of swaying and swirling. (The slider goes gray if the motility is steady.) As the slider moves, the bases spin or sway slower or faster.

When the child has assigned a complete set of behavior attributes, she can click the red System Area at the right to launch the creature onto the metaphorical ice rink. The creature launches only when its set of attributes is complete.

The System Area activates the behaviors, animating the creatures. The Area can show many dynamic creatures in bird's-eye view. Their behaviors influence one another, creating emergent effects.
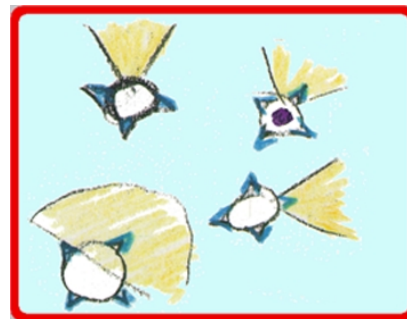

At first it is the zany movements that command attention, but gradually one realizes that subtle interrelationships between the creatures' perceptual fields, sociability, and motility contribute to the overall dance.

In addition to the slider-controlled operations, AnimMagix provides several ways for the child to examine these interrelationships. System Area functions include *Freeze All* (stop the fray – and the music, if there is any), *Frame* (which saves a creature in a manner similar to PatternMagix), *Freeze One* (anchor a creature), and *Flag* (mark the creature so you can keep track of it).

As the child launches a creature by clicking the red System Area, it expands and the green area shrinks. When the red area is larger, the Undo, Clear, and Snap buttons are available and the creature behaviors are activated. The child can play with one or many creatures in the System Area. By going back and forth between the red and green areas, she can create copies of the same creature or launch entirely new creatures into the fray.

When the red area expands, the Frame and Flag buttons are grayed out but the **Freeze** button is available. This is the *Freeze All* function. If the child clicks this button, several things happen: the creature dance stops, the name of the Freeze button changes to Fray, and the Frame button lights up and begins flashing. If the child clicks the **Fray** button, the action starts again and the button name changes back to Freeze. If the child clicks the **Frame** button, several things happen: the button name changes to **Catch**, the Behavior Library lights up, and the yellow-outline square begins floating around the System Area.The Frame works much as in PatternMagix: If the child clicks on the floating Frame, it stops and she can reposition it to surround a desired creature.
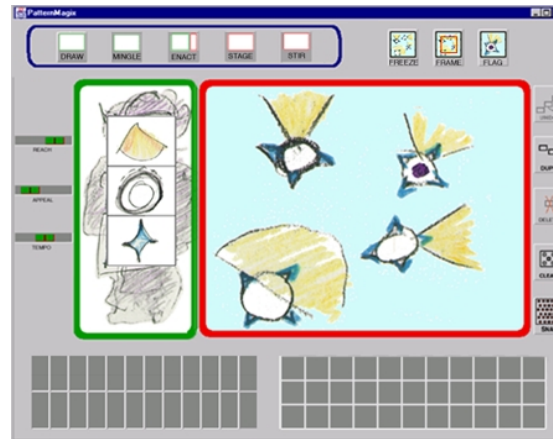
If the child double-clicks on the static Frame, it resumes floating. Similarly, if the child clicks on a frozen creature, the system selects it and she can use the mouse to move the creature anywhere within the System Area. She can also double-click on a static creature to set it in motion. When the system is in the Freeze All state, double-clicking a creature both activates the creature and changes the button name from Fray to Freeze.

When the creatures are dancing, the child can *Freeze One* by clicking on a creature. The creature stops and the system selects it. The selected creature is anchored while the others continue to move about. The child can continue to freeze single creatures. The system considers the most recently clicked creature as the current selection.

When a creature is selected, it highlights and the child can use any of the buttons that have become available: Remove, Clone, Flag, or Frame.

The child can delete a selected creature by clicking the Remove button, or duplicate the creature by clicking the Clone button. If she clicks the **Flag** button, the creature gets flagged: the system automatically chooses a color and puts a spot of that color on the selected creature. As soon as the spot appears, the Flag button grays out again.

The child can also Frame a selected creature. If she clicks the Frame button when a creature is selected, several things happen: the button name changes to Catch, the Behavior Library lights up, and the yellow outline appears around the selected creature.

If the child clicks the **Catch** button, the Framed creature appears in the Behavior Library. The child can save only one creature at a time. The Behavior Library stays lit up until the child exits the red area.

The Behavior Library holds creature Behaviors. Some are ready-made and others are saved with the Catch button. The Library shows them in the same "squashed" representation that appears in the System Area. From here they can be moved back into the Enact mode's System Area, or into the Group or Stage mode areas.

The Appearance Library contains creature Appearances – that is, costume designs for the abstract behavior sets. Some of these costumes come ready-made with AnimMagix. The child can make additional costumes in the Draw mode and save them in the Appearance Library.

Appearance Library   Behavior Library
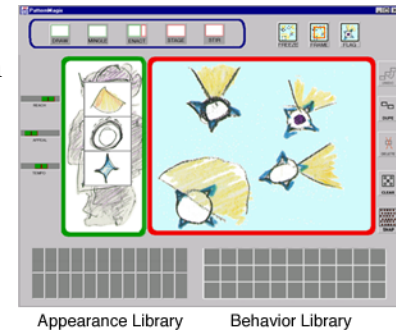
In Enact mode, the child can move Behaviors from the Behavior Library into whichever window is active. If a set of Behaviors goes into the red window, the creature representation joins the fray. If a set of Behaviors goes into the green window, the symbols appear in the appropriate boxes and the sliders automatically adjust to reflect the levels of the behavioral attributes.

When the System Area is active, the Appearance Library grays out. Appearances cannot go into the red area. However, when the Child Area is active, the child can move Appearances from the Appearance Library into the green area. When an Appearance goes into this Area, it replaces whatever figure-frame is already there. If the Appearance is one that came ready-made with AnimMagix, it has an associated belly color that appears in both the green and red windows. The color helps the child to keep track of the creature in the fray, and facilitates creature grouping. The child can use the Flag button to supplement belly colors with additional markings.

When the Child Area is active in Enact mode, the general function buttons are in the following states: Undo is available; Clone is grayed out; Remove is available (it removes the contents of just one construction box); Clear is available (it removes the contents of all three construction boxes, never any of the nine symbols from which the child makes selections); and Snap is available.

When the System Area is active in Enact mode, the general function buttons are in these states: Undo is available; Clone is available; Remove is available (it removes just one selected creature); Clear is available (it removes the contents of the entire area); and Snap is available (if the creatures are animated, the printout is of the moment when the Snap button was clicked).

Complementing the slider-controlled operations and System Area functions, AnimMagix provides additional modes in which the child can examine interrelationships within and among creatures.

Draw mode - Here, special tools appear for drawing and coloring creature designs. The sliders, Behavior Library, and go gray. The child can use the Frame to save creations in the Appearance Library.

In Draw mode, the general function buttons are in the following states: Undo is available; Clone is grayed out; Remove is grayed out; Clear is available; and Snap is available.
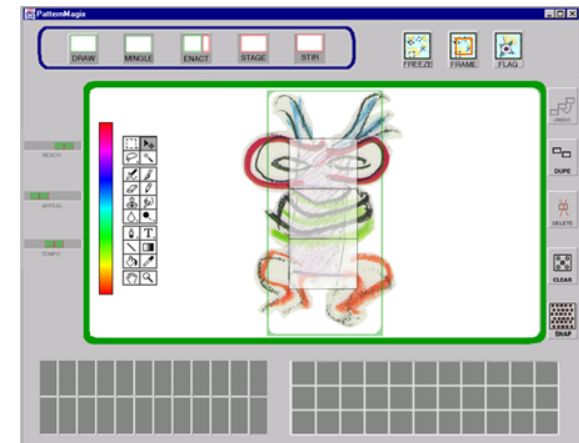
Mingle mode - Here, the child can bring Appearances and Behaviors together. She can bring items from the Appearance Library and Behavior Library onto the ice, combining them or leaving them in their original state. She can use the green sliders to adjust Reach, Appeal, and Tempo aspects of Behavior.

At first, the motion on the ice is frozen. The Freeze button is in the Fray state. The child can click the Fray button to start the motion of all creatures on the ice. To start a single creature, the child can double-click the creature.

The Freeze and Flag buttons work as in the Enact mode's System Area.
The Frame button is grayed out.
All of the general function buttons are available.
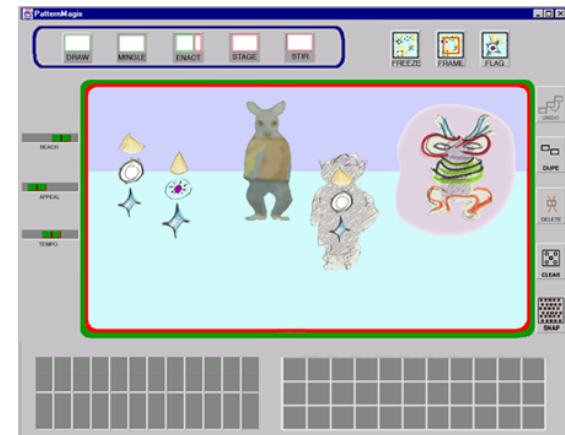
When an Appearance overlays a Behavior, they produce a creature that acts consistently with its embodied behaviors and which can potentially move about the ice. The creature is shown in frontal view.

Since the view is frontal rather than aerial, the inherent behaviors are translated and simplified: perceptual field is represented as an aura that shrinks and grows; sociability is represented by fading and increasing intensity of belly marking; motility is represented by variable-speed movements of the entire figure. A steady creature keeps its orientation; a swaying creature jiggles left-to-right; and a swirling creature flops front-to-back..

The child may choose to leave the Behaviors unadorned. Uncostumed Behaviors act as usual.

The child may choose to play with an Appearance without the Behaviors. Appearances without Behaviors have an interesting presence, but cannot move or behave in any way.

Stage mode - Here, the fray begins automatically and appears in aerial view. Both Libraries gray out. The child can manually adjust environmental conditions with the red sliders.

The Fog slider is the inverse of the the green Reach slider. The Fog slider darkens and lightens the Stage area, which has the effect of changing the depth of a creature's perceptual field.

The Vibes slider is the inverse of the the green Appeal slider. The Vibes slider sends charges through the Stage area, which has the effect of changing the creature's degrees of magnetism.

The Glaze slider is the inverse of the the green Tempo slider. The Glaze slider sends charges through the Stage area, which has the effect of changing the creature's degrees of magnetism.
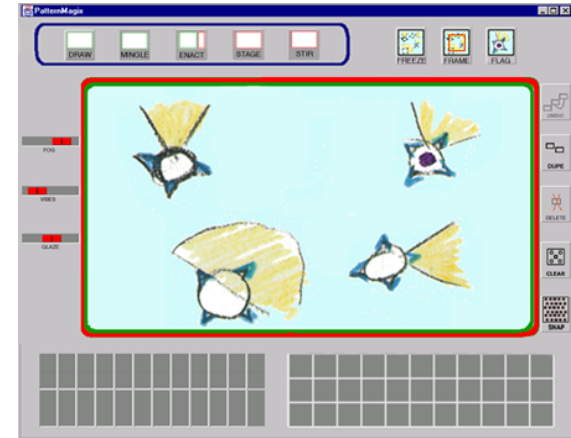
In Stage mode, the general function buttons are in the following states: Undo is grayed out; Clone is grayed out; Remove is grayed out; Clear is available; and Snap is available.

Stir mode - Here, the fray begins automatically and appears in aerial view. The Sliders and Libraries gray out, and the system adjusts environmental conditions automatically. These adjustments occur as alternating sequences of Fog, Vibes, and Glaze. Within each round, degrees of Fog, Vibes, and Glaze are adjusted randomly. If possible, the sliders reflect the varying degrees even while gray.

In Stage mode, the general function buttons are in the following states: Undo is available; Clone is grayed out; Remove is grayed out; Clear is available; and Snap is available.
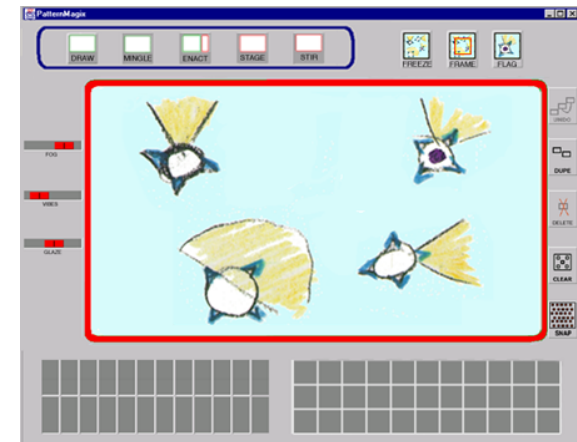
Future work: Ideally, the child would to be able to adjust the view of the ice rink by zooming in and out, in "Powers of 10" fashion. This may mean establishing a separate mode or adding a control to existing modes.

AnimMagix as a learning environment: We provide more controls as appropriate so the child can experiment with different configurations and balances of the creatures' behaviors. Over time and with repeated play, through the use of these controls, the child will no doubt develop better understandings of particulars of the complex interrelationships. However, even if the complexity remained daunting and the particulars remained relatively opaque, there is a basic, worthwhile point to the game: complex effects emerge through interactions of simple parts. If the child does nothing else but develop a better intuition about this basic idea in system dynamics, AnimMagix will have had a reason for being.

Reference

Strohecker, C. Embedded Microworlds for a Multiuser Environment. Technical Report 95-07. Cambridge MA: MERL - A Mistubishi Electric Research Laboratory.