Creative Storytelling in Art and Design From the Perspective of Interaction

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Abstract
In the practices of art and design, creativity is the most vital ingredient as its appearance is unpredictable, just like quantum leaps. Referring to the hyperspace theory, the 11 dimensions of space-time might show similar patterns with information exchanges. Therefore, I compare the "quantum entanglement" to the information loop of interaction. The relationships between arts and audience, people and environments, physical feelings and mental cognition are essential when designing and producing arts. By designing interaction, it is intended to help analyze storytelling and offer interactive information for further oriented design. Since the storytelling behind arts and design is the meanings of the work and why it matters, I am trying to propose a model of 11 dimensions (11D) of interaction and use "Interaction Hyperspace"as my early working definition. The 11D are Location, Action, State, Time, Interaction, Entangled Results, Time of Interaction, Possibilities, Intensity, Result to the outside and Memory. Hypothetically, by reconstructing the 11D of interaction, new story combinations might provide various possibilities for creative solutions. The research is trying to be engaged in practical applications, including academic teachings, industrial designs and trans-disciplinary communications. As the method itself is a creative stimulation, it might show people, even those from the not-classical-creative areas, a brand new idea of out-of-the-box thinking. Through redesigning the design thinking, this research is ultimately exploring the humanistic phenomena and psychological perspectives towards arts and design.

Keywords: Interaction, Quantum Theory, Hyperspace, Storytelling

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Introduction

Starting from "interaction", it is of vital importance to realize the relationship between the artwork and the audience, the people and people, the physical feelings and mental cognition. In the practice of interactive art and design, I am fascinated with setting up and maintaining certain entanglements. In the early research, some concepts from quantum theories are referred to interaction design and storytelling. And the experimental framework of "Interaction Hyperspace" is used as a creative method for generating innovative ideas. Through trans-disciplinary research and communication, I am looking for a way to deconstruct the interaction and try to build up a model to help find out more possibilities for designing innovative products and stimulating creative thoughts.

What is Interaction?

When "Interaction" is shown on a search bar, there are a bunch of results presenting "Human-Computer Interaction", "Web Design", "UI Design" or "Virtual Reality Technology", etc. Those technical terms are the most common and the most extensive applications towards "interaction" used in our daily life. They often deceive us into convincing us that the things we recognize as interaction are most tech-related and require human involvement.

From a coffee chat in the morning to the last tweet before sleeping, we are exposed to all kinds of information. The way we communicate (and as such, interact) with the world varies from practical to virtual interfaces, while the interactive experiences provide us the perceptions of space and time. As well known, it is of great importance to building interaction for us to make connections with social groups and understand the universe more thoroughly. However, things are not as perfect as expected. Messages are delayed or lost in a bad network in our daily life as the voice we send out to outer space fades out in the light year. More commonly, complex comprehension of a Shakespeare play and an unpleasant user interface of a product, people could quickly lose their interest in interacting. To begin a study on how to make efficient and smooth interaction and when/where the interaction happens eventually, I to try to find out what interaction is as a start.

In common sense, we could easily indicate that conversation is interaction indeed as the information exchanges reasonably between a person to another. Sports competition is interaction as the physical body confrontation is intense and direct. Computer games are interaction as the man-machine interaction is a specific industry when we are talking about interaction.Furthermore, a man looking at a painting in the gallery is an interaction since he could also get information from the painting by acknowledging the content of the image, the painter, the year of producing, and even the feelings or cognition from viewing the painting. People walking along the street by smelling the scent of flowers is interaction. The car crash is interaction. Roller-skating is interaction. Birds singing in the trees is interaction even not human-beings involved.

However, some situations are tricky to identify. Is meditation an interaction which is conducted all by oneself who is not moving at all ? Is rock falling out of the mountain an interaction which there is no human behaviour involved? Is dreaming an interaction which compares information generated in specific brain stem circuits with information stored in memory(Hobson,1977, pp.1335–1348)? These questions will lead to the mind experiments and reviews towards different disciplinary.

Research Question

From the carving figures in the ancient caves to the graffiti on the modern streets, the images are something people keep trying to comprehend and seeking the stories behind them. In my opinion, consciously or unconsciously, it is the nature of the human being keen to unscrambling what they see and feel. Especially in arts and design industries, the works are made to interact with the audience through specific storytelling methods. Storytelling skills of art and design is the main aims that I am trying to look into at this stage of the research. The interaction we assumed happening between objects are a process of a series of dynamic changes. As the philosopher Blaise Pascal(2012) said, "I only made it longer because I did not have time to make it shorter", the essential extraction requires a systematic approach and dialectical method to create innovative interaction in design. I am seeking a solution for outlining the basic information within interaction and clarifying the relationships by a straightforward structure. Therefore, the main questions that will be discussed in this research include:
(1) What is interaction in the perspective of quantum reality?
(2) How do the quantum theories relate to storytelling which builds the foundation of art and design?
(3) How does the experimental framework "Interaction Hyperspace" work for increasing creativity?

Literature Review

As shown in the Oxford Advanced Learner's Dictionary, the definition of interaction is "the act of communicating with somebody, especially while you work, play or spend time with them" when it is between performers and their audience. Or "if one thing has an interaction with another, or if there is an interaction between two things, the two things have an effect on each other" . By communicating with other people or things, I am looking into the messages and media used through the information exchange.

In the Shannon–Weaver model of communication (Shannon and Weaver,1949), the transmitter exchanges information with the receiver. When the message is sent back, the circulation of information comes up. This model describes the legible process of message moving and participants in each module.
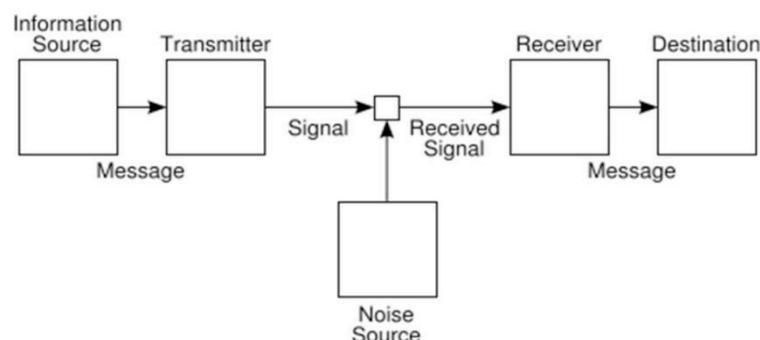

Figure 1: Shannon–Weaver Model of Communication

In this article, I pay close attention to the flow of information exchange. Therefore, adopting an idea from quantum theory, the entangled loop of information might be defined as "Interaction" in the scope of this research.
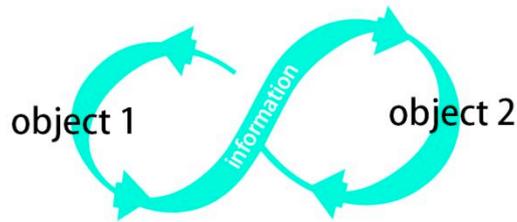
Figure 2: Entangled Loop of Information

The transmitter and the receiver are swapped every time the message is delivered, so there is no need to point out the specific identification. The objects within the loop as the main attenders are affected by the impact of information. Whatever the signal or the noise, these interrupt the constituent flow of messages, creating certain effects caused by reacting to each other in this information entanglement. When there are more than two objects attending the information interchange, the information flows within them. Notably, the "information flow" in Figure 2 is integrated with all the messages, signals and noises. That would never be one pure ingredient but create a complex mixture with all the unexpected influences caused within the entanglement we understand as communications. Regarding the direction of the information flow, the situation varies in different scenarios. If the interaction is time-divided communication like instant messaging or letter writing, there is an initiator and replier. That pattern follows the Shannon–Weaver model as a linear form. When this is a football match, the interaction between the football players is triggered at the same time. Since the whistleblowing, every body movement and every eye contact are collected into a Mobius-Strip-like information flow.

It is information that is the most vital factor within the various communication modes. As shown above, the primary understanding of interaction is described as an information entanglement within two or more than two objects. The universe is conventionally described in terms of physical quantities such as mass and velocity, but a quantity at least as important as these is information. (Stone, 2016, p.17) In the age of digital computing, entropy is the possibility of random variable events that are measurable. The most minor unit is quantum proton to the quantum mechanics as a BIT to information (in a binary system).In my early thought, I used to imagine that the overlap of multiple human experiences would be layer by layer. Every people have shared the mutual experience for a while and then continued to move on on each own track of life. In this stage, I chose not to look deep into the amount of information but how the information is delivered with a creative purpose. That's why I use 11 dimensions from quantum mechanics for reference.

Concerning that we understand that we ordinarily live in a universe of (3+1) dimensional space-time, we perceive the world as relying on our physical tactile sense and inferential experience. Length, width and height allow us to detect and locate 3D geometry volume while time is measured by different calendars or clocks. As a 3D being, we might only have the vision of 3D objects and hard to perceive higher dimensional notions. From the perspective of the spacial theory, the hyperspace is based on calculations by use of the mathematical-physical method that is clarified and further developed from the string theory up till the present moment. The present study claims that the 11 dimensions were introduced by "M theory" that M could stand for magic, mystery and meta to reflect our current state of incomplete understanding, membrane and Matrix theory for other possibilities or even mother of all theories (Schwarz,1999,p.107). The M theory describes that there are 11

dimensions which consisting of 10 space dimensions and 1 time dimension in terms of supersymmetric quantum mechanics. Through various thoughts on space-time, the human experience and perception are gained from different knowledge of interaction. Accordingly, the entangled information flow allows us to observe, to explore and to think dialectically.

When discussing about how to enhance creativity, some individuals might search the internet and literature, some would rather clear their heads for a while to leave some space for new sparks. A few people would like to go to sleep and wish the brilliant ideas to show up in the dreams, which seems passive but works for me as well. Studies have showed that sleep may help generate insightful and creative solutions for problem solving (Sio and Ormerod, 2009; Lewis et al., 2018) via restructuring and changing memory representations. On the contrary, the active learners might apply some methods to generate or stimulate different solutions. In the book "The Art of Ideas: Creative Thinking for Work and Life", Duggan and Murphy proposed a more fun version of method to help individuals to have their own training about creative ideas (Duggan and Murphy,2020,p.75). Most of the strategies for innovations offers a deconstructive process for the existed and remixing with different results. In my own teaching experience, I also set up similar methods for creative combinations which might benefit animation character design and story settings. As Jim Jarmusch(2013) announced "Nothing is original. Steal from anywhere that resonates with inspiration or fuels your imagination." "Always remember what Jean-Luc Godard said: "It's not where you take things from - it's where you take them to." I believe that corresponds to all methods involved with deconstruction and construction. In my working framework, it doesn't deviate from the track of the golden rules for creative combinations. The break-up and reestablishment process is based on the perspectives of interaction and focus on the entanglement of relationships and results.

The Framework

Referring to the hyperspace theory, this is my initial model that presents 11 dimensions or layers of interaction and uses "Interaction Hyperspace" as my early working definition.

0D	Object(People)
1D	Location
2D	Action
3D	Result(State)
4D	Time
5D	Interaction
6D	Entangled Result(to self)
7D	Time of Interaction
8D	Possibilities of Interaction
9D	Intensity of Interaction
10D	Result to the outside
11D	Memory/Cognition

Table 1: Interaction Hyperspace

Hyperspace meaning "space that consists of more than three dimensions" comes from the physics field, helping future researchers to have a general idea of this model. (Definition of hyperspace noun from the Oxford Advanced Learner's Dictionary)

In geometry, a single point is the 0 dimension when the single object is in nowhere doing nothing. It is the so-called 0 dimension that is a single Object(people) of Interaction Hyperspace, which is null with no meaning of information exchange.
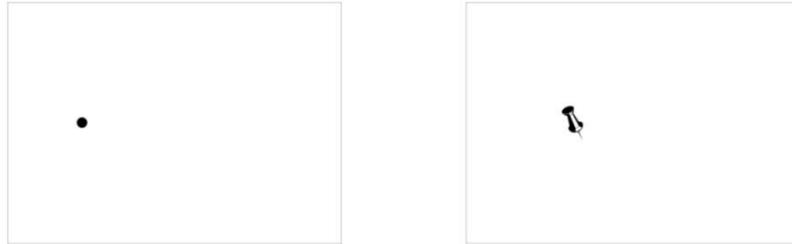
Figure 3: 0D-Object

The 1st dimension is Location.The Point moving into a line which consists of 1 dimension, the single object(people) moving would clarify the location information.

Figure 4: 1D-Location

The 2nd dimension is Action. This dimension in geometry is the plane, referring to the object conducting particular behavior.
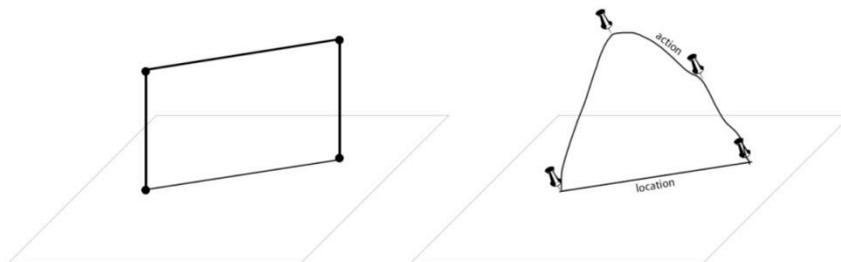

Figure 5: 2D-Action

The 3rd dimension is Result (State). The result for a single object(people) means the original state.
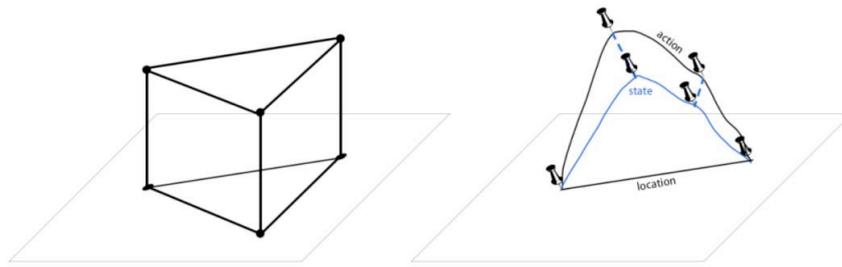
Figure 6: 3D-State

The 4th dimension is Time. They are the same in the hyperspace and this "Interaction Hyperspace".
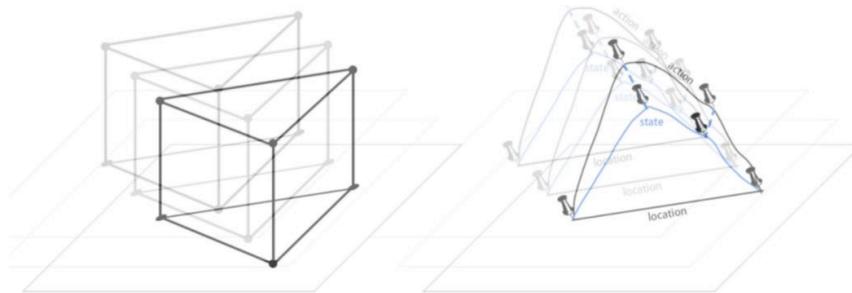

Figure 7: 4D-Time

So far, an object with the information of location, action, result(state) and time carries the basic message to prepare an interaction.

The 5th dimension is Interaction. With more than one object included, the interaction happened. In this system, it tends to determine a central object and the other object(s). Even though the interaction is mutual, the description in a narrative shall determine a subject.

The 6th dimension is Entangled Results (to the objects within the interaction). The participants are affected by the interaction no matter how tiny it is, therefore they eventually are influenced.

The 7th dimension is Time of interaction. Time of interaction also means the duration of information exchange. What is worth mentioning is that the duration of interaction is not always the same when the interaction happens between certain participants. For instance, there are a group of people(more than two people) in a free discussion(see Figure 8). Their time was spent differently in this mutual conversation while they joined and left separately.
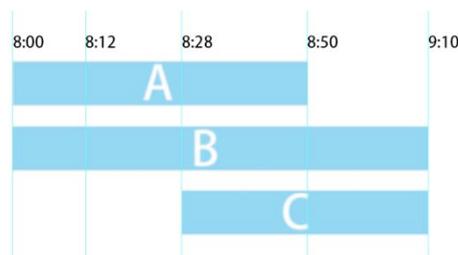

Figure 8: Time of Interaction

The 8th dimension is Possibilities of interaction. In this dimension, it is the various beginnings of interaction or even whether the interaction ever happened or not. In the sense of hyperspace, it might be the multiple parallel universes.

The 9th dimension is Intensity of interaction. It also means the depth, the specific process details of the interaction.

The 10th dimension is Results (to the outside). The effects on the environment according to the interaction.

The 11th dimension is memory, cognition, etc., the being "existed" beyond all the dimensions.

In the original space-time dimensions, the first 3 dimensions length, width, and height are the space terms, while the 4th dimension is time. In this "Interaction Hyperspace" the first 4 dimensions are location, action, state and time of an object consisting of the basic elements of a general narrative principle. From then, the objects are well prepared to describe an interaction.

Here is an example to explain the dimensions of interaction from the perspective of storytelling.

0D	Object	A man
1D	Location	Park
2D	Action	Running
3D	Result(State)	Refreshingly
4D	Time	10o'clock

Table 2: Example 1 from 0D to 4D

For instance, a man is running in the park on 10'oclock. It is still uncertain who is exactly in the interacting process. The differences between interaction and no-interaction are that the first 4Ds (of the main object) lack a certain secondary object for the information to deliver or to interact with. When other participants with their 4Ds join a mutual event, actual interaction is triggered and that forms the 5th dimension. When communication occurs, there are transmitter and receiver participants. The message being transmitted is information for the interaction to happen (mentioned by the Shannon–Weaver model of communication above). If we say a man is running in the park at 10'o clock leaving a series of footprints on the path, the secondary object is apparent and the receiver here is the path. In this way, information is delivered and marked. Or we could say a man is running in the park at 10'o clock with the breeze cracking his face. The secondary object that participated is the breeze and the man could acknowledge the smell, touch and even humidity from the breeze. Therefore, the interaction (as a subjective form) happened in the 5th dimension.

0D	Object	A man(main object)	Path(secondary object)
1D	Location	Park	Park
2D	Action	Running and stepping	Be stepped on
3D	Result(State)	A person	A nonliving matter
4D	Time	10o'clock	10o'clock
5D	Interaction	A Man is running and stepping on the Path	

Table 3: Example 1 from 0D to 5D

With information is delivered successfully, there are entangled results for the participants in the interaction naturally. Example: A man is running in the park at 10'o clock, leaving a series of footprints on the path. As the aspect of the man, he got mud on his shoes as a result of his stepping on the path. On the other hand, the path got the man's marks and changed its appearance of itself. The effects are delicate sometimes but inevitable eventually. That's what the 6th dimension is clarified.

The next dimension, the 7th dimension is the duration of the interaction which is measured by the valid time of information delivered successfully. When the interacted objects are two, the duration time is equal in this example.

The 8th, 9th, and 10th dimensions could also be seen as the beginning, process and end of an event. When the earthquake comes, the possibility of "A man is running in the park at 10 o'clock leaving a series of footprints on the path." is as close to 0 as possible. But when this interaction begins, the intensity begins the process. The pressure on the footprint, the feedback from the path and the length of the path combine and produce the intensity of the interaction. The result in the 10th dimension is the influences on the environment or the other objects apart from the interacting participants. The footprint might point out the direction of the man's heading for the followers. Or the pollination of certain plants in the park might change its pattern by the running movement. According to the Butterfly Effects(Lorenz, 1963,pp.130-141), the environment is definitely different if this "running" interaction happens.

The last but not the least, the 11th dimension is memories and cognition. They could exist beyond all space, time and events. In this example, "a man running in the park" might be his most unforgettable memory if the earthquake came.

It is noteworthy that all the 11 dimensions are not linear superposition but intertwined and blended with each other. Every aspect is crucial and slight modification could make the objects interact totally differently.

Figure 9 uses the three-dimension cube to present an object with the information of location, action and result(state), and the linear arrangement indicates the timeline. When Object A and Object B come across each other, the interaction happens between them. They might share the same location, action, state or time to make this interacting connection successfully but these are non-essential elements. For instance, a remote meeting doesn't require the same location; the car crash happens when the car's action and the pedestrian's action are not exactly the same; also, shuttlecocking letters are not always at the same time. Therefore, "AB" means they are having interaction but not particularly overlapping with their coordinates. Instead, "AB" of the Figure 9 showing purple out of red and blue indicates they have entangled and affected themselves and others. After they separated from this interaction, Object A and Object B became New Object A and New Object B with relative influences. Accordingly, the environment is also changed along with them which is what the 10th dimension represents.
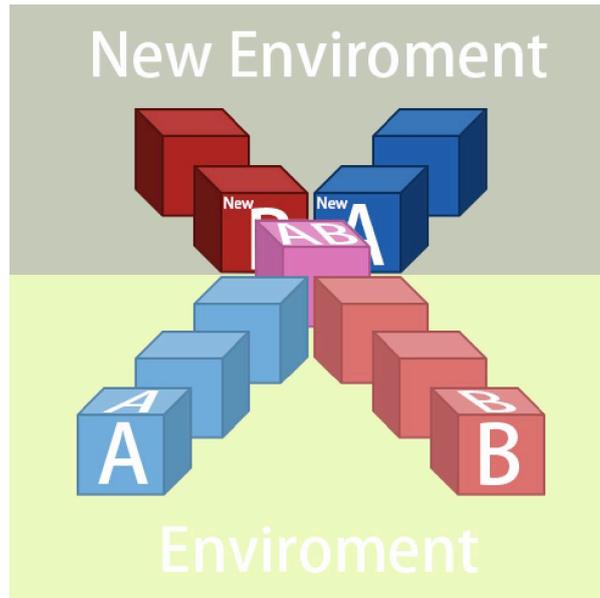
Figure 9: The Environment before and after Interaction.

Methods

In the university teaching practice, this creative method is intended to be a teaching methods conducting by researcher or by other lecturers with the researcher doing observations as outsider. To carry out the research, the method is also available to be on-line as digital questionnaires. I might look into the practical applications based on it in depth and conduct 3-5 case studies to testify the theory. Through trans-disciplinary research in analyzing all the data and feedback gathering from the field researches, the direct observations and exhibitions of the outcomes are also be taken into account.

Examples

As we know, "the Five W's" of Communication helps create information in the context of meeting an audience's needs(Hart,1996,p.139). There are Who, What, When, Where and Why, which are often used to direct storytelling as the basic structure. However, in this "Interaction Hyperspace" model, I attempt to use the 11D+0D, the 12 dimensions to describe and summarize an Event/Story.

In this way, the well-known novel "The Little Prince" is used as an example of narratives. This is from The Little Prince. Chapter Eight-Nine (Saint-Exupéry,2000,pp.37-46).

0D	Object	The Rose	The Little Prince
1D	Location	In little prince's planet	In little prince's planet
2D	Action	Growing	Living in his planet
3D	Result(State)	Proud and beautiful	Alone
4D	Time	When rose began to produce	When he met the rose
5D	Interaction	The rose and the little prince make a bond	
6D	Entangle Result (to selves)	They fall in love with each other	
7D	Time of Interaction	A few times before the little prince leaves	
8D	Possibilities of Interaction	Very likely to happen	

9D	Intensity of Interaction	Strong and dramatic They love, misunderstood and separate.
10D	Result to the outside	The little prince's view towards other roses changes.
11D	Memory/Cognition	Little prince will never forget about his only rose.

Table 4 Example of The Little Prince

In this example, the model of Interaction Hyperspace might instruct a basic frame of storytelling. It covers the fundamental elements of the 5W's and adds the "ups and downs" in the literature. Summarized in this frame, it indicates and guides us to enable a systematic and stratified structure of narratives. To complete a new dramatic or creative writing, it will lead to a completely different story by changing some of the "dimensions". Intertwined within all dimensions, they are inseparable and mutually interacting with each other. Therefore, a slight change of the above content in the structure could be a starting point for creative thinking.

Conclusion

To try to answer this question proposed in the very beginning, the other question I would like to ask is what is not interaction? If the action is static, is it not interaction? If the action has no human beings, is it not interaction? If the duration of time is too long or too short, is it not interaction?

According to the above "Interaction Hyperspace", I describe an early framework that my research will continue to explore. Once there is corresponding information in each dimension, the interactive flow will be entangled with every layer and cooperate with each other within the model.

Based on the exploration of the definition of interaction, dimensions, as layers through all the spaces and time, are the aggregation of human behavior and perception. By analyzing trans-disciplinary research about interaction, an original elaboration of "Interaction Hyperspace" as a creative tool is meant to represent. Since the basic creative model could be generated from the dimensional frame, that is the embodiment of behavior according to the interactive experience.

The framework of "Interaction Hyperspace" I explored and employed is still an early research of the potential to be valued as a new method helping people from creative industry to analyze their art and design by storytelling and adjust it along with perspectives of sociology and psychology. At the present stage, I have used this framework on script writing and animation performance teaching practice. It shows its advantages on encouraging students and designers to have their own creative story settings and group discussion. In the case study practices, my next stage of the research work might be focus on the diverse groups of practitioners responding to the method and trying to document the whole designing process based on it.

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