Designing Tools for Creative Learning

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Abstract

In this paper I present two tools for reflective, creative thinking: Pillow-Talk and Calliope; and discuss the research that led to their design. These tools make use of the "distorted mirror" metaphor for self-reflection. They are aimed at debunking myths of creativity as an acquired faculty promoting instead creative apperception and flexible thinking.

Their design parameters are built around the idea of making full use of the different vehicles and levels of thought accessible to us.

Pillow-Talk's targets flexibility in levels of thought by priming dream recall and facilitating capture through voice recording. It considers the dream an aesthetic experience we all undertake, where the dreamer is free to test knowledge liberated from physical and moral constraints.

Calliope endorses flexibility in vehicles of thought through co-creative and collaborative play. One can incorporate any object found in the environment as a tool or material, thus making contextualized and personalized creations. Calliope promotes cross-cultural and cross-generational co-creation as the echo from which to recenter perception.

Introduction

There is a general concern about the unpredictability of the future in a world that is changing faster than we can keep up with. In order to adapt, it appears that everyone, from education to entrepreneurship, is calling for more flexible, creative modes of thinking. Creativity is almost becoming a trend, being valued as highly as expertise as an asset to achieve "success."

Thinking creatively though, requires fluidity between abstract and concrete, internalizing and externalizing, combining new information with pre-acquired knowledge. Thinking creatively demands self-knowledge. (Ackermann, 2007)

But it seems like the same environment that demands flexibility of mind overlooks the need of time and space for creative thinking; and the crucial role that reflection plays in the equation. Information technologies have focused on access and distribution of media, their highlight being the capacity of personalization and exchange, but little attention has been paid to the creation of content itself. But when the environment does not demand creative engagement and instead asks for compliance, a sense of futility pervades. Our creative nature is overtaken by the one of consumers and transmitters.

Creative apperception is of crucial importance to psychological health. "It is only in being creative that the individual discovers the self." (Winnicott, 1971) Robert McKim states that we can only become integrated beings if we are able to transfer back and forth between rational and

emotional, to plunge into the unconscious and bringing it up to conscious attention, in short, when we are able to have an ambidextrous mind. (McKim, 1972)

But how is one to exercise and maintain a truly creative apperception? How can we acknowledge ourselves as creative beings, appreciate the uniqueness of our vantage point and debunk myths of creative handicap?

Access to our mental process, the ability to step in and out from ourselves through perspective taking, endorsing the value of personal experience and providing a time and a space to reflect need to be considerations taken when designing tools for creative thinking. Technology should help us engage in an inner dialogue through which personal, original content can emerge.

In this paper I present tools to foster creative thinking: Pillow-Talk and Calliope.

Pillow-Talk is a tool to aid dream recall. Its aim, beyond exposing the dreamer to the wealth of their self generated visual imagery, is to promote flexible thinking by allowing access to both conscious and subconscious levels of thinking; bringing a renewed sense of ourselves as creative beings.

Calliope aims to promote the creation of personalized and contextualized work by allowing the use of objects as material for creation. Designed as networked platforms, Calliope hopes to foster a flexible mind that permits alternative viewpoints where people from all cultures and ages can come together to internalize through their externalizations, learn from and through their and each other's manifestations and exploit the creative potential their environment possesses. In short, a stage to be, share and reflect.

These tools were designed with mindful consideration of providing space and time for self-reflection. They explore how the artefact, whether a physical object or an object of thought, serves as a soundboard for our thought process.

Reflective Learning and Adaptation

Adaptation is understood as the balance between assimilation and accommodation, between incorporating new information into one's preexisting cognitive structure and changing this structure to accommodate new information. (Piaget, 1954)

Given the speed at which all areas of our culture are changing, adaptation is a constant requirement. Information from the environment is becoming not only accessible but intrusive, reaching us at a speed never experienced and from channels never seen before. It seems as if our time to create and reflect has been compromised by the manufactured need to be present everywhere and with everyone all the time, depleting ourselves from a space and time for intimate interaction.

If adaptation is the product of equilibrium between assimilation and accommodation, it is fundamental for the individual to have a deep understanding of what constitutes him or her as an integral being. The creative act, creative apperception, obliges oneself to be, exposing rather than hiding our persona.

But creative enterprise seems to be easily mistaken with impulsive action. Creative thinking requires reflection and the postponement of immediate action. In John Dewey's words: "There is no intellectual growth without some reconstitution, some remaking of impulses and desires in the form of which they first show themselves." (Dewey, 1963)

Reflection then, is an integral element to learning.

Reflection happens when we synthesize experience into knowledge, when we take distance from what we know, when we take a different perspective and see through someone else's eyes. Reflection is influenced by how we feel as we reflect and happens as well when we share our thoughts and listen. Artefacts provide reflection when we think through them. Reflection secures our identity and calibrates our stance in the reality surrounding.

In creating tools for Creative Thinking, I have tried to consider the way they can provide a time and space for reflection in its social, personal, cognitive and emotional facets.

Asynchronous collaboration that does not demand face to face interaction, but that allows one to take one's time; the ability to contextualize creation by using objects and the environment as material for creation; the possibility of collaborating with people we would not normally do so; the capacity to go back and reflect on the creative process through documentation and the access to different layers of thought have been considered. (Rosenbaum, 2009)

Flexibility in Vehicles and Levels of Thought

Flexible thinking refers to the ability to fluidly switch vehicles of thought and to fully make use of the advantage one has over another. A vehicle of thought is not thought itself, but the way you represent thinking to your consciousness. They can take any shape; from sketching to mathematical models. (McKim, 1972)

Having access to a variety of vehicles of thought offers a much wider spectrum where to look for solutions to problems or derive conclusions from. Having flexible thinking is of great advantage when facing unknown circumstances, as it makes for a resourceful mind that is more likely to be self-sufficient and adaptable.

A flexible mind should be able to recognize the different layers at which we operate, unafraid of plunging into the subconscious, dwelling in emotions, and bringing it back to rational thought. It should also be able to smoothly transition between vehicles of thought, being capable of making the most of the offerings of each.

Our educational system though, has placed too much focus on language as a vehicle of thought, and while elementary and incredibly powerful, it has taken attention from visual thinking, a fact detrimental when trying to exercise a flexible mind since adhering to one vehicle tends to limit our sources for acquiring knowledge.

"With its ability to facilitate holistic, spatial, metaphoric, transformational operations, (visual thinking) provides a vital and creative complement to the reasoning linear operations built into the vehicle of language." (McKim, 1972)

Drawing and graphical representations are powerful tools for creative thinking. When we draw, we practice our perceptual capacity, our inner imaginary and our graphical skills to convey. Visual thinking requires us to see, imagine and draw. Drawing also provides record and detail, giving us what memory can't: the power to compare.

Tangible thinking on the other hand, steps out of the perceptual realm of visual thinking and into the object-oriented acquisition of knowledge; touching upon Piaget's constructivism and Papert's constructionism.

According to Piaget, we construct knowledge not only by refining perception, but constructing relationships between objects. Attention to texture and detail found purely in perception not being enough, this features must be situated within the spacial-temporal before having cognitive meaning. Constructivism states that physical manipulation permits understanding by investigating

how an object (not necessarily a physical object, but an object of thought) transforms in relationship to itself and to the observer.

Papert, takes the tangible, kinetic at heart saying that knowledge is better acquired when we physically manipulate objects, "Learning by making." The tangible artefact becomes a springboard for reflection by being an item that can be shared. (Papert, 1980)

Dreaming as Constructing

The activity that happens under the conscious level usually uses visual imagery to make itself understandable to the conscious level, otherwise known as autonomous imagery and being the dream the clearest example.

When we sleep, we create a visual landscape that does not necessarily follow the moral nor the physical rules of the waking reality we inhabit. In this sense, the dream provides an interesting window into object relating. In the dream the dreamer dreams itself, and the visual imagery abides by the aesthetic: the transformation of the thematic by the poetic.

When dreaming we create a stage where we play our own puppet with the added benefit of being able to bend space and time.

Although for the most part we are unaware that the landscape we inhabit is product of our mind, this is exactly what makes it all the more interesting, since it is not only the narrative that matters, but also the choices made to convey the message.

Dreaming goes beyond being a vehicle to self-knowledge. It is also an aesthetic experience. In that I like to compare it to what Turner would say about performance: ..." not only a reading of experience, but an interpretative reenactment of experience" (Turner, 1987)

The dream's visual imagery and the freedom to "bend the rules" whether spatial, temporal or moral when manipulating objects, be they physical or objects of thought, (I was sweeping the clouds to let the sun come through, fireworks melted in the sky like honey drippings, I was hiding inside the skin of a bear, I was walking on a tight rope over my roofless childhood home, I held a forest in my hand) offers a rich ground where to reflect on our way to construct knowledge, both in the constructivist and constructionist sense. Furthermore, it demands a wake inquisitive mind: "Veiled in enigma, the dream invites curiosity!" (Bollas, 1987)

Reflection in Reflexion: Distorted Mirrors

Not only is keeping a flexible mind important to creative apperception, it also fosters empathy by offering different vantage points. When we are able to see the familiar from a different point of view, we create knowledge and appreciation for what we take for granted or promote change for what we dislike.

Victor Turner suggests that: "we should try to find out how and why different sets of human beings in time and space are similar and different in their cultural manifestations; we should also explore why and how all men and women, if they work at it, can understand each other."

The externalization of an internal thought provides an object for critical contemplation that can be shared, interpreted, re-interpreted or mis-interpreted. In the practice of this we create new modalities of perception that might lead to the individuals re-discovery, as well as cross-cultural commonalities that transcend local realities and question stereotypes.

Collaboration is a performative act that requires negotiation of understanding. Just as we use different vehicles of thought to come to the solution of the same problem, we choose different

means to convey message, going beyond words and extending the symbolic repertoire to our sensory entirety. It is not only in the material but in the use of the material where personal style, moral stance, skill, and aesthetic choices are revealed.

Victor Turner regards the variance in means of expression as a hall of "magic mirrors" in which social problems, issues and crises are reflected, and that, when shifted to a different genre, illuminates different facets, making scrutinization possible and "accessible to conscious remedial action."

This resonates with what Bollas has to say about the dream experience, calling the dream text a primordial fiction and the dream space a theatre stage for an interplay of self and Other. This all occurring in a setting where thought is transformed to imagery.

By building a bridge over the big divide, we all benefit from enjoying the kind of knowledge that is only acquired when we collaborate with people that we would not usually think we would.

Quoting Victor Turner: "mirror distortions of reflection provoke reflexivity." (Turner, 1982)

Tools for Reflective, Creative Thinking

Here I describe two tools designed to situate computation in cultural and material contexts that attempt to seamlessly foment access and fluidity between levels and vehicles of thought.

Calliope: Vehicles of Thought

Calliope, is a portable, scalable stage for collaborative, cross-cultural, cross-generational storytelling. It incorporates analog and digital techniques as well as bidirectional capture and send of media, offering co-creation among peers whose expertise may not necessarily be in the same medium. It also offers the possibility of integrating objects as objects, as characters or as background. Using a paper sketchbook as the primary interface, it makes an inviting platform by simplifying the interaction through the affordance of the sketchbook.

Calliope is composed of two or more networked "creation stations" allowing synchronous or asynchronous collaboration across distance. The creative expressions done with Calliope are not limited to graphical representation through two dimensional means. Because one can embed audio, mix analog and digital media and make use of any object; it reflects a much truer personality of the user than by being systems limited to one imposed medium. This diversity invites the user to look into its surroundings for inspiration or for conveyers. Thus, what we express through Calliope is contextualized and personalized.

Calliope is a tool where we can learn from others and ourselves through joint co-creation. This is in the hope of offering self-expression instead of self-description, a means that I find conductive to unhealthy and anxiety filled self-consciousness.

Inspired by the Reggio-Emilia Approach, which emphasizes the position of the child in relation to other children, to his or her family, and to the societal and cultural surroundings as fundamental to the building of the child's identity, it was of crucial importance to make Calliope a networked platform that could help sustain the above statement by being a tool for group socialization that made everyone an equal participant by not requiring specialized skills, but instead honing diversity of approaches. (Edwards, et al. 1972)

Integrating history into the pages of the sketchbook in Calliope was crucial in making it a tool for learning through reflection. Calliope gives access to the history of any page in the sketchbook to the user without the need to interface directly with a computer. By placing the appropriate tag on

the sketchbook, the system displays all the iterations made to that particular page. In this way, we can say that every page retains the history of what has happened to it. This gives us access to the negotiation of actions between collaborators, the evolution of thought process, the coming to understanding and the reaching of agreement.
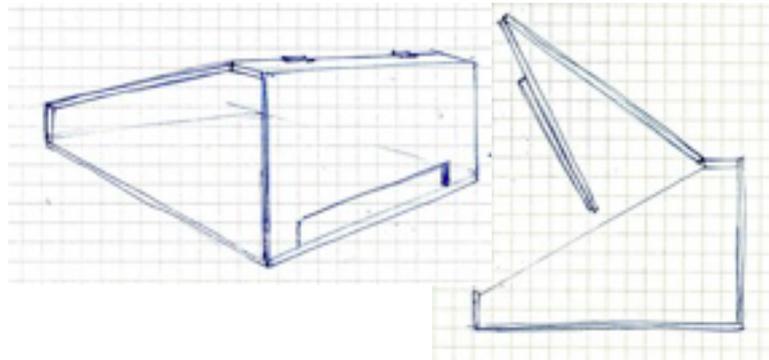
Calliope: Design Sketches (Santiago Alfaro)

Calliope offers a stage for objects to become part of the user's narrative. Objects become performers through the animism of the user, and users become performers by using objects to tell their stories. The choice of objects is not less important. While sometimes the narrative is driven by the object, in others it is the object that serves the narrative and yet other times, the objects are placed just to be recorded, to embed the identity of the user in one way or another onto the narrative. Stamping hands and faces, and changing the way they look by altering the digitalized self-image by drawing over it or by accessorising it with objects in ways mostly not permissible in real life was an amazingly amusing thing to do.

Calliope: Action tags

Calliope was designed to support the inclusion of personal experience as an integral part of creative learning and to prime the acquisition of future positive experiences by being a tool for cross-boundary collaboration that promotes the individual's capacity to re-contextualize their environment to fit their creative endeavour, engaging the individual in its present.
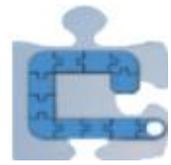
Calliope: Back and front view

Pillow-Talk: Levels of Thought

Pillow-Talk was designed as a tool to promote fluidity in levels of thought. It considers sleep as a time for dreaming, and dream as a time for identity consolidation (Jouvet, 2001). Furthermore, it resorts to the visual imagery that is created every night, by all of us in our sleep as a universal, primary source of self-reflective, creative thinking.

Maslow talked about two types of creativity: primary and secondary. He referred to the secondary kind of creativity as the one exerted when working with others and with the sources of others, and of primary creativity, he said, it is the one that resides in the "depths of human nature" not known to most people not only because it lays so deep, but because: "This is something that we not only don't know about but that we are afraid to know about." This primary creativity, he continues, is a heritage from every human being; a common and universal thing and visibly present in healthy children but repressed in most adults, only accessible if one digs deep (Maslow, 1971).Pillow-Talk aims to bring primary creativity to the fore-front.

We exercise what Christopher Bollas rightly added to Freud's vision of the dream: an "intrasubjective rendezvous", where we are both dreamer and dreamed, the object of the subject in a stage created by the aesthetic consideration of transforming thought into fiction. (Bollas,1987)

The dream is to me, the safest stage where to test knowledge, corroborate theories and create new ones. We wake up from an intense dream surprised at our own ability to resort to ingenious ways of solving problems, and while some might never work in waking life, they nonetheless did in their own context. We are freed from physical and moral constraints when we dream, we play under rules we create on the go, we are constantly constructing worlds!

Pillow-Talk: switch embedded in pillow

It has been said that dreams were the source for a wealth of inventions and discoveries, brought about by the ability of creative folk to move between conscious and unconscious thought seamlessly. Penicillin, the sewing machine, the atom structure among them (Barrett, 1993). But being able to find the solution in the dream requires not only remembering the dream; solutions are sometimes presented in a guise which requires a conscious flexible mind, as they might not be easily deciphered by the bounds of waking life.

Pillow-Talk attempts to make use of ubiquitous computing devices with reality-based interaction. Dream recall does not come easily for most people; most advice for recollection suggests keeping pen and paper close by. But sitting up, turning a light on or just simply moving is counterproductive to reminiscing. Stillness is crucial for recall, as even a slight movement is enough to make the dream evaporate from ones mind.

Pillow-Talk provides a seamless interface to prime recall and aid capture, minimizing the risk of distraction. To record a dream, one simply has to squeeze the pillow and start relating. Once captured, the dreams are time-stamped and saved onto ones computer for later use in whatever way one might see fit: for inspiration, analysis, self-reflection or mere curiosity. As an addition to capture, my colleague David Cranor designed a playback device, the "Firefly Jar". The jar is a Mason Jar made to look like fireflies have been kept in it. Once recorded, the jar flickers, the dream stored and played back when opened, providing an evocative, tangible visualization tool. (Portocarrero et.al, 2011)
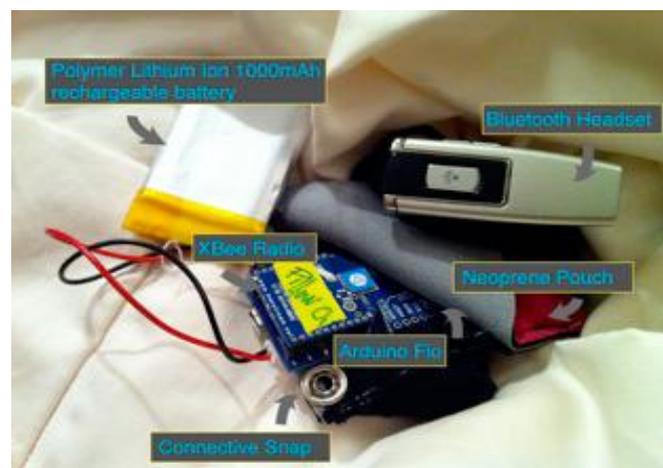
Pillow-Talk: module parts

The digitized dream allowed by Pillow-Talk, unlike a dream diary, gives the user the potential to analyse dreams over time, qualify and quantify themes, characters and emotions.

Speech to text recognition could allow data analysis, revealing common themes not only presented in the particular user's dreams, but among different users. Pillow- Talk could serve as a powerful tool to bring further insight into the fears and desires of a determined culture or generation as interpreted through their dreams and the aesthetic choices made to convey them. As Joseph Campbell puts it: "Myths are public dreams, dreams are private myths...dreams talk about permanent conditions within your own psyche as they relate to the temporal conditions of your life right now." This could potentially relieve any sense of alienation by illustrating that every individual problem should be seen in reference to the human situation as a whole.(Campbell, 1988)

Pillow-Talk sparkled interest for unexpected uses in various fields. Image Rehearsal Therapy (IRT) is a practiced and successful technique to treat recurring nightmares in Post-traumatic stress disorder (PSTS) victims that requires the dreamer to reframe the nightmare into a positive dream by imagining and repeating the desired outcome before going to sleep. (Greiger, et al. 2006) (Barry 2006) (Talbot 2009) (Kershaw 2010)

Other studies suggest that nightmare recurrence diminishes when the dreamer is conscious of sleeping under observation. Pillow-Talk could be said to be an inhibitor of bad dreams and a primer for recall.

Pillow-Talk is meant to be a personal tool for self reflection by bringing to conscious awareness the dream not only as a "road to the unconscious" but as an aesthetic lived experience, a product of creative mind common to all and which we go through every night. Pillow-Talk hopes to capture the detail of this imagery, for the aesthetic choices made reveal as much as the dream narrative.

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