Conformed Thought: Consolidating Traces of Memories

Silvia Laurentiz(✉)

University of Sao Paulo, São Paulo, SP, Brazil
silvialaurentiz@gmail.com

Abstract. For Gestalt, the performance of a task depends on previous performances, and the concept of memory traces is an attempt to explain this dependence. It is not easy to distinguish an innate process from an acquired one, but the interesting point is that "*an experienced tennis player has not learned to perform a small number of specific moves, but to hit the ball properly in the multivariate situations of the game*" (Koffka 1975, p. 516). That is mean, in the learning process we create systems of traces of a type, we consolidate and make them increasingly accessible, whether in repeated or new situations. (Idem, idem, p. 533). Thus, learning is defined by traces of learned, consolidated and available memories that modify processes and, consequently, behaviors. They also consider that traces can be transformed through interaction with other traces and processes. At that early moment of Gestalt theory, psychologists questioned improvement the practice and effect of repetition (ibid., p. 562). Therefore, the idea that we can exercise cognitive abilities and make them accessible to new functions, through a learning process, was already studied in that period. In previous work, we have established relationships between experiences of the senses and the representational aspects of experiences (Laurentiz 2015). At this moment, we will be focused on how these cognitive abilities acquired through conformed thoughts (patterns, codes and set of codes, algorithms) reflect in aesthetic experience, by the intrinsic condition of the relationship between experience, sensations and thought.

Keywords: Sensations · Model · Cognition · Thought

1 Introduction

Studies on video games and the development of cognitive abilities (Laurentiz 2017; Gong et al. 2015), point out that games - especially action games - increase our ability to spatial distribution of attention, cognitive control and emotional regulation, and thus, contribute to the formation of our symbolic thinking, learning and knowledge, as well as sensory capabilities. In previous research, we conclude that many skills are developed by game players: improvements in reaction time, concentration, improvement of peripheral vision, precision, control in hesitation and timing in the spatial resolution of vision, attention, cognitive control and emotional regulation, multisensory temporal processing skills, manual motor coordination, contrast sensitivity, oculomotor performance and

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body movement, selective attention, and attentional blinking. We still need to know how cognitive abilities are acquired by patterns, conformed thoughts, and how they will reflect in the aesthetic experience.

Our hypothesis is we are training thought forms from conformed thoughts, which will consolidate traces, as defined by the Gestalt, and they are not a response to direct stimuli by things of the world. We are training thought forms through simulations, models, patterns, and algorithms, and these are the core of what we call conformed thought. This will cause significant changes in our thinking, and consequently, behavior.

To better present the concept that we have developed, we will observe the diagrams below.

Fig. 1. Illustrative diagram

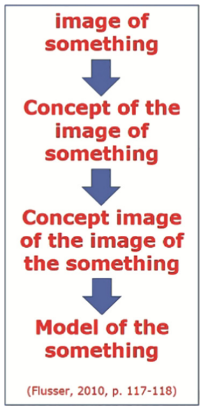

Fig. 2. Illustrative diagram

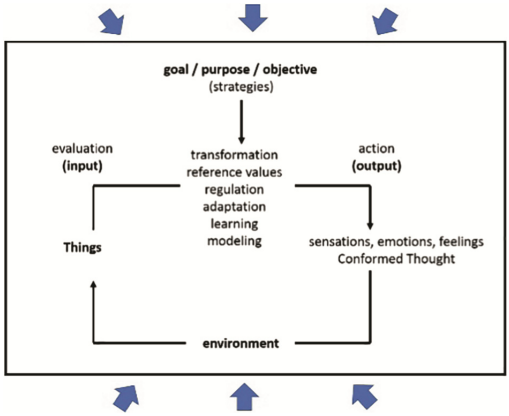

Fig. 3. Illustrative diagram

As we can see, there is an important transition when the image of something becomes the model of this something and the modeling process itself. From the outset we can perceive a difference between 'thing in itself' and model (Figs. 1 and 2), where models are formed by things that have been made objects, contextualized, conceptualized, inserted in a process of evaluation, transformation, comparison to reference values, adaptation, coding, and finally, modeling (Fig. 3). In models, on the other hands, which are made up of objects (which are objectified things), the structure of relationship between objects, and the analogous internal relations of objects and objectified things, are also replicated. Models and objects are part of the modeling process.

Clearly there is a tension between 'thing in itself' and object (or something objectified) (Fig. 1), that already triggers significant consequences in the sign process. We will not need to review this step because it has been too much explored. However, we are interested in explaining the passage from an object to a model.

Above all, it should be made clear that the very definition of object is something that cannot be explained by its separate parts. Therefore, we must consider that it is not possible to define an object only by the effects it causes, nor even by the context in which it is inserted. Denying the existence of objects, considering only their qualities of existences does not seem to us also insightful, once that would be very reductive disregard the complexity of their formative parts, effects and context.

In this way, the concept used in this work for objects is 'objectified thing', where aiming is to give expression, either to an abstract notion, a feeling, an ideal, or anything, in a form that can be experienced by others. Therefore, the formative characteristics, the effects caused, the context in which it is inserted, and its qualities of existence will be considered, in a cohesive whole, that immerses beyond its subcomponents, and which cannot be explained in its separate parts.

Thus, it is evident that an apple (thing) and the image of this [apple] (objectified thing, therefore, object) already carry the historical questions of the sign, which have already been much discussed, but which will also provide impetus to our next steps (Fig. 1). According to the diagram, from the image of something, we move to a next

level of abstraction when we have the explanation (or concept) of that image, and with an image of this explanation we have a model of something (Flusser 2010, p. 117–118) (Fig. 2). A process of third-degree abstraction, according to Vilém Flusser, is one that "*abstracts one of the dimensions of the traditional image to result in texts (second-degree abstraction), then reconstitutes the abstracted dimension to result in an image again*" (Flusser 2011, p. 13). It is crucial to understand that all this happens in a context that feeds the system and that, as already mentioned, there are processes of evaluation, transformation, comparison to reference values, adaptation, coding (as graphically shown in Fig. 3).

Explained in this way, we will pass to the analysis of two cases to perceive cognitive abilities that are acquired through conformed thoughts (patterns, codes and set of codes, algorithms) which, from these initial settings, will reflect in aesthetic experience, by intrinsic condition of the relationship between experiences, sensations and thought.

2 Case Analysis: The Game Flow Free

[1]Flow Free is a free iOS application, which allows players to solve puzzles by connecting pipes according to their color. It is a board puzzle game, what means it involves problem solving through logic, strategy, pattern recognition and sequencing. In other words, it is a logic game, such as Tetris, Maze, Jigsaw.

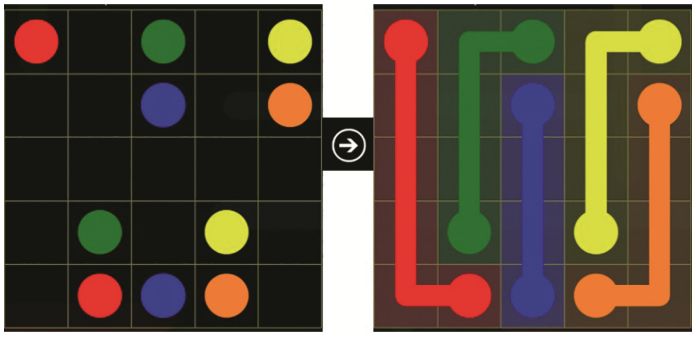

Fig. 4. Flow Free game illustration image. Flow Free game screenshots.

Flow Free is a simple game: connect the matching colors through a pipe to create a flow. Match all the colors by filling in every square of the board – grid - to solve each puzzle (Fig. 4). The only rule is that the pipes intersected or overlapped will be broken, and you lose the game. The goal is to fill all squares of the grid using the pipes.

[1] Flow Free® by Big Duck Games LLC in http://www.bigduckgames.com/.

As soon as we complete the grid, a sense of accomplishment through some creative ability seems to take our mind, generating a sense of satisfaction that leads us wanting to move on to the next level[2].

There are several different levels of 'Flow Free', the first level is the most basic and is very simple. It serves to introduce the player in the game, familiarizing him/her as much as its gameplay. Although Flow Free does not induce high levels of stress initially, when the player progresses to higher levels, according to his/her abilities and interests, he/she can provoke hedonic, cardiac and excitement reactions. This is described in a survey carried out on the potential of smartphone applications as a solution for stress reduction (Dillon et al. 2016), considering stress level, mood changes and anxiety, measured by detecting physiological signals such as heart rate, breathing, muscle activity, or skin temperature before and after the participants played the game. These demonstrated changes reinforce our argument about the intrinsic condition of the relationship between experience, sensations and thought. That is, even in practice of conformed thoughts there is an important sensorial participation in the decision making and learning.

1. Another important factor is that the player can play the game in different positions, locations, time, even performing other tasks, due to the mobility of the smartphone and the ease of gameplay[3].

Analysis: In fact, nothing very creative is required, despite the resulting sensation. All the elements are already there, but invisible. Moreover, all the actions involved are expected, nothing surprising or unforeseen will happen. And this also guides us in our decisions. What we do is to make visible an already predetermined grid. Therefore, there is an initial grid, where the trajectory lines - the pipes - were erased, and only the initial and final points of these lines appear. Once the predetermined path is confirmed and made visible, the mission is successfully completed. That is, it is a game of connecting the digital dots.

We realize that decisions are driven by repetitions of previous actions and that there is no creative act involved in the process, just a predetermine problem-solving. To reach a creative stage, it would be necessary to propose alternatives to the game. For example, in the objectives were included possibilities to fill the lines of the initial and final points by using as less number of squares of the grid as possible (and not the contrary, where the total grid fill was previously predetermined). Thus, it would complete the game the one who follows the standard model, but someone who could complete the pipes using the least number of grid squares would gain extra bonuses. In this way, we would add a creative and innovative factor to the game (of course, this possibility should be foreseen, which is not currently). There are variations of this game on the internet already, some more creative than others.

2. The 'game with time' experience (Timed mode) leads to a record breaking, but there is a mechanical problem that is prevented from overtaking. It is necessary to solve

[2] The reports about this game were made from a proposal to perform daily puzzles for a year, with at least the execution of a challenge per day.

[3] In addition, under stress, boredom, waiting time, this game can help control anxiety.

as many of the puzzles as possible, before the timer has set runs out. The touch screen responds at machine and application speed. Therefore, the performance of the game will depend on the interface and application. Another interesting fact is that, after a period of experience, the touch of the finger on the screen participates in the game, and the body begins to think the movements and participates in the cognitive and sensorial process.

Analysis: After a while, the frame settings are memorized, and the mind follows automatically, by reflex, depending on the mechanical agility of the process. Adding something creative in this step could be introducing random changes during the game, which would lead to a change of route of the player over time. This implementation in the game destabilize the acquired habits and could cause changes in the results. Currently we already have intelligent learning programs, and these could establish new strategies during the game, from the recognition of tendencies of each player.

3. After some levels, the player learns trends, formats, rules, and acquires greater performance (although still depending on the performance of the interface, as mentioned). From this point on, we play with the patterns, what we call conformed thinking (using conformed thought), and react from these configurations that have been acquired, memorized, even without full control over them. For example, someone naturally tries first to draw the largest and outer lines, and then to solve the central lines. Dots that are both far apart and resting on the very edges of the grid are a sure-fire clue to draw a big line around the edge of the board to join them together. Pairs of different colored dots in these positions can often be another clue to create concentric circles of lines on the grid. We try to find recognizable blocks - what we could call meaningful blocks -, contours, paths and repeated configurations in previous plays. You are looking for easy-to-solve moves first (those of obvious solution, because they are positioned in situations with no other outputs[4]) and complete the grid with the most difficult decisions from them. These are strategies generated by a thought that was acquired from the repetition of the goals acquired (Figs. 5, 6, 7 and 8).

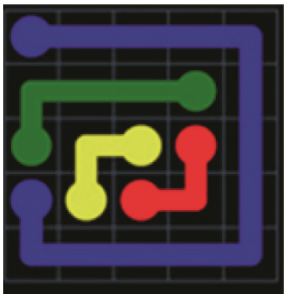

Fig. 5. Flow Free game screenshot. The larger pipe is connected first and then the internal ones are solved.

[4] For example, dots that are within three spaces of each other are a clue to draw them together.

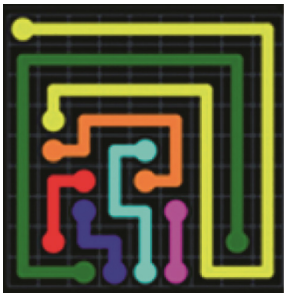

Fig. 6. Flow Free game screenshot. Here, it is difficult to reach the solution of the yellow pipe before the solution of the green, even if one has the initial idea of starting at the ends. (Color figure online)

Fig. 7. Flow Free game screenshot. In this case, there is no way to solve by the formula of starting with the external lines and then solving the internal ones, since most of them have external and internal points.

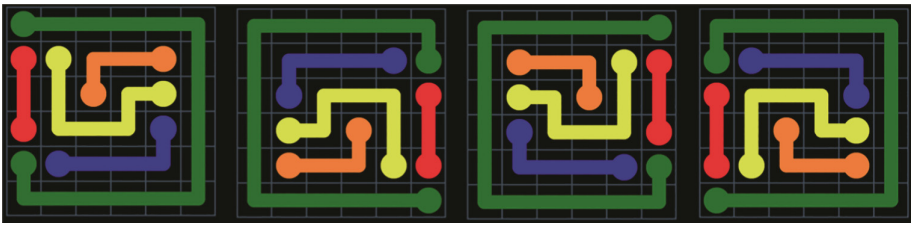

Fig. 8. Flow Free game screenshot. In these challenges is noticed that the red pipe has a single solution, the decision to solve it initially is immediate. It does not depend on place or direction, the red pipe (or even pipes of other colors) is recognized as a pattern and easily identified. (Color figure online)

Analysis: The same memorization mentioned in item 2 gains complexity at this moment. The framework is considered as a whole in itself, and the strategies - traces of

memories - begin to guide the actions of the players. The creation of variations of the model (expansion packs) in Hexes, Warps, Bridges, Rainbow, Interval, Garden, Tower, Party, etc. already offers an alternative for breaking the monotony of the models. It is a determining factor where the passage from one format to another is naturally received, without any detailed explanation about the changes, since they follow the fundamental principles of the original, and the changes are explained by the internalization of the system acquired. Thus, body and mind will already have acquired the performance of that task and will be able to perform them in new situations.

An even more radical variation, which would apply a creative motivation to the game, would be the model to be self-constructed from a rhizomatic structure with random rules or by the application of an intelligent agent that would participate with the player in the construction of the space structure and timing of the game. This would be an implementation that would add a creative action to the game (Fig. 9).

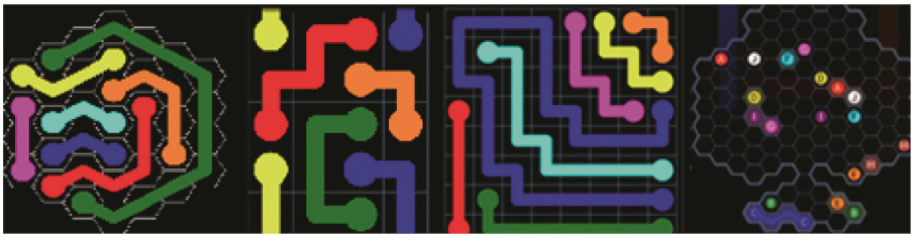

Fig. 9. Variations of the model of Flow Free game.

Nowadays, there are numerous digital games that present themselves with the figure of flows, tubes and pipes. If they really represent tubes, flows or pipes is not the point. If they are indeed flows and pipes does not matter for this moment. But they are tasks that require strategies and logical reasoning, and that will be exercised and repeated, over and over again.

They are exercises to connect points, despite the figures. The implementations that we are suggesting are only proposals to add non-premeditated actions to the game, as this is a property of digital environments that can be exploited. Unlike a physical game, where matter carries the physical limits of the game, the digital one can explore other spatiality and temporalities[5]. But the point is: repeating an abstraction[6] also generates traces of memories and can trigger cognitive and sensory experiences and behavior changes.

These graphic patterns that we present could be drawn on a simple sheet of paper. The point here is to perform the same task to exhaustion, which would not be possible using only paper and pencil, because of the limits and difficulties of doing this with paper and pencil, as opposed to the ease of performing these procedures in the digital

[5] Besides, the player can gameplay while riding the bus to work, while commuting on the subway, or simply while he/she is relaxing at home. This is another reason for new temporal and spatial experiences.

[6] Considering the levels of abstraction of Vilém Flusser, as presented previously.

environment. In addition, the recording of all experiences are also opportunities for comparisons, references, identification and recognition of blocks of meaning, and all of this will potentiate the process. Moreover, the assessment of learning, in response to the correct and mistaken practices, is merely immediate and automatic mechanical action. Now, multiply by the countless logic games of today. We are training these conformed thoughts all the time, and everywhere. And this will cause effects on us.

3 Case Analysis: Online Tennis Game

Sports games simulate traditional physical sports. They can emphasize playing the sport or the strategy behind the sport.

Tennis for two[7] and *Pong*[8] are of the first computer games that look like tennis (Fig. 10).

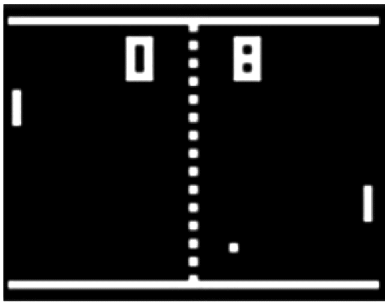

Fig. 10. Image to represent Pong game.

When we play a virtual tennis game[9] between players in different locations on a digital platform, the racket and ball are just pixels on the computer screen. The actions performed are transmitted via computer-network, which trigger a complex sequence and generate several updates of the records corresponding to the positions of the racket and the ball on the screen of each of the players. An additional fact is that a programmer could update these logs directly, without even visualizing racket and ball. Therefore, despite the impression that we are playing a match with the same single ball, there are two: one in the computer of the first player and another in the computer of the opponent, which are updated from the transmission of the coordinate changes, in response to the commands of each.

Analysis: Although the perception be a game of tennis with a single ball in the match, in fact, we will have interfaces, each one with a ball, causing an effect of the same reality to us, from a "*perception through the user interface multimodal*" (Hoffman 2008).

[7] *Tennis for Two* is a sports video game developed in 1958, which simulates a game of tennis, and was one of the first games developed in the early history of video games, by the American physicist William Higinbotham.

[8] Pong was originally developed by Allan Alcorn and released in 1972 by Atari corporations.

[9] There are several games currently available, for this study we will not analyze a specific case.

Neither the racket nor the ball sends signals to the computer, the racket and the ball only show on screen the output of the actions that were triggered by a data complex sequence - but hidden inside the computer -, resulting in adequate updating of records corresponding to the racket and ball positions (ibid., p. 96). We are led to believe that we are in one and same game, with one and unique ball. This means that we believe that we are playing a game of tennis, but it is a simulation, and therefore, an algorithm simulates certain actions, without being an actual tennis match. It is an algorithm and an interface that leads us to believe that we are playing, that is, a conformed thought guides us to act as if it were a conventional tennis match. There are objects (ball, racket, scenery, avatars, interface…) from a model (simulation of a match, with a relationship structure between the objects in the scene), responding based on parameters as if they were a tennis match. But they react under certain aspects of a game and not in all its aspects. Just remember that the speed of the engine can be decisive for the outcome of the game where the ball on the screen will be updated at a speed while the ball on the opponent's screen may be updating in another. Besides, as we have already said, there are two balls in fact, appearing to be just one.

Another point to note is that we are always armored, we will never get a ball or a racquet right at our face, we will not get hurt with a deviation, or a fall, common in a tennis game. That is, our reflexes will be performed solely and exclusively in response to calculations and the interface, whether a joystick, mouse, or other device specially created for the game, which means that we will be repeatedly training actions from models, algorithms, thoughts conformed. It is interesting because there are many currently simulators that are being used in learning processes but being in the face of the simulated action itself differs from practicing the action itself, by the various presented points. Currently we have very well-developed interfaces to simulate the game of tennis, but surely, they are not able to simulate all the characteristics of playing tennis. Returning to our initial argument, that for Gestalt, the performance of a task depends on previous performances, and that "*an experienced tennis player has not learned to perform a small number of specific moves, but to hit the ball properly in the multivariate situations of the game*" (Koffka 1975, p. 516), we are, in this case, training other motions and in different situations by the simulation of the same game, and that, after all, will cause completely different effects exactly because their characteristics are immaterial and moved by conformed thought.

4 Final Considerations

Charles Darwin has already said in 1871 that "*a long and complex train of thought can no more be carried on without the aid of words, whether spoken or silent, than a long calculation without the use of figures or algebra*" (Darwin 1871, p. 57). The author further states that "*as the voice was used more and more, the vocal organs would have been strengthened and perfected through the principle of the inherited effects of use*" (idem, ibidem). He argues there is no doubt that continued use of language would have reacted in some way in the mind, allowing and encouraging it to hold long thoughts (idem, ibidem).

In the same way that Darwin has recognized, the complexity of thought, at from a moment, started to need words, just as the calculations need numbers and algebra, today, patterns, models and algorithms are needed to deal with the complexity of our current thought.

This doesn't mean we are saying that learning develops only through training through repetition. Repeating certain patterns means that we will internalize a system of rules, consolidating traces of memories, and this is one factor that determines a thought, but not the only one. There are several factors involved in complex mental acts.

There is also the hypothesis that from this interaction something unexpected arises that, according to Noam Chomsky, "*to the best of our knowledge, the possession of human language is associated with a specific type of mental organization, not simply more intelligence*" […]. "*This poses a problem for the biologist, since if it is true, it is an example of real emergence - the appearance of a qualitatively different phenomenon at a specific stage of the complexity of the organization*" (Chomsky 2006, pp. 61–62).

Therefore, different thought organization can make different phenomena emerge, in other words, we may be at an earlier stage of the emergence of a new language (even through something premeditatedly programmed), or of an organizational transformation in response to specific abstraction exercises, such as we have seen in the analyzed cases.

From the proposition of conformed thought, that resulting from third-degree abstraction, we can consider that we are thinking today through these patterns, and if this means that we are moving further away from the things of the world (as shown in Figs. 1, 2 and 3), in a reverse way, we will be establishing new models, which when objectified will carry a new sensible and cognition dimension. Since we understand that mental image is an internal representation that functions as a "*weak form of perception*" (Kosslyn et al. 2015, p. 590), a model formed by objects (objectified things) can cause sensory effects (aesthetic experience), although we are not in front of the materialized object, even in lesser power, just as things in the world affect us. Thus, considering that mental images function as a weak form of perception, they will feed back the cognitive and sensorial system, so the thought (Fig. 11).

It remains the question whether objectified models will replace objects that in turn substitute things (object in the sense of being an expression in a form that can be experienced by others), and how these levels of abstraction will cause effects in our thought organizational structures. And, if learning is defined by memory traces, and these will modify behaviors, how will we act in the future if our impacts and frictions will be between immaterial data and will we have only the confrontations with multimodal interfaces? How to think without attrition, gravity and rubbing?

Finally, when we 'play' with the patterns, that we call conformed thinking (using conformed thought), and react from these configurations that have been acquired, memorized, we are been affected by them and their interface-things. The digital system appropriates our experiences but is guided by models and patterns that guide the outcome. For example, when using the mechanical typewriter, every mistake made is the reason for redoing a whole process or applying correctives because they were definite marks left on paper. Today, text-based programs recognize errors and are capable of automatically correcting them, even before we account for them. Programs recognize patterns and trends and automatically correct any slippage in our memory traces or even

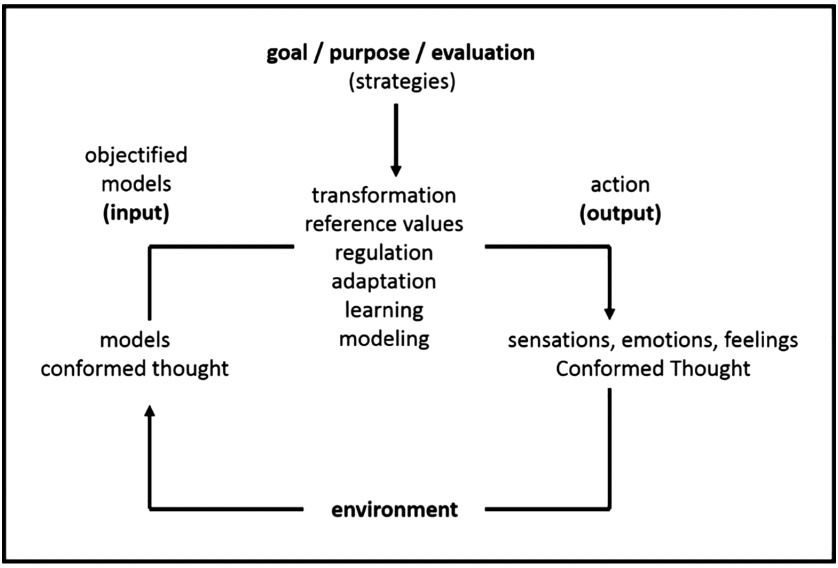

Fig. 11. Final graphic

our reflexes. Therefore, comparisons and deviations are readjusted and rearranged by the computer. This means there are decision-makings that are not just individual ones, the computer can have programmed actions that re-evaluate our activities and change them according to a pattern, an algorithm, a conformed thought. And sophisticated smart programs will be generating their own templates and patterns, which will automatically cause us new memory traces. Thus, the relationship with the 'things' of the world is transformed, our interactions with the interfaces alter our perception, cognition and sensoriality, and our decision-making is relating to computer(s) and/or device(s).

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