

Artistic Concept

I have been engaged in research of 3D modeling interface design and in development of 3DCG software products, which give priority to experiences and physical laws in the real world, or the concept of "How can it be made closer to the real world?" While conducting research tasks, the author began to doubt the concept. "Shapes have three dimensions but screens have two dimensions. Can experiences in the real world be utilized in the two-dimensional world with one dimension lost?" Physical laws dominate our world, but the world of the screen (two-dimensional) world is different from our world. There may be a method of expression that exploits the advantages associated with two-dimensional planes as opposed to three-dimensional ones. Such a method would not simulate physical laws, but would transcend them and would require a mechanism. However, expression beyond our understanding cannot convey the two-dimensional world to the third-dimensional one, nor vice versa. If a person could interactively create an expression that is understandable albeit somewhat strange, a message would be conveyed to the brain. This is a characteristic that cannot be extracted from three dimensions, neither is it a concept not bound by dimensions. In doing this analysis, the answer presented itself; the ability of recognition is only possible in humans. This is the beginning of the concept; "expressions that are impossible in reality, but possible in the human mind."

Extended Cognitive Tools is the general name for software that has expressions for extending human recognition and includes Incompatible BLOCK, OLE Coordinate System, and Constellation.



Incompatible BLOCK (2006)

Incompatible BLOCK is a block-based 3D modeling software with an interface of wonders.

FEATURES

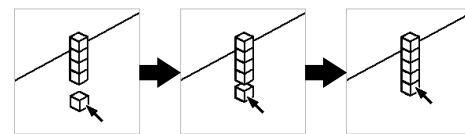
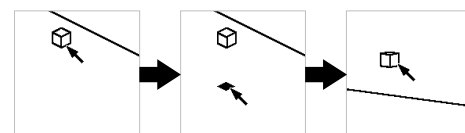
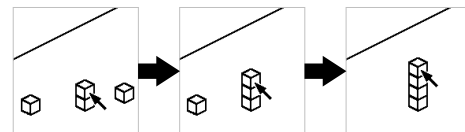
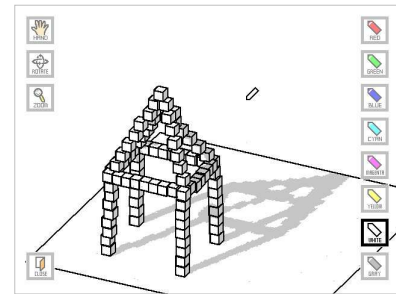
Moving a Cube

If a cube is moved to a screen position on the screen by dragging, the Incompatible BLOCK judges the destination and places the cube at the expected position in 3D space, as described below.

Rule 1. If a cube moved onto a 2D floor, the software places the cube on a 3D floor.

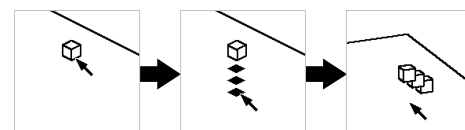
Rule 2. If a cube is moved to a look-as stacking position on the screen, it can be placed to be touched other cubes.

Rule 3. A cube in empty space is moved vertically or horizontally from the start position. Additionally, by dragging, the floor can be moved along the XZ plane.



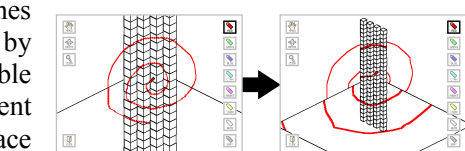
Changing a Cube Height

In addition to Rule 3 above, there are two methods of changing a cube height. One method uses a "shadow". A shadow can be pulled out from a cube by dragging the bottom of the cube down. The height of the cube is changed in the 3D space so that it will look afloat. Actually, the cube moves in the direction of view each time the shadow is moved down. If a cube is added upward to the bottom of a form adjacent to the floor, the added cube looks as if it is under or over the floor. In the real world, however, a form buried in a floor cannot be seen. By considering this, the Incompatible BLOCK shifts the whole form up so that the form will be adjacent to the top of the floor.



Changing the Number of Cubes by Using Shadow

User can increase the number of cubes by pulling out several shadows from a single cube. In the real world, this can be compared to several building blocks lined in the direction of view, and the same number of cubes as shadows can be added to 3D space. In contrast, pulling out a small number of shadows when several cubes are overlapping and look like one can reduce the number of cubes. In other words, the number of shadows corresponds to the number of cubes.



Changing a Pen Size

The Incompatible BLOCK enables the user to draw lines directly on the screen for the cube, floor, or background by 2D operation. Since lines can be drawn only on the visible sides, the back of the form is not painted. And, the apparent boldness of a drawn line is fixed, irrespective of space zooming. In other words, zoom-out makes a pen thick and zoom-in makes it thin.

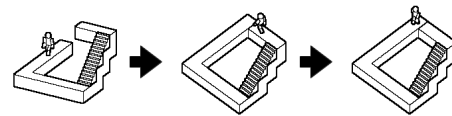
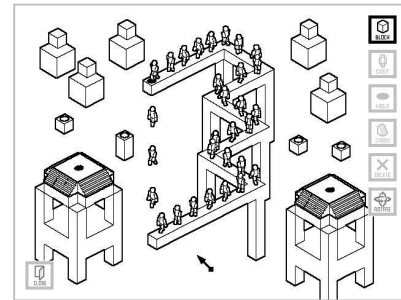
OLE Coordinate System (2007)

OLE Coordinate System has some interactive illusions that enable the character to perform impossible motions on the block and the stairs in the virtual 3D world.

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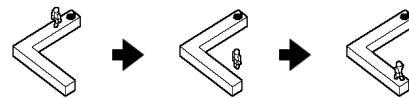
Subjective Translation

Even if the staircases and blocks aren't linked together in the actual 3D space, when they appear connected in the 2D view, the character is able to move across the unconnected objects as if they are linked. This movement is impossible in reality, but it becomes feasible through the drawn image. I call this "subjective translation."



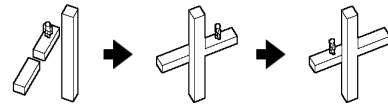
Subjective Landing

Even if the character isn't really perched on the object in 3D space, when it appears like they are in fact on the block or staircase in the 2D image, then the character is able to stand as if the object is right below their feet. The character is able to land in a way that is impossible in reality. I call this "subjective landing."



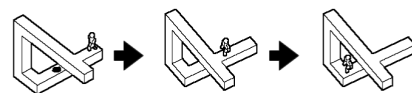
Subjective Existence

Even if the block has a gap, when it looks like the block is fully present but hidden, the character is able to move as if the gap isn't there. The character's behavior makes you feel like something is present, even though it isn't really there. I call this "subjective existence."



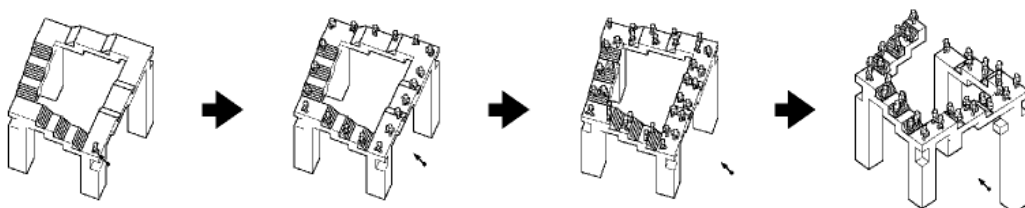
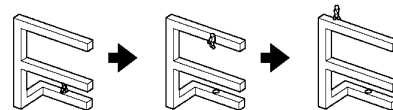
Subjective Absence

When holes or jump platforms aren't visible, the character is unaffected by them. It seems like they don't really exist. The character's behavior makes you feel as if something that actually exists is missing. I call this "subjective absence."



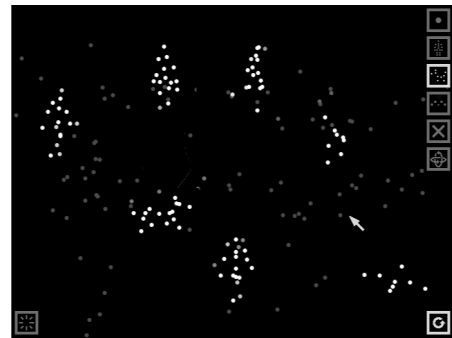
Subjective Jump

When the character jumps, a discrepancy arises in its relationship with the objects in the rear. This leaping action confuses depth perception through the character's relationship with its surroundings. I call this "subjective jump."



Constellation (2008)

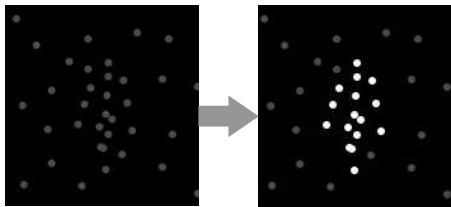
Constellation is a point-based animation system with cognitive morphing expression which character constructed several points changes to another one momentarily. Human beings can reconstruct the structure of an object from two-dimensional moving images that are digitized over time ("Structure from Motion"). The characteristic of human visual perception can be exploited to offer representations that stimulate the intellectual curiosity of users by quickly changing the shape of a character or morphing it into another object.



FEATURES

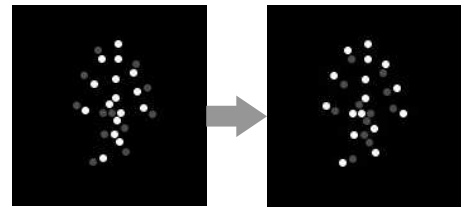
Generation

A new character is created from multiple points.



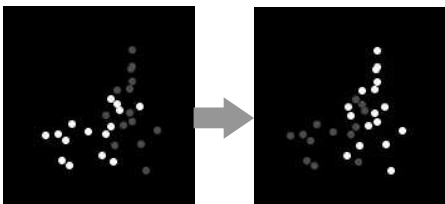
Transformation

Some of the points forming the character are replaced with stones or part of another character.



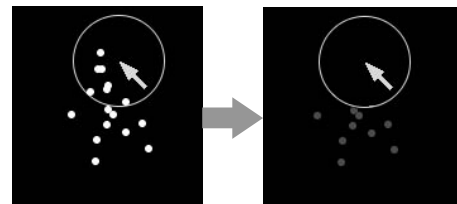
Metamorphose

Another character is created from points forming an existing character, or both stones and points forming a character.



Destruction

A character from which constituent points are missing is destroyed. Destruction occurs when the user deletes points forming a character or when the points forming it are used for another character.



Technical Realization

My works visualize the 3D object (including point) according to a viewpoint change between the perspectives of two or more interpreters. The object's motion is determined based on the 3D structure estimated from the 2D image drawn on the screen. The apparent size does not change according to depth when the 3D object is drawn by parallel projection. Consequently, the 3D object, as estimated from a 2D image, is not yet uniquely settled. As a result, the motion might sometimes produce some sequence of motion that cannot exist in the real world.