The Philosophy of Computer Games Conference, Berlin 2015

SELF-TRANSFORMATION THROUGH GAME DESIGN

Stefano Gualeni

0. INTRODUCTION

Communication is an activity that characterizes all living forms, and it is a particularly challenging one. As human beings, we experience difficulties in conveying ideas or explaining processes on an everyday basis. Such difficulties become progressively more vexing with the growing complexity of what we intend to communicate. Our struggling with the articulation of notions is often also a symptom of our not having a complete or completely conscious understanding of the very information that we are trying to communicate. The mere 'working understanding' of something hardly enables us to clearly and efficiently teach or explain that something to someone else. It appears as if we can only competently organize, re-focus, and metaphorize concepts and courses of action for our interlocutors (and comfortably meet their communicative preferences) once we have sufficiently internalized that particular knowledge or that specific process ourselves.

Every time we design something that is meant to have a communicative or didactical purpose (such as a recipe, a 'serious' videogame, or a conference presentation), we are faced first and foremost with the challenge of consolidating and completing our own knowledge about what we are trying to communicate. This paper will focus on the transformations that occur in human beings when they are involved in the process of structuring information for other human beings. Its conceptual basis is the notion according to which

> **during the process of structuring transformative experiences for somebody, we inherently develop and refine our own sensitivity and knowledge.**

Clearly, this is not a new notion, or one that is peculiar of our digital era. As early as 65 AD, in his *Moral Letters to Lucilius*, Roman Stoic philosopher Seneca the Younger famously declared that "*docendo discimus*" ("when we teach, we learn"). A quote attributed to Albert Einstein stating that "if you can't explain [something] to a six year old, you don't understand it yourself" is a testament to the same belief. In this regard, it is also revelatory to notice that the self-transformative qualities recognized in activities concerning design and communication motivate several contemporary educational strategies. It is on that conceptual basis that students are still asked to articulate (and defend) their knowledge and beliefs in essays, theses, and project presentations.

Turning its attention to the specific transformative (and self-transformative) potential of designing the virtual worlds of simulations and (video) games, my 2014 paper titled 'Freer than We Think' argued that when engaging in the interrelated processes of researching, crafting, and iterating that take place when designing, the designers materialize and refine not only their functional plan, but also their very *ethos* and sensitivity (Foucault, 1988, 11-18; Gualeni, 2014, 4). With the present paper, 'Self-transformation through Game Design', I aim to further articulate that theoretical

perspective and root it more firmly into the practice of design. Put in a somewhat simpler way, I will try to demonstrate in practice that

> **in the process of designing a game or an interactive simulation with transformational goals for its audience – the designers inevitably self-fashion themselves in ways and in directions that are analogous to those that they intended to elicit in the recipients of their work.**

My optimism towards the possibilities of understanding design as a valuable and viable self-transformative practice is also supported by a study conducted by German-American psychologist Kurt Lewin in 1943 concerning dietary changes and group decisions. In his study, that took place during World War II, Lewin asked a group of women to collaborate with him to come up with a plan to convince other women to change their habits in relation to meat consumption. In the development of this transformative plan, the group of women who co-operated with Lewin were asked to design and test new recipes, and to contribute to the structuring of the lectures that were meant to convince another group of women to make use of parts of animals that were customarily not utilized in traditional American cooking (the change in cooking habits had also a social value, as meat was becoming a particularly limited resource during the war). The second group of women were uniquely informed about the culinary and economic value of cooking and eating unconventional animal parts in the form of passive lectures that built upon the work set up by the first group. This second group did not actively participate in the making of food, nor in the elaboration of recipes, or in the organization of persuasive lectures. At the end of the study, through cognitive elaboration and self-persuasion, the first group of women changed the dietary habits of their families in ways that were markedly more significant than those who were simply lectured on the topic (32% versus 3%) (Lewin, 1951).

To demonstrate the self-transformative effects of game design experimentally, I will discuss the results of a pilot study that I conducted at the University of Malta in collaboration with the Behavioural Science Institute (BSI) of the Radboud University (Nijmegen, the Netherlands). Our experiment tracked the specific psychological and behavioural changes of a small group of game design students (a total of nine participants) during the five-month development of their small, transformative videogames[1].

As already suggested earlier in this introduction, the challenges posed by transformative game design and its educational effects are understood to be, in line of principle, analogous to those of other forms of design or structured communication. I am not, thus, trying to argue for the remarkability of the design of games and videogames with transformative aspirations on the basis of some of its inherent qualities as a practice. What I am trying to accomplish with 'Self-transformation through Game Design' is initiating a systematic study of the overlooked 'uncharted terrain' of game design as an effective transformative practice for the designers themselves.

The long-term objective of this research project, beyond these first, tentative steps, consists in the validation of the educational and cultural value of the practice of game design. Its ultimate

[1] In this paper I will call 'transformative games' those games that are deliberately designed to povoke or facilitate specific transformative effects. Such effects can be psychological, cognitive, behavioral, convictional, or involve combinations of several of those aspects.

aspirations are the meaningful integration of game design with established educational practices and its recognition as a crucially important 'technology of the self' (Foucault, 1988; Gualeni, 2014).

1. TRANSFORMATIVE VIDEOGAMES FOR RESEARCH

As a member of the Institute of Digital Games (IDG) at the University of Malta, in the past year I had been involved in an informal collaboration with the BSI. The collaboration consisted in guiding and supervising the design and development of specific videogames that the BSI would use in the experimental phases of their on-going research project on teenage obesity[2].

The fundamental design objective for the videogames that needed to be designed and developed for our research partners was that of eliciting a positive change in the implicit attitude of the players towards healthy food through 'play'. The videogames were to be developed by the students of the Master of Science in Digital Games of the IDG as the final project of their game design course.
To facilitate the students' process towards that design objective, our partners at the BSI proposed that each designer picked two among three psychological methods (or rather paradigms) that are commonly employed in provoking attitudinal changes[3]:

1. **THE EVALUATIVE CONDITIONING PARADIGM**: usually understood as a variant of Pavlovian conditioning, the evaluative conditioning paradigm modifies our attitude towards a certain thing or event by consistently associating it with an external thing or event (which can be positive or negative, depending on our conditioning intentions),

2. **THE ATTENTION BIAS PARADIGM:** in this paradigm, our evaluation of something can be modified by actively focusing our attention away from a certain thing or towards that thing

[2] The BSI is investigating whether a positive implicit attitude towards sugary and fatty foods can be recognized as a triggering factor of teenage obesity. Implicit attitudes are automatic judgments through which a subject evaluates of an object or a situation (in our case, sugary of fatty food); generally speaking, such evaluations can be positive (favourable) or negative (unfavourable).
In the context of the cognitive sciences, the descriptors 'automatic' or 'implicit' indicate that certain judgments occur without the conscious awareness of the subject judging. Greenwald & Banaji's template for the definitions of terms related to implicit cognition describe implicit attitudes as "introspectively unidentified (or inaccurately identified) traces of past experience that mediate favorable or unfavorable feeling, thought, or action toward social objects." (Greenwald & Banaji, 1995, 8)

[3] The three paradigms in question were examined in the specific context of their employment of changing food-related attitudes and behaviors. In particular,

- the evaluative conditioning paradigm was examined on the basis of the work of Ebert et al. (2009) and Hollands et al. (2011),

- the attentional bias paradigm was informed by the research conducted by Boutelle et al. (2014) and Wehrtmann et al. (2014), and

- the go/no go paradigm had an interesting precedent for its application to food-related attitudes in the work of Van Koningsbruggen et al. (2013).

The students were specifically asked to pick one paradigm between 2 and 3, while paradigm 1 was mandatory for all design projects. The decision of imposing the first paradigm on all of the students was made as a consequence of having to perform psychological conditioning through a very specific kind of medium (videogames). Due to their computational nature, videogames have traditionally communicated with their audience – the players – by associating desired courses of action with positive stimuli (positive feedback) and by pairing unwanted player behavior with negative stimuli (negative feedback).

(depending on whether we would like our attitude towards something to become respectively less positive or more positive), and

3. **THE GO/NO GO PARADIGM:** this paradigm upholds that behaviours and attitudes can be modified by performing an action under a stimulus and by not performing an action under another stimulus (thus encouraging or inhibiting a certain association).

The two paradigms picked by each student (or team of students) would become the functional foundation for their design. As a consequence, the fundamental conceptual task for the students consisted in finding appropriate and efficient ways to translate psychological methods (as explained in the specific literature, see footnote 3) into playful interactions that are suitable for their intended target audience.

Aside from prompting a specific food-related attitudinal change in overweight teenagers through 'play', the BSI design brief imposed further research-related restrictions on our designers. The deliberately transformative videogames to be used in their psychological experiments also needed to:

- **BE SHORT** (so that a handful of play-sessions could fit into the envisaged ten-minute duration of the experimental sessions that the BSI intended to run for this specific research project. Transformation does not necessarily need to be quick, or to happen in short bursts, but our play-sessions need to be short so that many of them can fit psychological and experimental sessions of different durations),

- **BE SINGLEPLAYER** (as this ensured that each experimental session would be possible to be controlled and tracked in terms of in-game performance and play duration. This requirement guaranteed that the aspects of 'play' ensuing from interacting with other players – or being disrupted by them – would not influence the experiment data),

- **FREQUENTLY PROMPT THE PLAYER FOR ACTION** (this requirement was established because, in order to produce optimal exposure for the planned cognitive tests, the players are expected to interactively express their gameplay choices more than 10 times per minute or even more than 40 times per minute, depending on the chosen psychological paradigms),

- **INVOLVE A DEGREE OF UNPREDICTABILITY AND RANDOMNESS** (similar to the design strategies that are typical of the 'casual' sector of the games industry, the games had to be designed to challenge the players with spatial puzzles and logical patterns that could not be memorized and predicted. A degree of randomness in the generation of challenges and game-worlds guaranteed that the performance expressed in each play-session was determined by the accuracy of the player's decisions and reactions, and not by their having learned what the videogame expected of them by rote),

- **VISUALIZE A QUANTITATIVE SUMMARY OF EACH GAMEPLAY SESSION IN THE RESPECTIVE GAMEOVER SCREEN** (in order to allow researchers to easily summarize each gameplay session and quickly produce statistical observations, each game needed to visualize quantitative information relative to every individual game session in the respective 'game over' screens. Such information ought to

include indicators such as the session's duration, an account of the player's accuracy, and the final score – see figure 1), and

- **PREFERABLY OFFER AVATAR CUSTOMIZATION** (existing literature concerning a cognitive and behavioural approach to game studies established a correlation between the possibility of making choices concerning players' avatars and the level of empathy that the players will feel towards them. A higher degree of empathy with the in-game characters is deemed to increase the personal investment of the player in the virtual experience and – as a consequence – the efficacy of its transformative effects) (Koehne et al., 2013; Turkay & Kinzer, 2014)

The total of nine design students in the class were fully informed about the goals and needs of the research project conducted by our partners at the BSI on the relationships between implicit psychological attitudes and teenage obesity. Two students out of the nine decided to not be involved in designing an attitude-changing game for the research project and instead develop their own personal videogame project. Working in pairs or individually, the students had five months to design and complete their games.

The five months of work of our students were punctuated by frequent design supervision meetings and by the regular (remote) mentorship of a cognitive neuroscientist from BSI. The supervision contribution of the neuroscientist focused on providing relevant academic coordinates and references, and on making sure that the students' design solutions aligned with the methods and the practical recommendations offered by literature. At the end of the course, five food-related attitude-changing videogames were delivered to the BSI to be used in their experimental research (see an example in figure 1).

The picture below (figure 1) presents two screenshots taken from *Fast Food* (Cachia & Portelli, 2015). The screenshot at the top of the picture shows a typical play session for the game, where the players – who are asked to pick and impersonate one aspiring cook among a few possible candidates – need to make rapid decisions concerning the ingredients that they intend to use for their healthy dishes. In other words, *Fast Food* asks the player to react to low-fat, non-sugary, nutritious ingredients and to completely ignore unhealthy ones (transforming the players' attitudes towards food through the attentional bias paradigm).

The screenshot at the bottom of figure 1 shows a 'game over' screen and visualizes the quantitative aspects of player performance at the end of each play session. As requested by the BSI, these results include the duration of the play session, final score, and overall accuracy. These figures would later help researchers quickly produce statistical observations.

Figure 1: Two screenshoots of *Fast Food* (Cachia & Portelli, 2015), one of the five transformative videogames developed to be used in experimental research at the BSI.

2. DESCRIPTION OF OUR PILOT EXPERIMENT

While the students were designing their games to assist scientific research, they were unaware that they were themselves part of a scientific experiment. Our informal collaboration with the BSI was not, in fact, limited to our producing the videogames that they needed, but was also aimed at producing data for a meta-experiment concerning the self-transformative qualities of the very activity of designing games.

While the videogame development process was thoughtfully organized to both be a meaningful educational experience for the students and produce viable videogames for experimental research, it was also an opportunity for us to study and record the self-fashioning that our students underwent after having been engaged in designing a transformational videogame. For this meta-experiment, we monitored specific changes in the students over the period in which they were busy designing their food-related attitude-changing videogames. Their games were deliberately designed to elicit a positive change in the implicit attitude of the players towards certain food types by stimulating a stronger positive association towards healthy food, by reinforcing a negative association towards unhealthy food, or by combining both methods in the same videogame. On the basis of this specific design objective, I intended to verify if the same changes occurred in the game designers themselves.

With that objective in mind, before even being briefed about their design assignment, each student was put through a computer-based test meant to measure their initial implicit attitude towards healthy food. The test we used is called implicit-attitude test (IAT) and is a common measuring tool used in psychology research[4]. The IAT is specifically designed to quantify the strength of a person's automatic association between certain mental concepts. It prompts the participants to rapidly categorize two target concepts with an attribute (for example having to associate either the concept of "fries" or that of "carrot" with the attribute "healthy"). The faster a test subject associates a concept with the desired attribute, the stronger the association in the memory of the participant is interpreted to be.

Each of the students' own weight and dietary habits were also recorded through self-assessment in two questionnaires. Before tests and questionnaires, the students all read and signed a written agreement confirming their voluntary participation to the experiment and consenting to our use of their data for research. Both the questionnaires and the IAT were administered to the students a second time, five months later, upon the delivery of their finished videogames. The second data-gathering session was run at the same time of the day and with the same testing tools and in the same order (in terms of specific tasks) as five months prior.

Fearing that the students' knowledge of why we were tracking their attitudes towards food could bias them in the process, we decided not to reveal the reasons behind their being tested.

Once all of the experimental data were collected, we attempted to give empirical answers to the following two research questions:

1. **Did the students' implicit attitude towards healthy foods change during the process of designing a transformative video game?**

2. **Is there a correlation between the students' changes in their implicit attitude towards healthy foods and changes in their weight?**

[4] It is particularly interesting and important to notice, here, that the same IAT test that was used to measure our students' implicit attitude towards healthy food is also the main assessment tool that the BSI is programmatically using to evaluate our transformative videogames' effects on their research subjects (overweight Dutch teenagers who are on a weight-losing diet and are regularly supervised by dieticians).

3. EXPERIMENT LIMITATIONS

There are two reasons why this work has been described in this paper as a 'pilot study' or a 'pioneering experiment'. The first reason is that similar experiments concerning the self-transformative effects of (video) game design have never been performed before or, at least, they do not appear in academic literature. Without studies or guidelines to rely upon, I took the opportunity of the ongoing collaboration with the BSI to try to better understand game design as a self-transformation practice by means of a small, tentative experiment. As such, the results of this study need to be interpreted as the first exploratory steps in what is still essentially 'uncharted territory'.

The second reason why I consider this to be a pilot study is the very modest sample size for the experiment (nine participants in total). The implicit processes that we measured through IATs are, besides, unlikely to go through such dramatic changes that would be clearly detectable in such a small group of participants, and even if interesting patterns or statistical trends were to emerge from the data, our results and insights could hardly be defended in front of the scientific community. On this basis, I believe it is important to insist on the fact that the results of the experiment presented in this paper are to be understood as guidelines and signposts for future research, rather than as scientific evidence.

On top of what was just observed, the very game design project that made the experiment possible shaped our research with very specific limitations. First and foremost I want to mention the fact that our test subjects were forced to materialize their playful, transformative plans via the digital medium. Another limitation to this experiment that I consider to be crucial is its duration: it had to run for five months and it spanned over three seasons. The game development process lasted from January to June, from winter to summer in our Northern hemisphere. Medical research established that a number of factors (including the lesser intake of vitamin D, the increased levels of melatonin, the diminished amount of physical activity, *et cetera*) statistically determine the tendency of human beings to gain weight over the cold months of the year. The weight accumulated in the cold months of the year is then generally lost in the warmer months (Kanikowska et al., 2015; Shahar et al., 2001). These cyclical weight fluctuations clearly make our single-session experiment poorly revelatory in terms of understanding the effects of the students' attitudinal changes on their weight.

There are three other obvious limitations arising from running a single-session experiment that are, in my opinion, also particularly worthy of mention. I am referring here to our impossibility to determine:

- if the observed psychological changes are influenced by the time-scale of the design project,
- if other kinds of psychological and behavioural transformations (for example dispelling their fear of flying or changing the players' attitudes towards environmental sustainability) would yield analogue results, and
- if and how psycho-social determinants (such as age, religious orientation, level of formal education, gender, *et cetera*) are contributing factors in determining the transformative effects of the practice of (video) game design.

This particular area of academic research is moving its first, exploratory steps in what is potentially a wide, rich, and socio-culturally impactful research field. In the coming years, my academic work will focus on overcoming the limitations and answering the questions outlined above. Hopefully, in

time, we will be able to provide some of the answers that will permit and facilitate the adoption of self-fashioning game design as a viable and valuable educational practice.

4. EXPERIMENT RESULTS

The chart in the figure below (figure 2) displays the changes in the IAT scores for each individual participant in the experiment. The bright blue bar visualizes the results that were measured at the beginning of the design process, while the dark red bar represents the IAT score that was measured at the end of the design process, upon the students' delivery of their complete videogames. In order to calculate the individual IAT scores for each participant, our partners at the BSI used the improved scoring algorithm (approximately equivalent alternative), recommended by Greenwald et al. (2003).

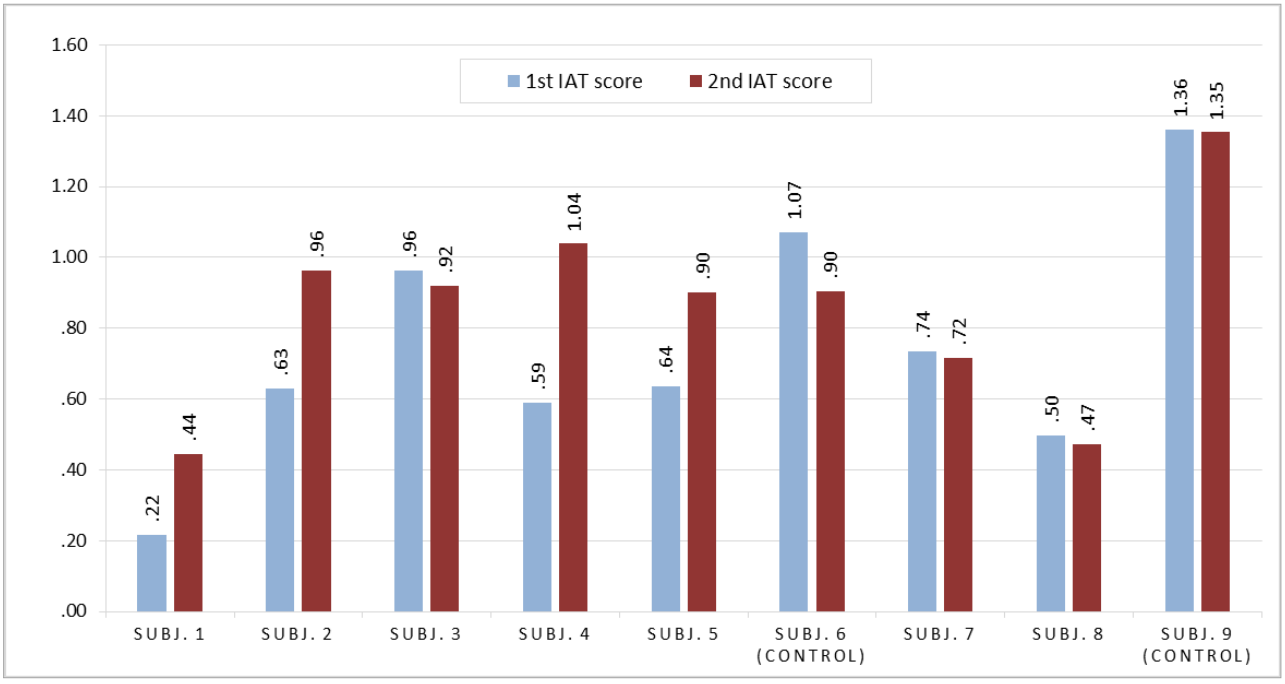

Figure 2: A chart displaying the individual IAT results for each test subject. The participants' automatic associations with healthy foods before the design process are visualized with bright blue bars, the ones after the design process are represented with dark red bars. The higher the bar, the most positive the implicit attitude of a subject towards healthy food is.

All participants to the experiment were found to have a 'healthy bias', meaning that no participants obtained a negative IAT score in either tests. This means that the reaction times of all the participants were consistently faster when associating healthy snacks with positive attributes and unhealthy snacks with negative attributes if compared to their reaction times of when the test asked them to associate healthy food with negative attributes (for example "lettuce" with "fat") and unhealthy snacks with positive attributes ("fries" with "healthy").

Since only two test subjects decided not to work on a videogame meant to change the players' implicit attitude towards food (subject 6 and subject 9, marked for convenience with the label 'CONTROL' in the charts), the group-sizes of the participants who were actually tested for attitudinal change and the group who did not work on food-related games were not only very small,

but also very asymmetrical (seven people *vis-à-vis* two people). These limitations with the experiment sample made the statistical analyses of data a poorly helpful tool in assisting the understanding of our results.

Interestingly, however, examining the data in figure 2 we notice that both the subjects in the group who did not work on food-related games (subject 6 and subject 9) became less positive towards healthy food during the experiment. Subject 6 in particular was the one individual out of the whole sample who lost the most positive attitude towards healthy foods (-15.9%).

Out of the seven participants who, instead, engaged in the design of a videogame meant to positively change its players' attitudes towards healthy foods, four became substantially more positive towards healthy foods, while three showed a marginal negative attitudinal change. The majority of our test group appeared, thus, to have increased their IAT score. Subject 4 was the one individual who, out of the whole sample, gained the most positive attitude towards healthy foods (+43.3%).

Averaging our results within each group, the group that designed food-related games improved its IAT results compared to its scores at the beginning of the process. The group that did not work on food-related games, instead, scored less than it did in the first measurement. These observations suggest a possible correlation between designing videogames that deliberately aimed at transforming their players and the occurrence of the same kind of transformation in the game designers themselves. They also allow us to answer our first research question with a provisional 'yes'.

Concerning the second research question, which focused on whether the changes in IAT scores of the participants corresponded to changes in their weight, the outcomes of our measurements are more problematic and less revelatory (see figure 3).

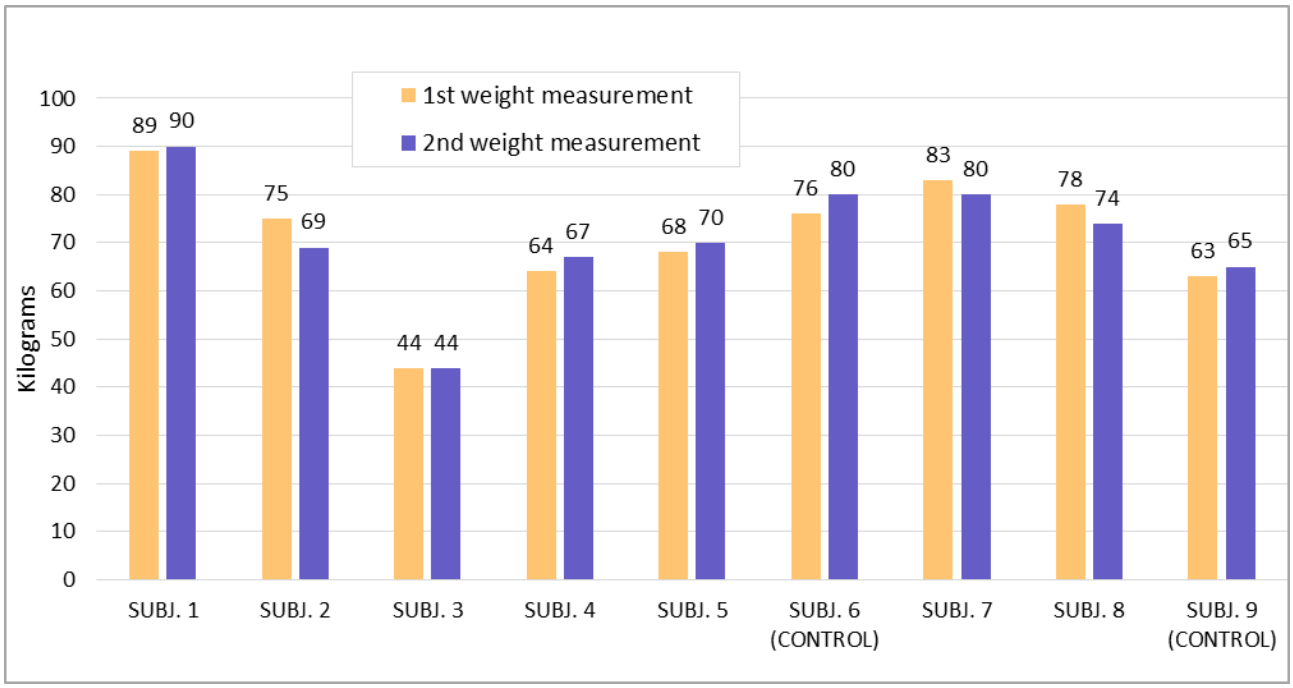

Figure 3: A chart displaying the individual weight measurements for each test subject highlights the differences between each of the participants' weight before the design process (visualized with bright peach-colored bars) and after the design process (the darker, mauve-colored bars).

Observing the chart in figure 3, we notice that both the students who did not work on a food-related game gained weight. Subject 6 was the individual who gained the most weight out of the whole sample (+4 Kg). The main group's changes in weight were, however, less consistent: three people gained weight, three people lost weight, and one participant maintained the same weight as five months prior. Subject 2 was the one individual out of the whole sample who lost the most weight (-6 Kg).

Averaging once again our results within each group, the group of designers who worked on food-related games appears as having lost weight (-7Kg) while the other group gained weight (+6 Kg), suggesting the existence of a correlation between positive changes in IAT scores and weight loss.

The answer to the second research question is, however, harder to formulate than the previous one, even on a tentative basis. If, on the one hand, a pattern seems to emerge between changes in implicit attitude towards food and changes in weight in terms of group averages, on the other hand no statistical correlation between the individual changes in IAT and individual changes in weight emerged from our data. Besides, as already pointed out in the limitation section of this paper, changes in weight cannot be considered a reliable experimental tool in our case, on the basis of it being a variable that is influenced by several factors that cannot be controlled or isolated in the context of a single-session experiment. Among these factors are the already mentioned seasonal weight-loss weight-gain cycle, and the test subjects' levels of stress. It is worth mentioning, in relation to the second point, that the second data-gathering session took place during the last two weeks of the students' term, a demanding period which precedes their final exams.

After what was observed, we believe that our second research question is unanswerable with the data at our disposal.

5. CONCLUSION

This paper had the objective of initiating a systematic study of the overlooked 'uncharted terrain' of game design as an inherent transformative practice for the designers. In the pursuit of this goal, and in an informal collaboration with the Behavioural Sciences Institute of the Radboud University of Nijmegen (the Netherlands), we set up a pilot experiment that tracked specific psychological and behavioural changes in a small group of game design students (a total of nine participants) during the five-month development of their small, transformative videogames.

Specifically focusing on designing videogames capable of changing the players' implicit attitudes towards healthy food, in our experiments we were able to measure the changes in the implicit attitudes towards healthy foods in our students. Albeit not conclusively, the experimental results seem to confirm our hypothesis:

(video)game design is a transformative experience that changes the designers in ways that are analogous to the changes that they intended to cause in the players.

Future research will likely clarify for which transformative and educational activities the design of games and videogames can suitably and effectively function as a self-fashioning practice. More experiments will also contribute to determine which educational activities can be integrated or enriched by transformative design activities, and whether the designers' awareness of the self-transformative effects of design is a factor in their personal transformations.

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7. ACKNOWLEDGMENTS

I am indebted to Eva A. Alblas for her help, her advice, and her commitment which made this pioneering study possible in the first place. I would like to also dedicate a special ‘grazie’ to Ivan Mosca and Andrea Polla Mattiot for their support as academics and, crucially, as fellow human beings. I am thankful to Ashley Davis for his unceasing kindness and his help with the experiments. Last but not least, I would like to express gratitude to Marcello Gómez Maureira, Daniel Vella, Riccardo Fassone, Michelle Westerlaken, and Irina Tomova for their careful reading, their help with editing, and their precious advice.