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EXPLORATORY DESIGN, AUGMENTED FURNITURE

On the Importance of Objects' Presence

ABSTRACT

This chapter explores the poetics of everyday objects, and their abilities to elicit meaningful interactions. Our focus is on a special kind of everyday objects: a chosen set of “augmented” chairs and tables, especially designed to gently disrupt usually associated emotional / social responses, and shake habitual ways in which people interact with – and through – furniture. We address the physical, relational, and cultural qualities of these objects in terms of the objects’ “presence” and “personality” and we discuss their abilities to engender amusing incongruities. We conclude by speculating on the need of using exploratory, non-mainstream design methods as a means to understanding and thinking through innovations in human-computer interaction. Several cases of augmented furniture will be presented to illustrate the raised points: i) therapeutic furniture (*Robotic Massage Chair* and *Squeeze Chair*) and ii) furniture that mediates human transactions and aides self-reflection (*Conversation Table*, *Stealing Table* and *Table Childhood*).

1. INTRODUCTION

From third-generation mobile phones (with embedded cameras) to smart cars (with built-in navigational systems), and from iPods and TiVos to robotic massage chairs we are surrounded by hybrids and quasi-objects (Latour 1993). Yet, not all hybrids and quasi-objects (generally referred to as “augmented” devices) are equally engaging, or vivid as relational “partners” (Kaplan 2005). Some draw us in while others keep us at a distance. Some are obedient while others seem to have a mind of their own. Some are tiny and accompany us as we transit between places while others, big and bulky, keep us grounded, posted, or even boxed in: they require that we position ourselves with respect to them.

This chapter addresses a particular kind of everyday objects: furniture with embedded technologies, or “augmented furniture”. Of particular interest to the authors are the evocative, transformative, and mediating powers of slightly “incongruous” tables and chairs, i.e., their abilities to amuse and delight. We

characterize such tables and chairs as *uncanny* everyday objects¹ (Freud 1925) or *strangely familiar* ones (ref. familiar strangers²). Their main “relational” quality is that they can surprise while, at the same time, evoke the familiar. While tapping into the habitual, they gently disrupt expectations.

In the sections to come, we explore the poetic qualities, or presence, of such artefacts, i.e., their abilities to mediate and alter the social and emotional responses of people who interact with, and through, them. The focus is on everyday, non-instrumental scenarios of interaction (e.g. dinner at a table, conversation with a friend) that we qualify as *small moments* (de Certeau 1984). Lastly, we address some methodological issues for the study of poetic “augmented” furniture.

1. THE POETICS OF EVERYDAY OBJECTS, AND THEIR ABILITIES TO ELICIT MEANINGFUL INTERACTIONS

While each person experiences and appropriates cultural artefacts in very personal ways – depending upon interests, experience, and background – it is also the case that objects and places set their own constraints regarding the ways in which we engage with them. In other words, not all artefacts are good enough projective materials!³ Some are clearly better suited to foster meaningful and delightful encounters.

1.1. *The beauty in the eyes of the beholder?*

All forms of human imagination – from fantasy play to musing about incongruities – are based on a unique mental process that the writer Arthur Koestler called “bisociation” and which consists of “perceiving a situation or idea in two self-consistent but habitually incompatible frames of reference” (Koestler 1964, page 94). While some form of unexpected, surprising, or incongruous relation is always present in play, poetry, or humour, the presence of incongruity won’t suffice to create humour, delight, or playfulness. Instead, incongruity can be perceived in any of three ways: interest, fear, or amusement, depending upon the context. For an incongruous event or object to engender amusement or delight it needs to be taken

¹ The German word for uncanny is *unheimlich*, the opposite of *heimlich* (homely) and *heimish* (native), the opposite of what is familiar. We are tempted to think that the uncanny is frightening precisely because it is not known and familiar. Yet not everything that is new and unfamiliar is frightening. We can only say that what is novel holds the potential of being frightening. In this paper we use the word “uncanny” as a non-frightening incongruity, or gentle “disruption”. In Freud, S. *The Uncanny*. 1925.

² The *Familiar Strangers* research project (Intel Research, Berkeley) explores often ignored yet real relationships with familiar strangers. Experiments and studies derived from Milgram (1972) have led to the design of a personal, body-worn device called *Jabberwocky*. Retrieved on 20 April 2006 from <http://berkeley.intel-research.net/paulos/research/familiarstranger>.

³ It seems essential for designers, say of learning toys, to take responsibility for their products by not assuming – to caricature the constructivist’s stance – that, no matter the external form, people will use it as Rorschach stains and project their own experience, or alternatively that the intent of the author is what prevails through a design. Any creations, once launched, may well speak to others in ways not intended. It too takes on a life of its own.

seriously in its *unreality*, which in turn requires a person's ability to operate on make-believe ground, or do as-if – what psychologists refer to as *suspension of disbelief*.⁴

A person who laughs at jokes, amused when pretending or observing incongruous events, acknowledges the “unreality” (the impossibility or absurdity) of the imagined events: events are humorous *because* they are at odds with reality. Suspension of disbelief is the one single most important quality of human imagination.

According to Piaget, a child's abilities to pretend sets in at a time when s/he most needs them – developmentally speaking – because s/he enters in the process of individuation, and builds a fragile sense of self. Through pretend and fantasy play, a two-year-old gets a chance to *dramatize* many intriguing events, sometimes changing the original event's outcome, which helps the child to come to grips with the hardships that identity-formation entails. Piaget noted, for example, that at 23 months of age, his daughter Jacqueline “put a shell on the table and said “*sitting*,” then put another shell on top of the first, adding delightedly: “*sitting on the potty*”. Quite an enactment! Through exaggerations and non-sense, the child distances herself from the seriousness of everyday life, while capturing its essence through fictionalizing. Her use of humour cleverly relieves some of the tension from what might be a stressful situation (in this case toilet training). Isn't it why we all like comedy and slapstick humour, for it injects a sense of levity or ridiculousness into many otherwise too serious, painful, or untenable situations?

1.2. *Objects' presence?*

The poetics of everyday objects speak to an artefact's abilities to evoke incongruous yet amusing associations while at the same time, uncovering otherwise veiled “truths” or “dangerous” ideas, and opening up new mental venues, or possibilities, often *possibilities within* – i.e., re-digesting or reverberating deeply felt human experience.

2. DESIGNING OBJECTS WITH A ‘PRESENCE’ AND ‘PERSONALITY’: PHYSICAL, RELATIONAL AND CULTURAL

Donald Norman introduced the term “affordance” to refer to an object's ability to signal its potential uses (Norman 1988). Examples of objects with poor affordances include a lamp that doesn't tell the location of its “on” switch and a doorknob that doesn't communicate whether the door should be pushed or pulled⁵. While affordance speaks to an artefact's clarity to signal its whereabouts, something more

⁴ Early manifestations of suspension of disbelief appear in a child's fantasy or pretend play, and in her urge to invent/converse with imaginary companions. They also appear in the ability to tease and joke.

⁵ Ultimately, even a mundane doorknob could be delightful if, beyond getting us through a doorway, it could retain our attention, suspend our breath and – why not? – slow down our steps. It too could evoke feelings about passages and thresholds, and enrich our experience of moving between places. It too could speak a language that reaches our inner most aspirations.

is needed to sustain interest, produce delight, or enchant. This “something more,” in the case of augmented furniture is the surprising blend of autonomy and responsiveness alluded to before: a clear invitation to play and dance!

2.1. CHARACTERISTICS OF FURNITURE

Furniture has unique physical⁶ and relational characteristics. Material properties, such as shape, scale as well as temporal immobility and stability fall into the category of physical characteristics of furniture. “Relational” characteristics include different functional and symbolic characteristics, as signalled / perceived within accepted cultural conventions or “scripts that guide the sequence of behaviour” (Norman, 1988). We review the following issues unique to furniture:

- Scale, the body and the engagement of senses
- Temporal personalization and shared use
- Stability of furniture
- Cultural conventions
- Relations between shape and arrangement of furniture, and its meaning

2.1.1. *Scale, the body and the engagement of senses*

We interact in different ways with small hand-held objects than we do with furniture, car, rooms or spaces, simply because the scale of the objects is different.

Mobile: Hand-helds and wearables are small and light, and are designed to be held or worn. We carry them along, and they become a part of our “nomadic” selves.

Grounding: Buildings, parks and rooms are habitats that provide shelter and places to live and rest. This is true even if the capsule is moving, as is in the case of a car. The capsule may move and get us places yet it is still a shelter (a mobile “home”!)

Holding: Furniture, lastly, keeps us settled. Chairs, beds and benches provide body-sized “zones” to rest. Tables bring friends and families together supporting us either socially (to dine or converse with others) or physically (to rest, sleep or sit). The seats in a car, train, or airplane (moving capsules) keep our bodies immobile while we are on the go. In all cases, horizontal surfaces offer a fit terrain for placing objects.

2.1.2. *Temporal personalization and shared use*

We often share furniture, appropriating and sometimes personalizing it temporarily, both at home and in public spaces. We often settle and become temporarily immobile as we sit on a chair or bench, eat at a table, or lie on a bed.

⁶ John Gloag states that “[n]early all articles of free-standing furniture are variations of two basic shapes: a platform or a box. Stools, benches, chairs, couches, beds and tables are platforms elevated on feet or legs or underframing, on which you sit, lie, or put things; chests, cupboards and wardrobes are boxes for storing anything from linen and clothes to food, wine, drinking vessels, documents or money.” (pp. 3-4)

Occasionally, the inability to move around or shift our positions relative to the furniture (location or distance) results in peculiar social situations – from the conversations at long holiday dinners, to uncomfortable silences during social events.

2.1.3. *Stability of furniture*

Unlike consumer electronics products, augmented furniture is inherently stable. When a cell phone breaks, we cannot use it until it is fixed or we replace it with a new one. When tables with embedded screens and a robotic massage chair is out of power, the objects maintain their core functionality. In other words, they keep their integrity as holding devices that allow us to eat, read, converse with others, sit or relax. This *stability* of augmented furniture is a critical feature that lends it much of its instrumental and evocative powers.

2.1.4. *Cultural conventions*

Accepted cultural conventions and ‘scripts’ guide the sequence of people’s behaviour (Norman 1988). Such conventions include behaviours at or around tables, chairs, etc. Table manners are one such set of culture-specific ‘rules’ of behaviour. In the West, proper use of dining utensils is expected. In contrast, in many other countries it is considered perfectly appropriate table manners if fingers are used instead of dining utensils. Another example of culture specific behaviour is illustrated in a report about 19th century Hindu craftsmen (Cranz 1998). The squatting of these blacksmiths, carpenters, and masons while at work was interpreted as uncivilized by their English employer who tried to force the workers to sit on chairs and work on a table, only to find them on the following day working while squatting on the top of the table (page 24). Cranz indicates that “... the reason[s] for sitting on the floor, on mats, on carpets, platforms, Chinese *k’angs*, or stools stem from cultural traditions rather than economic development.” (page 26). According to Csikszentmihalyi and Rochberg-Halton, “...the notion that chairs and tables are more comfortable [than, say, sitting on the floor] is not true in absolute sense; they are so only within a pattern of cultural habits and expectations” (Csikszentmihalyi and Rochberg-Halton 1981, page 58). In fact, traditional Japanese or Hindu homes do not have much furniture.

2.1.5. *Relations between shape and arrangement of furniture, and its meaning*

The following two examples illustrate the inter-weaving of physical, symbolic and cultural meanings embedded in an object.⁷

⁷ According to Csikszentmihalyi and Rochberg-Halton, “[o]bjects are not static entities whose meaning is projected on to them from cognitive functions of the brain or from abstract conceptual systems of culture. They themselves are signs, objectified forms of psychic energy (page 173).

Example 1: The knights and the round table

The circle is a shape that has an infinite order of symmetry and can be split into an infinite number of equal parts. The legendary King Arthur gave his knights an equal place at the table and, therefore, an equal right to speak. Today the term “roundtable” is synonymous with the terms for committee or assembly. The shape itself symbolizes fairness and equality in group conversations.

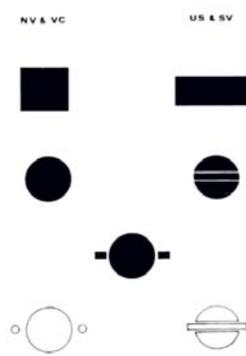


Fig. 1. Diagrams with proposals for the shape of the conference table. From *The Decorated Diagram* (Herdeg 1983, page 28).



Fig. 2. The giant table and the signing of the peace agreement in Paris on 27 January, 1973. Image retrieved in March 2006 from www.gruntonline.com/TheWar/peace_accord1.htm

Ex 2: “Roundtables” for peace talks?

One of the most “graphic and politically important instances of deliberately manipulating the shape and symbolism” (Herdeg 1983, page 27) of a piece of furniture for a ‘round table’ occurred in Paris in the late 60s during the peace talks between the United States, South Vietnam, North Vietnam, and the National Liberation Front (NLF).⁸ The parties involved could not agree about the organization of the conference, and, in particular, the shape of the conference table. The North Vietnamese and the NLF preferred a square table to stress equality between the parties (figure 1 left) while the US and South Vietnam proposed a rectangular table that did not provide an equal amount of space for all of the parties (figure 1 right). After numerous iterations of proposals and rejections, the Soviet ambassador in Paris proposed a giant, round table with two smaller rectangular tables located at two opposite sides of the round table (figure 2). After ten weeks of deadlock in the negotiations due to the table’s shape, everyone agreed. Herdeg comments that the negotiating parties never disagreed about the meaning of the proposed shapes of tables and “... both recognized and cherished the political symbolism implied in form.” (page 27).

⁸ Thanks to Mark Meagher for pointing out this example during the CAIF 2005 workshop.

3. AUGMENTED FURNITURE: INCONGRUOUS CHAIRS AND TABLES DESIGNED TO ELICIT “SMALL MOMENTS”

In *Practice of Daily Life*, the French philosopher Michel de Certeau distinguishes two types of daily activities, *strategic* and *tactical*, and stresses that both have their own modes of production and consumption. According to him, formally acknowledged social activities such as classroom-based school work, working in a job, having a meeting, or playing in the (local) football team are strategic in their character. Many marginal, everyday practices such as talking, reading, walking in the city, shopping, cooking, etc. are tactical in their characters. Marginal social activities are important for the social development of the members of the community, but are not acknowledged as such in a formal way.

Designing for work-related activities or scenarios implies focusing on efficiency, productivity, relationships between clients and providers, etc. This approach is *rational* and *programmable*, implying ‘air-tight’, ‘wind tunnel’ tested objects – furniture, domestic appliances, mobile phones, user interfaces, etc. – that will not fail nor allow any unplanned ambiguities when used by end users. The instances of augmented furniture in this paper are not driven by work themes. Rather, they explore the theme of *small moments*, everyday, non-instrumental interaction scenarios (e.g. dinner at a table, conversation with a friend, walking on the street, relaxing, reading a newspaper) that may appear marginal but are in fact the very glue of our daily lives.

3.1. Therapeutic furniture: Robotic Massage Chairs and Squeeze Chairs

Robotic Massage Chairs have a precise functionality: they give massage. They also capture our imaginations in a deeper way for they deliver mediated touch. The chairs interpret the topography of a person’s body and match it to a fixed repertoire of motions. A pair of rollers (“a contoured tracking system”) located in the back panel of the chair first ‘scans’ the back of the user by moving along their spine. The same rollers can then create a variety of massage patterns. The user can choose a duration and specific type of massage (rolling, kneading, compression or percussion) using a remote control. Models of robotic massage chairs may include i-Pod docking station, built-in speakers, subwoofers and beverage-holder, to “blend music and massage into the ultimate relaxation experience”.

An advertisement for the *iJoy™ Robotic Massage Chair®* describes their patented *Human Touch Technology®* as “wrists and arms” that behave as the “hands” of a trained massage professional (figure 3):

Meet your new, best friend. The science of comfort. Inside every iJoy™ Robotic Massage® Chair are the “hands” of a trained massage professional, just waiting to provide you with a soothing back massage. But don’t take our word for it. Sit down in one. Human Touch Technology® starts with a patented mechanism that works like “wrists and arms,” we added “hands” – massage rollers that move three-dimensionally on a straight track. The result is a Robotic Massage® that feels remarkably human. (Retrieved on 28 April, 2006 from www.abtelectronics.com/product/16957.html)



Fig. 3. Panasonic EP3202 Real Pro robotic massage chair provides “Swede-atsu” massage. Image retrieved on 28 September 2004 from <http://www.sharperimage.com>

While the rhetoric used in the advertisement refers to the embedded technologies as the ‘hands’ of a human, the advert actually sells mediated touch. This topic was researched by Rachel Maines in her work on early 20th century therapy for female hysteria using small electric appliances. Maines found that: “the idea that technologies are deliberately shaped for social purposes is now widely accepted, but the phenomenon of camouflage is less familiar.” (Maines 2001, page 117) The word ‘camouflage’, according to Maines, means that the advertising rhetoric of products conveys what the item offers without endorsing all of their possible uses.

Although robotic massage chairs do not have ‘clandestine’ advertising needs (they are still chairs!), the variety of audio-etc. peripherals, seem to obscure the core use of the object. Paradoxically, the more functions are added to the chair, the more precise these functions become. When Baudrillard talks about gadgets or thingamajigs, he states: “[s]o precise is the function proposed, in fact, that ... such objects are *subjectively* functional, that is to say, *obsessional*.”⁹ (Baudrillard 1996, pp. 113-114)

Arguably, these chairs *are* functional, ‘declare their own existence’ and remain stable even if technology fails. Although the ambition to optimize the experience of the object has pushed the “experience to the prosaic” (Dunne 1999, page 14), these strange, fascinating objects with many purposes still serve us. And as Baudrillard puts it, “[l]ike all obsessions ... this particular variety has its poetic side.” (page 114)

The *Squeeze Chair* by Wendy Jacob provides another example of therapeutic furniture addressing mediated touch. In the mid 1990s, Wendy Jacob, faculty at the MIT Visual Arts program, read a *New Yorker* interview about Temple Grandin, a renowned American animal scientist best known for designing livestock facilities that restrain and calm animals before they are killed. Grandin, herself autistic, writes:

⁹ Baudrillard continues by stating that the same obsession exists for the opposite, aesthetic approach to designing objects: “As for the opposite, ‘aesthetic’, approach, which omits function altogether and exalts the beauty of pure mechanism, this ultimately amounts to the same thing. For the inventor of the Concoours Lépine, the creation of a solar-powered boiled-egg opener or some other equally dotty gadget is merely an excuse for obsessive manipulation and contemplation.” (Baudrillard 1996, page 114)

From as far back as I can remember, I always hated to be hugged. I wanted to experience the good feeling of being hugged, but it was just too overwhelming. It was like a great, all-engulfing tidal wave of stimulation, and I reacted like a wild animal. Being touched triggered flight; it flipped my circuit breaker. ... Many autistic children crave pressure stimulation even though they cannot tolerate being touched. It is much easier for a person with autism to tolerate touch if he or she initiates it. When touched unexpectedly, we usually withdraw, because our nervous system does not have time to process the sensation. (Grandin 1995, page 62)



Fig. 4. Wendy Jacob, *Squeeze Chaise Lounge*, 1998. Red mohair, wood, pneumatic system with pump and hoses. **Fig. 5.** Wendy Jacob, *Child Squeeze Chair*, 2001.

Through a series of self-experiments conducted since her teen years, Grandin discovered that physical pressure stimulation on animals and autistic people produces similar results – a calming sensation (page 83). Based on her experiences in designing squeeze machines for livestock, Grandin designed a human squeeze machine for lessening hypersensitivity and anxieties of autistic people. Her goal in designing the machine was “... to enhance the feeling of being embraced” (page 80).

Jacob was “intrigued with this idea of taking something as emotionally complicated as an embrace and reducing it to something mechanical.” (Jacob 2000) She carried out a series of conversations with Grandin, and the outcome of this collaboration was *The Squeeze Chair* (figures 4-5), an armchair designed to soothe people. The armchair has two curved arms that can inflate to embrace the person sitting in the chair. The arms inflate using an attached foot pump. The pump is activated either by the person who sits in the chair or by an outside observer. Regulating the amount of air increases or reduces the strength of the arms’ embrace. Those who used this armchair identified the experience as soothing and relaxing, as if one received a giant, firm hug.

3.2. *Mediating: Conversation Table, Stealing Table and Table Childhood*

Conversations often take place at tables, either among colleagues in a business meeting, or between family members that come together for an everyday meal or special celebration. As we have seen, each of these occasions carries own set of accepted cultural conventions.

The *Conversation Table* by Nikolovska was inspired by such situations (figures 6-7). The goal of the project was to offer a commentary on power dynamics as they occur during conversations. The table, made from cardboard, was designed for two

people, each seated at one end of the table. Two microphones placed at each end below the surface of the table, capture the initiation, duration and volume of speech at regular intervals. The captured signals trigger the lighting of an array of LEDs (light emitting diodes), going from the person who speaks to the person who listens. From having a conversation and having a mutual awareness of each other, users of the *Conversation Table* suddenly become aware of a very unusual feature for a table. The animation of the LEDs provides a visual representation that mirrors the conversational dynamics between the people seated at the table.



Fig. 6-7. *The Conversation Table*. Gemma Shusterman and Lira Nikolovska (left) and Kelly Dobson and Susanne Seitinger (right) at the *Conversation Table*. Left photo by Kate Kunath, 2005.

The *Stealing Table*, another project by Nikolovska, was an example of a kleptomaniac or a magician table (figures 8-9). Acts of disappearance can be interpreted as stealing, borrowing, storing or even cleaning. Disappearance can also be interpreted as magic, suspension of disbelief and understanding of a situation as something out of one's immediate control. Magicians have mastered the art of illusion, offering optical illusions such as floating ghosts and oracles, vanishing elephants or ladies sawn in half. Cabinets equipped with angled mirrors give the illusion that whoever was inside, disappeared (Steinmeyer 2003). The audience often knows that the whole event is an illusion, but is unable to figure out how the trick was done.

This table was designed to examine our relationships with objects placed at tables, specifically, what happens when objects disappear. The table, in this case, is the symbolic thief or the magician, and it is a selective one because it absorbs only small and light object placed on it.

Half a year after it was made, the behaviour of the table became unpredictable. The honeycomb cardboard weakened due to the frequent transport of the table and the weight of the hardware components. As a result, the plywood, the plexiglas planks and the sensors became misaligned. The planks on the tabletop continued to sense and absorb objects, but started to open and close spontaneously, surprising (and even pinching!) users who tried to predict the pattern of behaviour. The behavioural quirks of this table triggered gamut of users' emotions, from amusement to discomfort.



Fig. 8. Student playing with the *Stealing Table* during the *Four Tables* exhibit at MIT Rotch library in October 2005.



Fig. 9. Custom-made aluminum parts are attached to servo motors and load cells. Red plexiglas parts connect the servos with the planks.

Table Childhood by Max Dean and Raffaello D'Andrea is an example of 'inquisitive' furniture (figure 10). This autonomous robotic table 'resides' in an enclosed room in museum or gallery. It selects one of the museum visitors that came to see it and attempts to start a 'conversation' with them. The development of the 'dance' between the table and the 'chosen one' are based on the movement of the visitor. If s/he is timid, the table becomes inquisitive and pursues the visitor around the enclosed room. If the visitor is assertive, the table may either run away or become unfriendly. D'Andrea pointed out that the table is not a technologically complicated device but it appears to behave in a complicated manner because the people who engage with it behave in complicated ways. As the table chooses whom to pursue, it is the viewer that *becomes* the selected object of attention and, ultimately, s/he becomes artwork. The roles of viewer and artwork reverse.



Fig. 10. Max Dean and Raffaello D'Andrea. *Table Childhood*, 1984-2001. Collection of *The National Gallery of Canada*, Ottawa. Photos by Robert Keziere.

The table moves with four motors and wheels located at each leg. A computer vision system with a camera mounted on the ceiling of the room enables real-time tracking of the selected person in the room in relationship to the table, and controls the table's movement.

4 TAXONOMY OF AUGMENTED FURNITURE: FUNCTIONAL, RELATIONAL AND POETIC

4.1. *Functional*

A first, very basic dimension, or continuum, refers to the **functionality** of augmented furniture (Nikolovska 2006). The augmentation can be *connected* to the existing functions (for example, when a recliner becomes a massage chair or a work chair with built in computing peripherals). In this case the core functionalities are extended and the object becomes a *hyper object*. Examples of *hyper objects* include *Robotic Massage chairs*, *Squeeze Chair*, and *Conversation and Stealing Tables*. At other times the augmentation can be *unconnected* (for example, when a recliner or a chair acquires built-in speakers or built-in refrigerator). In this case the functionalities are tangential to the core use of the object and the object becomes an *alien object*. Examples of *alien objects* include *The Table Childhood*.

4.2. *Relational*

A second dimension, or continuum, refers to the degree of **autonomy**¹⁰ of augmented furniture. Elsewhere, Ackermann has explored the “relational’ qualities of artificial play-partners, or “animates,” grouping instances of animated/robotic toys along the following continuum: “good slaves” (malleable and obedient), “inner driven” (stubborn) and “good dancers” (autonomous yet responsive) (2005). In another study, Nikolovska has investigated augmentation of furniture along a passive to autonomous continuum (2006). One observation is that augmentations are more like gradients rather than clear-cut categories because even autonomous objects are passive at times. For this chapter, we propose the following continuum:

- ‘PRETTY’ YET INERT (ORNAMENTED AND PASSIVE): These objects remain stable within a certain state – they are either switched on or off. Numerous examples of passive augmented furniture use light (from fluorescent light to LEDs and electroluminescent wires) as a decorative element that offers new kind of ornamentation possibilities. Examples of passive furniture are the *Eudora chair* by Critz Campbell, a translucent fibreglass chair internally illuminated with fluorescent light, and the *LED Table* by Ingo Maurer where over 200 miniature LEDs are encased between two layers of glass.
- “GOOD SLAVES” (MALLEABLE AND OBEDIENT): ‘Push their buttons’ and they obey (execute your orders)! These objects can sense and respond by exhibiting branched behaviours, but have no mind of their own. Examples of ‘good slaves’ include the *Robotic Massage chair*, and the *Squeeze Chair*. In the example of the *Squeeze Chair*, the more air one pumps into the chair, the more the chair squeezes. If someone else is pumping, the chair’s “blind tendency” to hug or let

¹⁰ An autonomous object is self-governing, independent, not ruled by external law or force. For detailed discussion on autonomy see Winner.

go is out of the user's control, in which case the chair may be perceived by the user as being autonomous, with a mind of its own.

- “INNER-DRIVEN” (STUBBORN): These objects keep their bearing without paying much attention to anything else. They optimize their performance along some predetermined dimension, and they do so no matter what. Most importantly, they will not flinch, no matter how hard users try to engage them! They may have sensors, yet their sensors are blind to users' solicitations. Examples of stubborn objects include, ironically, many self-orienting devices, such as compasses, gyroscopes, or levers. They are referents precisely because they do not “compromise”. Examples of inner-driven augmented furniture may include devices that know when their battery is low and automatically seek their cradle to recharge.
- “GOOD DANCERS” (AUTONOMOUS YET RESPONSIVE): These objects are ideal relational partners that share control and engage in dialogic gives-and-takes. They are not only autonomous and empathetic, they also have personality. The *Table-Childhood* by Dean and D'Andrea falls in this category. The table chooses a viewer and attempts to establish a relationship with them: this table ‘likes’ a good dance!

4.3. Poetic

A third dimension, poetic, has emerges from a conscious **design strategy**. Projects like *Robotic Massage chairs* are designed in a programmatic way: a clear, rational program of input and outputs drives the design of the object. By contrast, projects such as Jacob's *Squeeze Chair*, Dean and D'Andrea's *Table Childhood* and Nikolovska's *Conversation* and *Stealing Tables* are designed to allow the emergence of incongruous or surprising responses to people's solicitations. This poetic approach emphasizes the emergence of *small moments* and, incidentally, enriches the relational qualities with two new categories which we call MEDIATORS and MISCHIEVOUS.

- MEDIATORS (THE EYE OF THE PSYCHOANALYST): The *Conversation Table* is an embodiment of what an “intelligent” listener role may be – the psychoanalyst's eye. Without being intrusive, and if one pays attention, this table reveals otherwise unspoken aspects of the dynamics of interaction between its users.
- MISCHIEVOUS (THE THIEF): The stealing table is an embodiment of naughty and curious troublemaker. It is the quintessence of an “uncanny” piece of furniture! When least expected, this table intrudes and asserts its own presence.

6. WHAT KINDS OF USER EVALUATIONS ARE APPROPRIATE?

When asked about the role of end users in innovation, Henry Ford responded: “If I had asked people what they wanted, they would have said faster horses.”¹¹ In a less

¹¹ Thanks to Dana Cho for pointing out this example during the CAIF 2005 workshop.

cynical way, Brenda Laurel makes a similar point in her book *Utopian Entrepreneur*:

Asking people to choose their favourites from among all the things that already exist doesn't necessarily support innovation; it maps the territory but may not help you plot a new trajectory. On the other hand, most people are not very good at inventing *new objects of desire*. If you asked someone in 1957 what new thing they would like to play with, chances are they would not have asked for a plastic hoop that they could rotate around their hips. Somebody had to invent the Hula Hoop. (Laurel 2001, page 37)

While essential to refining the use of a product, the lore goes, user studies are not necessarily the best bet when it comes to envisioning the future, or designing innovative concepts / products.

One approach used to remedy this problem is what is known as co-creation, or *co-designing with users*. In this approach, designers work together with users, immersing both users and themselves in the projected uses of a product. Another approach used by design consultancies to evaluate "visions of the future" projects is known as *expert evaluation studies*. The idea is to bring experts who know the field intimately, and to interview them about the issues potentially important for the projects. As Deasy states, it is important to "[b]e broad in your definition of expert; for example, teens make great experts when you are investigating instant messaging." (2003, page 173). Experts can be brought in any phase of the project. The goal is that designers get enough critical support without 'killing' the seeds of ideas that seem uninteresting or irrelevant early on.

Research by Höök, Sengers, and Andersson suggests that methods for evaluating human-computer interaction (HCI) are "...useful for improving the design of interactive systems, yet may be rejected by non traditional technology disciplines such as media art" (2003, page 1). Indeed, when it comes to usability, the arts and HCI are at odds! Both disciplines have elected different evaluation methods and perspectives. HCI evaluation strategies are routinely applied to find out how and where to improve the performance of products or systems. HCI researchers use ethnographic observations or quantitative-scientific / user studies. Art projects, on the other hand, are evaluated either by art critics, professionals skilled in placing the work in a specific socio-cultural context, or by the actual audiences. The interpretation is subjective and, in the mind of the artist, users should derive their own conclusions or interpretations of the work they observe and experience¹².

How to bridge the gap? In the paper *Sense and Sensibility: Evaluation and Interactive Art* Hook, Sengers and Andersson discuss evaluation techniques used in two Royal College of Arts (London) projects, *Presence* and *Placebo*. In *Presence*, a European Union (EU) project, the evaluation included informal reflections by the authors Dunne and Gaver about the installation process and on-site use of augmented benches by people in a neighbourhood in Amsterdam. In *Placebo*, a project by Dunne and Raby, a small number of people were interviewed and recruited to "adopt" one of the eight placebo objects. These people lived with the

¹² Michael Mateas writes about the differences between cultural production in the arts and artificial intelligence (AI). Whereas the arts rely on poetics, audience perception, specificity and artistic abstraction, the focus in AI is task competence, objective measurements, generality and realism. (page 149) Mateas, Michael. *Expressive AI: A hybrid art and science practice*. In *Leonardo: Journal of the International Society for Arts, Sciences, and Technology* 34 (2), 2001. 147-153.

objects in their homes for a short period of time after which the designers interviewed them about their experiences with the objects. These interviews are transcribed verbatim in the book about the project, and as the authors state, the authors offer no analysis or conclusions and leave all the thinking to the readers. In contrast, ethnographic research and user study evaluations were continuous throughout other EU projects, such as the *Living Memory*¹³ project (from the same project cluster as *Presence*). *Living Memory* was developed among project partners from industry and academia. The evaluation of the interaction scenarios in *Living Memory* was embedded with the design work.

Arguably, much of the interactive media artwork can benefit from critical HCI insights about its usability. We are already seeing a new genre of art critics emerge, ones grounded in HCI. In the end, it will be the users that will have the final word.

6. CONCLUDING REMARKS

What is it that “poetically” links people and “augmented” furniture? How can such a link, or rapport, form and evolve? What thoughts and feelings draw people to certain artefacts? What qualities of the artefacts themselves may lead to engaging or amusing interactions?

People are born into a world of signs, symbols and human-made artefacts, and as they grow older, they appropriate these objects, re-creating and interpreting their meanings through the lenses of their interests and experience. Cultural artefacts, on the other end, go beyond affordances. They exhibit relational and poetic qualities best described in terms of objects’ *presence* and *personalities*.

As a way of conclusion, a few words on people, things, and the poetics of playful interactions, or small moments, follow.

6.1. On people

In the first part of this paper, we have shown that the understanding of beauty depends on the individual’s perception. In particular, we have shown that without suspension of disbelief we would not be able to engage in play, or appreciate a joke or a work of art. Like imagination itself, pretend play and joking are non-literal. They are about make-believe. Both pretence and humour allow a person to step back occasionally from the seriousness of everyday life and approach it with a “grain of unreality.” Symbolic replays, through dramatization or humour, are not confusing, even to young children, provided the context is safe. Likewise, fantasy play is not an escape from reality. Rather, it helps people from all walks of life to better understand reality.

¹³ One of the Living Memory project partners was the Communications Department at the Queen Margaret College from Edinburgh, UK. They closely worked with human factors specialists from Philips Design in Eindhoven.

6.2. *On things*

If the beauty ultimately relies on perception (“eyes of the beholders”), not all objects are equally good projective materials. As a way to capture the *hidden qualities* of artefacts that enable meaningful encounters – and sustain engagement over time – a useful heuristic has been to “ask” the object itself a host of questions relative to *its’ relational abilities to draw in people and keep them engaged*. The following relational vocabulary presents a means to capture many essential qualities, usually left unexamined by instrumental or rational approaches to object’s affordances:

Holding power: A concept’s ability to engage person’s attention and sustain her interest long enough for a meaningful relation to take place (play it again).

Transformative power: A concept’s ability to *let* the person *in*, i.e. to encourage her initiative, both physical and mental (do, transform).

Evocative power: A concept’s ability to bring about rich associations and thus to unleash a person’s imagination (be transported, inspired).

Mediating power: A concept’s ability to facilitate the expression, communication, and negotiation of feelings and ideas (say it with...).

Reflecting power: A concept’s ability to open up a space for reflection and contemplation (stop and think).

6.3. *On the poetics of playful interactions, or ‘small moments’*

As mentioned earlier in this chapter, designing for work-related activities or scenarios implies focusing on efficiency, productivity, and transactions between clients and providers. This approach is deliberately *rational* and *programmatically* and the goal is that ‘products’ will not fail nor allow unplanned ambiguities when used by end users. In this paper, we have instead explored the theme of *small moments*, everyday, non-instrumental interaction scenarios between people or between people and artefacts. Although these interactions may appear marginal, they represent the very glue of our daily lives. Much of the information technology developments in the last decades have enabled work, pleasure and leisure activities of daily lives to intersect (Mitchell 2003). Rather than designing for these intersections, or creating a design strategy for addressing small moments in a rational way (the dominant HCI approach), the chosen approach of the examined projects is best described as a *poetic*.

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