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### Cyborg or Robot?: Technological Art Pieces' Entanglement with Their Human Creators

With AI innovations on the rise, it is inevitable that robots will soon be integrated into human life everywhere we look. Åsa and Carl Unander-Scharin's Robocygne, a swan art piece dancing to a remix of Tchiakovsky's Swan Lake, is one such place. Åsa, its choreographer, Carl, the composer of the music it dances to, and the other engineers and designers that helped it come to life are all humans who are inextricably connected to Robocygne. The adjacency of its movements to that of a real animal's is profound, yet there also comes a hybridity with the formal aspects of its performance only achieved by something mechanical: backbends of the neck, audible trembling, and electronic hums and whirrs in time with its incidental music. As a voluntarily accessible *performing* art piece, Robocygne distinguishes itself from other entities in its unique interaction with humans emotionally and visually through the formal features of its performance. Individuals who chose to view the piece are simultaneously comforted by expressive animalistic wing and beak movements and also put off by mechanical contortions of the neck and arms of the swan in time to eerie music.

In contrast to other art piece RCMs, Robocygne is unique in its construction, including design, media, audio, and engineering aspects of its performance. First of all, to avoid conflation of the meanings of words used to describe robot-entities such as robot, cyborg, machine, etc., I will use the acronym "RCM" to address any type of robot-entity in the rest of this paper. According to Eduardo Kac, three major art forms involving mechanics can be related conceptually: "robotic art," which showcases electronic creatures, "cybernetic art," which

combines organic and electronic materials, and “telepresence art,” which projects a remote human subject onto a telerobot (Kac 60). Most relevant art pieces fall into only one of these categories, and therefore Robocygne is unique in that it combines elements from all three within its performance and design. It is an electronic creature, made from organic (wax, silk, aluminum) and inorganic (circuit cards, servo engines) materials, carrying out movements that are projections of the human Åsa Unander-Scharin’s dancing. In addition, the music Robocygne dances to layers audio on top of visuals, a component that all three major types of mechanical art usually lack.

*Figure 1: Robocygne spreading its wings & Figure 2: A real swan spreading its wings*

Although Robocygne is a mechanical piece, its animalistic features and actions distinguish it from other primarily artificial intelligent entities. In its performance, Robocygne gracefully spreads its wings in time with the swell in volume of Swan Lake in the background (Unander-Scharin). This action is reminiscent of a real swan’s wing-spreading, yet it is animated



slowly in a way to allow human recognition of real-life connections. Other primarily artificial intelligent entities, such as the PeopleBot human-sized RCMs used in a University of Hertfordshire exploratory study, are much less graceful in their movements (Dautenhahn 686). PeopleBots appear as TV screens raised about various sensors and motors that allow for

programmed movement along the ground on wheels (TelepresenceRobots). The lack of limbs and the cold metal finish on their “body parts” do not distinguish these RCMs from the classic human perception of robots as instrumental task-oriented machines. Robocygne, in contrast to other instrumentally motivated pieces, is a uniquely expressive aesthetic RCM.

Robocygne also distinguishes itself from other primarily artificial intelligent RCMs because its performance is meant to evoke human response rather than test its capabilities for human interaction. According to Carl and Åsa Unander-Scharin, Robocygne’s performance was based on the ballet *Swan Lake*, and the RCM was modeled to switch between portraying the emotions of the antagonists and then protagonists of the story (Unander-Scharin 213). The audience was “deeply moved” by Robocygne’s movements directed “toward[s] the audience,” though a specific response from human watchers was not searched for or recorded by the artists (Unander-Scharin 218). The RCMs designed for Professor Morana Alač’s study concerning the possibility of using them in future educational methods are an example of an RCM’s ability to evoke a certain reaction in human interactors - in this case, a positive emotion. In Alač’s study, the discipline of social robotics was used to interpret results of infant interaction with RCMs, finding that human movement, talking, and warmth shape the RCM’s social agency and determine which actions they carry out (Alač 893). Rather than observing how human performance shapes RCM response, Robocygne uncovers human responses to RCM performance.

The human response evoked by Robocygne is also unique because of humans’ active participation in watching its performance, rather than the passive gallery observance or need for human interaction in initiating a response that is seen in other RCM art pieces. Traditionally, art pieces are displayed in museums or galleries alongside several other pieces, and viewers can

choose which pieces they wish to view at all, and which more extensively than others. Sitting down to watch a performance a person is interested in viewing allows for understanding and impact of the piece unobtainable from a mere passing by. Other art pieces such as Christian Kroos' *Articulated Head* need human interaction as input to generate output in the form of movement. *Articulated Head* is a robotic arm holding a screen on which a remote human subject's face is projected, and the piece moves according to detection of human visual and audio input (Kroos 402). This piece likely elicits only marvel at its technological feats, rather than a complex mix of emotions, as Robocygne's melancholic and expressive performance does.

Descartes' concept of mind-body dualism may be seen in the component parts of Robocygne: the mechanical body and the coding into that body of Åsa Unander-Scharin's choreography. Descartes, a substance dualist, believed in two substances: matter, which exists physically in space, and mind, which does all thinking (Robinson). In addressing the ontological question of differentiating between mental and physical states, Descartes created the philosophical view called mind-body dualism that may be applied to RCMs, including Robocygne. The body of Robocygne, composed of several organic and inorganic mediums, can be thought of as controlled by the engineering algorithms which compose its "mind". Christian Kroos and his colleagues define the term "Embodied Conversational Agent" as an RCM whose programming is so separate from its body that the algorithms controlling its movement can be "removed" and placed into a different RCM's body, and the exact same movements will be produced in that new RCM. This definition provides support for mind-body dualism as it applies to robots, in that input systems that sense, output systems that act, and something in between that does "thinking", are all independent parts of the RCM's mechanisms.

The interconnection of engineering algorithms and the mechanical body parts they control is present in both the *Articulated Head* installation and in Robocygne, so that they actually defy mind-body dualism. The control system for *Articulated Head*, called the Thinking Head Attention Model and Behavioral System (THAMBS), has 4 sensory systems that are tightly linked in that input, output, and “in-between” are indistinguishable and ongoing simultaneously - not unlike how humans can sense, act, and think at the same time (Kroos 404). Similarly, the choreographer for Robocygne’s dancing “model[ed] the dance of body parts in relation to one another—thus *dancing life into the robot*” (Unander-Scharin 217). In this way, the dancing movements were attuned to the specifics of Robocygne’s body, inextricably linking the “mind” and “body” so that they were not distinguishable from one another, as Cartesian theory would assert.

Robocygne may be better seen as an intentional physical agent in the way that its body parts are controlled even by weathering and interplay of its design media - factors outside of the artists’ and engineers’ control. Christian Kroos defines another term to oppose the Embodied Conversational Agent, which is the intentional physical agent - an RCM whose movements are performed intentionally after thought and according to bodily ability. In their reflection on Robocygne’s performances, the Unander-Scharins detail that their programming of the RCM obviously caused its movements, but “secondary movements” also began to emerge as the effects of gravity, friction, and increased performance frequency. For example, tension from holding “a limb in a strenuous position...created [slightly audible] vibrations...that added a sense of effort and crying to the performance” (Unander-Scharin 217). Though the RCM itself has no self-consciousness, the intentionality in its movements is still present, recognized in the visible and

audible vibrato of its body parts, even though they were not directed to do so by precise computer software.

Donna Haraway's definition of the "cyborg" may represent Robocygne, as seen in the various factors contributing to its hybridity between animal, human, and machine. In "A Cyborg Manifesto," Donna Haraway outlines the ways in which a cyborg can cross social boundaries between definitions of human, animal, and machine. Haraway establishes "a hybrid of machine and organism" as a cyborg, where "the machine and the organism are each communication systems joined in a symbiosis that transforms both" (Haraway 5, 11). The aforementioned effects of the organism or body of Robocygne's wear and tear on its machine performance displays this "symbiosis" of communication between computer software and bodily movements. Additional components of Robocygne's design and performance also align with the hybridity outlined by Haraway's definition of a cyborg.

The design of Robocygne, including who its makers were and the mix of organic and inorganic materials they used to create its body, contribute to its "cyborg" hybridity. The very fact that human creators created the body of Robocygne and coded the algorithms that direct its movements points to an anthropocentric goal in its creation. This human aspect of Robocygne's nature is furthered by the use of inorganic and man-made materials such as tulle, servo engines, and circuit cards in designing its body. However, these materials also tie into technological associations, defining the engineering mechanisms that control Robocygne's body. Organic materials were also incorporated in its design: wax from bees, silk from silkworms, and aluminum naturally formed in the Earth (Unander-Scharin). These materials contribute to animal connotations that define Robocygne. Therefore, none of three words - human, animal, or machine - can truly define Robocygne's design, as the materials that characterize them overlap

both in definition and literally, as friction between media components affects the entire performance.

Performance choices, including animal movements, RCM attributes, and music remixing and content advance the hybrid cyborg nature of Robocygne. In its performance, Robocygne moves according to programmed choreography that mimics the motion of a swan, specifically that in the popular ballet *Swan Lake*. The swan itself is an animal, whose biological behaviors like the spreading of wings and opening and closing of the beak were taken into account when making choreographic choices. Hybridity presents itself in the ballerina's attempt to perform the swan's actions, and therefore humanistic aspects are incorporated into the choreography as well. Additionally, the feathers on the "wings" of Robocygne's body, the vertebrae-like sections of its neck, and the billed "beak" make the appearance of the RCM more directly animalistic. However, these bird-like qualities are juxtaposed with visible metal protrusions from the base of the body which serve as "legs" to hold up the bird but look simply like sturdy poles - quite mechanical in appearance. The music Robocygne dances to is also an important quality to prove its hybrid nature. The very name of the piece, *Swan Lake*, already associates the swan, as an animal, with the swan-like RCM. The fact that the piece is remixed implies human intervention, and perhaps even human necessity for enhancing the performance of an RCM like Robocygne. These attributes of Robocygne's performance interlock to blur the boundaries between animal, human, and machine, serving to solidify its existence as a Haraway-defined cyborg.

The hybrid nature of Robocygne's design and performance help evoke mixed reactions from human audiences: animalistic and humanistic associations provide familiarity, while mechanical and RCM impressions leave individuals uneasy. During its performance, Robocygne moves with grace, spreading its wings wide and opening its beak slowly to the unhurried and

melodic portions of its remixed background music. These motions put watchers at ease, catering to the audience's animal assumptions about swans and their elegantly beautiful qualities.

However, as the music starts to quicken and unresolved chords linger on in the remix, the swan's movements become more jerky: its head contorts backwards as a result of gravity, and its beak bites and cries out at the audience. Viewers' presuppositions are now disturbed, as Robocygne reveals its mechanical side, pulling off stunts that a real swan could never, and making audible disruptions to the previously unfaltering incidental soundtrack. Robocygne is "liminally situated between the human and the nonhuman," and therefore audience members feel the uncanny – a mix of familiarity and unfamiliarity – by watching its performance (Richardson 110).

Humans respond to Robocygne's performance with awe at the creators' artistic skill and marvel at their technological prowess, but also feel inspired by and drawn into the passionate piece, because they regard it as an individual entity with agency separate from that of its makers. Audience reactions were in response to the emotional trembling, jerking, and fluidity all incorporated within Robocygne's performance. These "emotional effects were not separated from the body—they were neither inside, behind, nor prior to the movements" (Unander-Scharin 218). A suggestion of an intrinsic presence shapes the way individual humans would view the piece: instead of being controlled like a puppet or by a human with a remote control, Robocygne moves on its own, intentionally, expressing its purpose through bodily movement and seemingly internal feelings.

Each individual element of Robocygne's design and performance differentiate it from RCMs used for purely instrumental means, and also from RCMs used primarily as technological art pieces. The formal features of Robocygne's design and animated movements conjure human, animal, and machine connotations that challenge the notion of mind-body dualism because of



their overlapping and interdependent natures. A combination of complex technology, artistic display, and expressive performance, Robocygne evokes uncanny emotions in human audiences to transcend Donna Haraway's definition of the "cyborg" and reveal new ontological interpretations of what it means to be an RCM. My interpretation is relevant in the age of modern technology, since robot-cyborg-machines may be incorporated into our everyday lives in the future. Rejecting mind-body dualism is key when learning how to empathize with RCMs, if we wish to coexist and support each other. The current best way we can do so is by drawing connections between technology and human-animal attributes, since we already know how to empathize with, draw emotion from, and find inspiration from creatures we know are alive. Robocygne does a beautiful job at conveying messages about humans, animals, and machines, and helps us understand more about ourselves through its brilliantly passionate performance.

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