THROUGH THE BROKEN GLASS

Angela Detanico, Rafael Lain

https://doi.org/10.25364/97839033742879

There is a famous letter Einstein addressed to the family of Michele Besso on the occasion of his death in 1955. Referring to his close friend and fellow physicist, Einstein wrote:

"Now he has departed this strange world a little ahead of me. That signifies nothing. For us believing physicists, the distinction between past, present and future is only a stubbornly persistent illusion."

What Einstein was expressing in these comforting lines was his belief in the idea of the 'block universe' that considers the cosmos as a block of space-time.

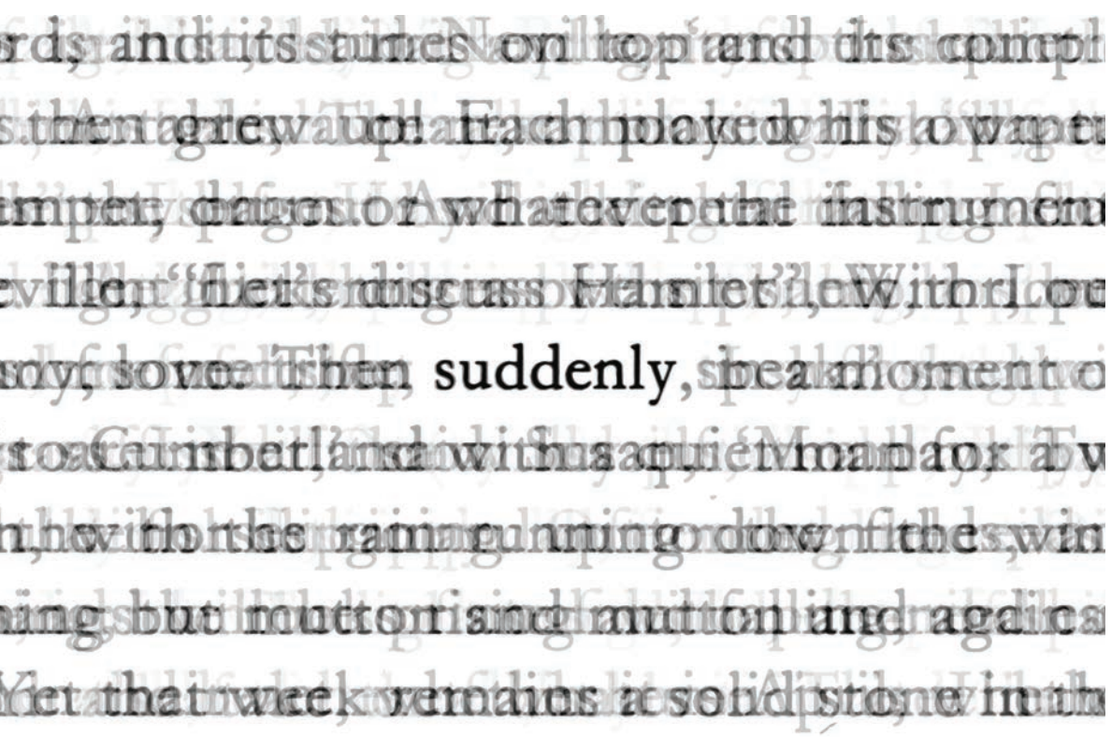
If we take the cosmos as a book, a micro-cosmos where one could travel freely in any direction instead of following the line created by the text.

If we consider a book as a block of words, not as a sequence of lines, can we write a sentence by navigating it back and forward? If we don't follow the line, what can be read?

In 2005 we created an animation using the pages of Virginia Woolf's novel *The Waves* as our raw material. The passing of time is the main subject of the book, as the cycle of a day from sunset to sunrise is paralleled with the cycle of life by following the stories of a group of friends through the years.

We reordered the pages going forward and backwards to find words to write a new sentence, one that was not present in the lines of the book but that could potentially emerge from Woolf's ocean of words.

What makes reading possible here is change, an illusion of movement, as the pages succeed each other focusing on one word that seems to stand still in the centre of a background moving too fast to be read. Our sentence surged as a question, a hypothesis that expresses itself through content and form. The first word, *what*, occurs 240 times in the book and is shown in an accelerated pace; *if* occurs 178 times, *suddenly* 26, as a blink, *nothing* 60, *else* 6 and *moves* 7, in a diminishing number expressed in a decreasing animation speed.



As we approach stillness, we realise that without movement the whole sentence is lost.

The solution is brought by the very question mark that appears 270 times speeding up again the animation.

Change seems inevitable.

?elbaviecnoc kcab gnignahc si, esac eht si taht fi

In general, reading backwards makes no sense, but in some special cases called palindromes it does.

WAS IT A CAT I SAW was created by Samuel Loyd, an American chess player and puzzle author, inspired by Alice in Wonderland.

In his book *Cyclopedia of 5,000 puzzles*, published in 1914, he proposed a puzzle in which all the letters of the palindrome were displayed in a diagram and invited the reader to find out how many times one could write

```
                w
              w a w
            w a s a w
          w a s i s a w
        w a s i t i s a w
      w a s i t a t i s a w
    w a s i t a c a t i s a w
      w a s i t a t i s a w
        w a s i t i s a w
          w a s i s a w
            w a s a w
              w a w
                w
```

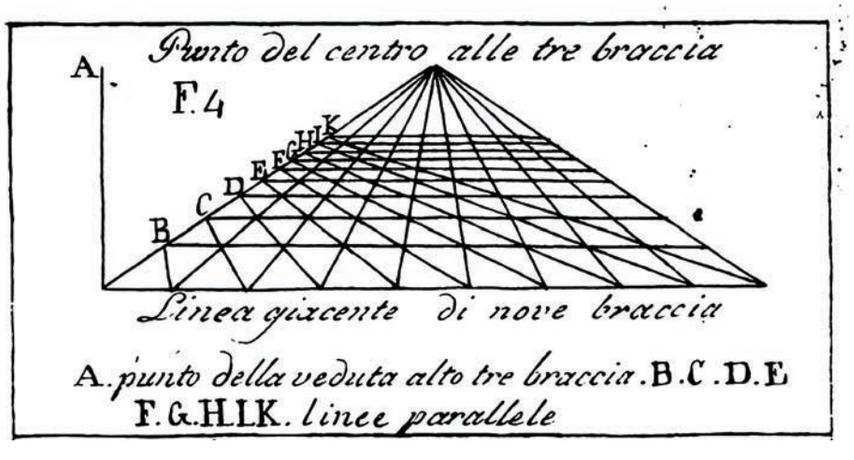
starting at any one of the W's, spelling by moving up or down, left or right, to the next letter until reach the C, and then back to the border again.

In 2010 we were experimenting with sound frequencies and a possible correlation with the notion of perspective in art. We created a visual space in which 8 layers of image flow from left to right at different speeds, the closer passing in a high frequency, the more distant gradually slowing down. Amplitudes follow and wave lengths change in inverse proportions. A sound frequency, either high or low, is associated to the layers. The accumulation of waves, more or less frequent, short or long, high or low, create a composition we called *Wave Horizon.*

When doing the notation of *Wave Horizon,* trying to figure out its duration (15 hours and 24 minutes) we arrived at a point of symmetry. From that point, the animation mirrors itself until all the waves are aligned again as in the initial state. Like in a palindrome.

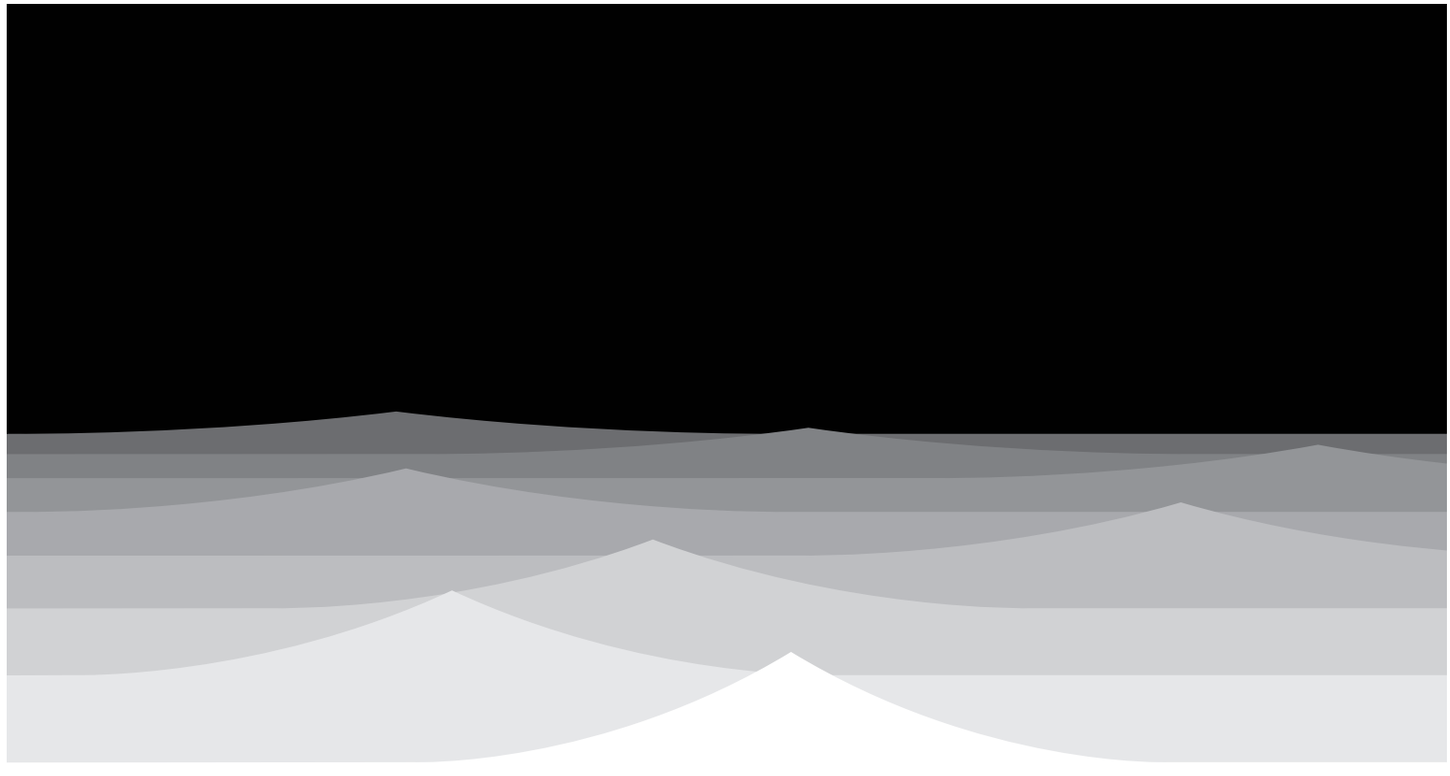
Are there levels of reversion?

Geometric perspective is a set of mathematical rules applied to the pictorial space to create the illusion of three dimensionality on a flat surface. It was conceived in XV century Florence by architect Filippo Brunelleschi, then further theorised and developed by Leon Battista Alberti in the treatise *On Painting* and by the mathematician, geometer and painter Piero della Francesca's *On Perspective in Painting.* Perspective transformed not only how art was produced and viewed, but changed the way we see the world, influencing other domains such as astronomy and optics.



Brunelleschi is known for once breaking an egg in order to challenge his rivals in a competition for building the dome of Santa Maria del Fiori in Florence. The tale, reported by Renaissance artist and writer Giorgio Vasari,[1] stands as a powerful image of disruptive thinking. Brunelleschi shows that breaking old ways of seeing can bring a solution for a given problem. But some problems seem unsolvable.

1. Giorgio Vasari, *Le vite de' più eccellenti pittori, scultori, e architettori,* (Florence: Lorenzo Torrentino, 1550).

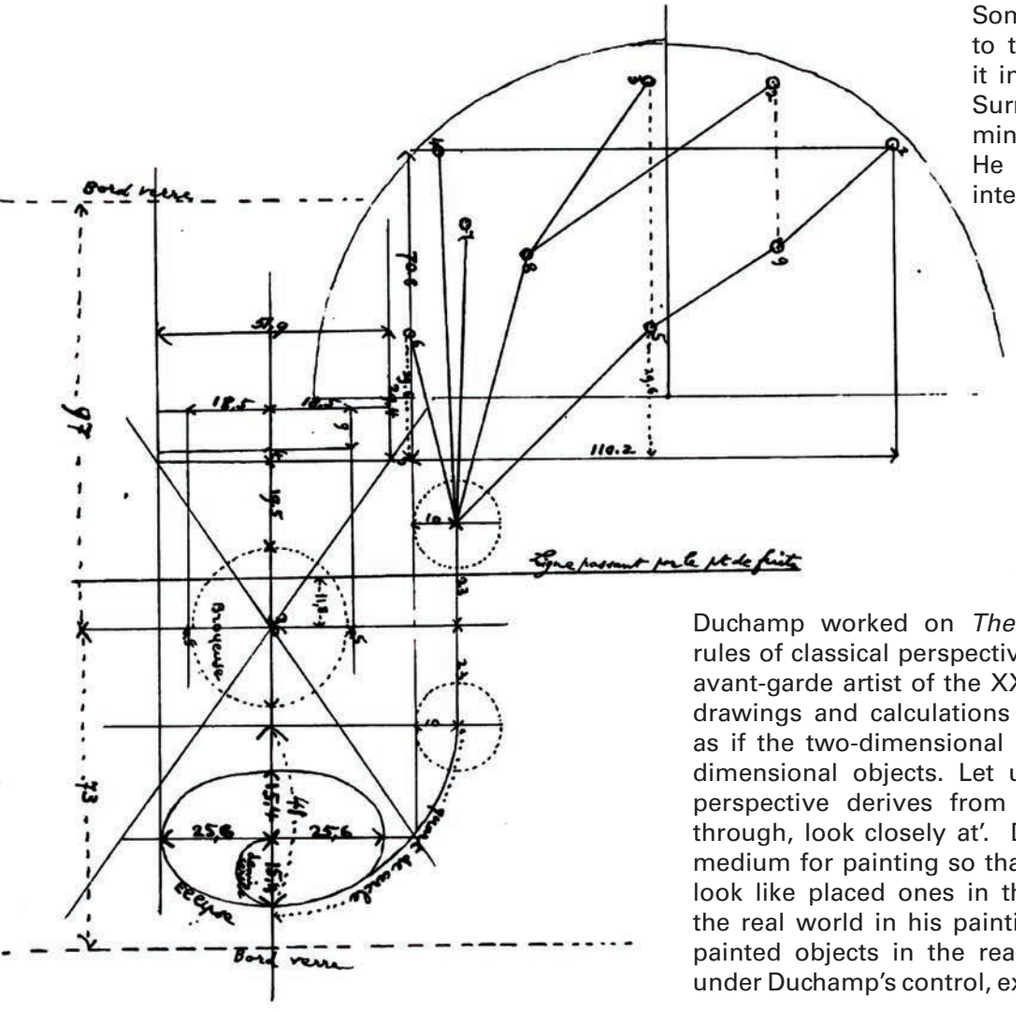


Can we define irreversibility by finding the limits of reversibility?

We saw that in simple systems composed of letters, images or sounds, reversion is possible. But for everyday objects, like an egg for example, things can get more complicated. The will to revert is not something unusual; it manifests itself in many daily life situations, as when something is lost or broken, like shattered glass.

Looking back 100 years, in 1923 the artist Marcel Duchamp declared *The Large Glass*, the masterpiece in which he was working for several years, *definitively unfinished.*

Duchamp began to conceive the first elements for *The Large Glass* in 1912 while living in Munich. He made drawings and paintings aimed at what he called *precision painting*. He says: *"I wanted to go to a completely dry drawing, a dry conception of art... and the mechanical drawing for me was the best form of this dry form of art".*[2]



Some paintings from that period were transposed to the glass when Duchamp started working on it in 1915. Even if associated with Dada and the Surrealist movements, Duchamp was a rational mind, even describing himself as a Cartesian. He was a high-level chess player and was also interested in the latest progresses in science.

Artist Fernand Léger gives a glimpse of Duchamp's somehow special personality when writing about a visit they made together with fellow artist Constantin Brancusi to the Salon d'Aviation in 1912: *"Marcel, who was a dry type with something inscrutable about him, walked around the motors and propellers without saying a word. Suddenly he turned to Brancusi, 'Painting is finished. Who can do anything better than this propeller? Can you?'"* [3]

Duchamp worked on *The Large Glass* following the rules of classical perspective, something unusual for an avant-garde artist of the XX century. He made complex drawings and calculations with precise measurements as if the two-dimensional paintings were actual three-dimensional objects. Let us note here that the noun perspective derives from the Latin *perspicere:* 'look through, look closely at'. Duchamp chose glass as the medium for painting so that the pictorial objects would look like placed ones in the room, thus incorporating the real world in his paintings as much as placing the painted objects in the real world. Everything seemed under Duchamp's control, except the fragility of the glass.

2. James Johnson Sweeney, *A conversation with Marcel Duchamp,* (New York: National Broadcasting Company, 1956).

3. Mary V. Dearborn, *Mistress of Modernism: The Life of Peggy Guggenheim*, (Boston/ New York: Houghton Mifflin Company, 2004), p. 128.

In 1926, *The Large Glass* was shown at the Brooklyn Museum as part of the Société Anonyme exhibition, organized by Duchamp's friend and collector Katherine Dreier, among others. In 1927 the piece was put in a wooden crate to be sent to Dreier's home. It was transported from New York to Connecticut by truck without the driver being informed of the delicate nature of the cargo.

The Large Glass didn't travel well. When the crate was opened in 1933, the two former panels were reduced to uncountable pieces of shattered glass. A local newspaper described it as *"a 4 by 5-foot three-hundred-pound conglomeration of bits of coloured glass."* [4]

When told the bad news, Duchamp, instead of calling the artwork 'lost', decided to restore it by putting the broken glass pieces back into place. The task was not easy. He faced it armed with gloves, invisible glue and a lot of patience but eventually succeeded after a two month period in 1936.

4. Mark Pohlad, *Macaroni repaired is ready for Thursday,* Toutfait.com, The Marcel Duchamp Studies Online Journal, 2000 https://www.toutfait.com/macaroni-repaired-is-ready-for-thursday-marcel-duchamp-as-conservator/#N_42_

"It's a job, I can tell you," Duchamp confessed in an interview, *"like doing a jigsaw puzzle, only worse."* [5]

5. ibid.

6. James Johnson Sweeney, supra.

The Large Glass is permanently on display at the Philadelphia Museum of Art. The cracks became part of the piece and Duchamp eventually acknowledged loving and accepting them as elements added of what he called, *"an extra curious intention that I'm not responsible for".* [6]

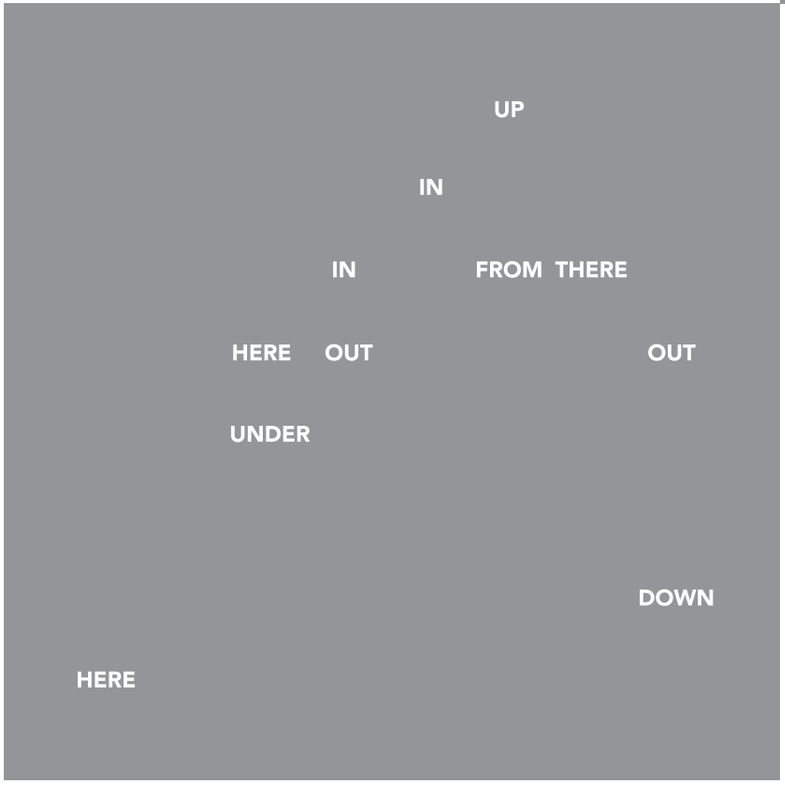
Could the attempt to revert be considered as a creative rather than a restorative process?

After finishing *The Large Glass* in 1923, Duchamp abandoned painting and dedicated himself to chess. In 1925 he attained master level in the 3rd French Chess Championship. He also designed the poster for this event, deconstructing the chess board in cubes floating in the air.

Duchamp somehow saw no difference between art and chess. He once stated: *"The chess pieces are the block alphabet which shapes thoughts; and these thoughts, although making a visual design on the chess-board, express their beauty abstractly, like a poem."* [7]

7. Kynaston McShine, *La vie en Rrose,* at *Marcel Duchamp* (New York: The Museum of Modern Art, 1973).

In 2018 we used the notation of a game Duchamp played with his friend, the writer and mathematician François Le Lyonnais, as the basis for a visual poem. We replaced the chess pieces by words, using antonyms to stage the black and white opposition. An army of **IN** is confronted by an army of **OUT**. **LEFT** and **RIGHT** place themselves in the limits of the board. **UNDER** and **OVER** move in an L shaped jump. **TO** and **FROM** cut the board diagonally. **HERE** and **THERE** run in any direction. **UP** and **DOWN** struggle to keep their kingdoms.



Those words are placed on the board and follow the game as a score. The game now is playing with words. Words change places, mix and disappear. As the game goes on, they recombine themselves creating a new text in every move. Reading happens in the space of the board, not in the limits of the line. Different games create different texts, even if the words on play are the same.

Games of chess end when the king has nowhere else to go, or when one player realises there are no more possibilities to win, but what if the king suddenly regrets the battle and wants everything to come back to the starting point? Is it possible to play backwards?

If the game was recorded using chess notation, we know the steps back. Memory would show us the way.

But in the case of a chess problem, where there's no memory of the game, can we play it backwards using the rules we know?

Unplaying CHESS or playing SSEHC

The first thing to note is that the nature of the game changes from competitive to collaborative. Both players are engaged in a common task aimed at restoring the initial position of the pieces on the board.

Unplaying chess is like solving a puzzle.

This fundamental shift transforms it in a new game. We'll call it SSEHC.

What would be the rules for reversibility?

Some rules of SSEHC are simple inversions of CHESS rules: in CHESS, pieces are taken from the board. In SSEHC they are put back on the game.

But some rules remain identical: all the pieces in CHESS and SSECH have the same movement behaviour, except pawns.

Reversing reveals itself a subtle exercise.
There are better places for oppositions:

The opposite of the CHESS rule:

a pawn always moves forward

could be

a pawn **never** *moves forward*

or

a pawn always moves **backwards**

The second being more informative and thus a better rule for SSEHC.

The whole description of pawns moving is a good exercise in oppositions:

In **SSEHC***, a pawn moves straight* **backwards** *one square, if that square is vacant.*
It will move **backwards** *diagonally if* **liberating** *a piece.*
Pawns cannot move **forward***.*

As we move on SSEHC rules, we can feel like getting lost:

In CHESS, white performs the first move. The last move can be performed either by white or black.

In SSEHC, we determine who plays the first move simply by analysing the board. A checkmated king determines which player starts the game and also suggests the first move. But just as not all the CHESS games end in checkmate, a SSECH game can similarly start from some other situation. On the other hand, we know the last move should be played by white.

Things can also get exponential:

We count 20 different moves to start CHESS: 16 possible moves for the white pawns, that can either move one or two squares straight forward, plus 2 possible positions for each one of the 2 white knights. The number of possible openings for a SSEHC game will only be known by the calculation of the possibilities of a given game's final position.

By this point, we may be tempted to abandon playing SSECH as something of the impossible. But inverting our perspective again, we may argue that playing CHESS would seem less fun if one were to know all the possible endgames.

from

```
. . . . . . G .
. . . . . . . .
. . 3 . . . . .
. . . . . Z . .
. . . . E . . .
. . . . . . . .
. . . T D . . .
. . 2 . . 6 . .
```

back to

```
A B C D E F G H
I J K L M N O P
. . . . . . . .
. . . . . . . .
. . . . . . . .
. . . . . . . .
Q R S T U V W X
Y Z 1 2 3 4 5 6
```

How would one describe the most economical way to reverse a system?

All the work involved in playing SSEHC raises a fundamental question. If we want to come back to the starting point, why not just put all the pieces back in place? Like cleaning the mess so one can start it all over again? Sometimes we simply don't know how.

Can the attempt to revert a process generate new forms of knowledge?

Maybe the problem with irreversibility lies in our 'stubbornly persistent illusion' of time, on our will to come back to the past to undo or redo something, to live again a pleasant moment or do something differently to fix a mistake. Since we cannot move backwards in time, we need to create new rules for the game, to invert the perspective to see the other side of the picture. By accepting the idea that we can only act in the present to create the future, we may be able to change the past. In this way we can approach reversibility while navigating the illusion some call 'time'.