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AFFECTING REALITY: INTERSECTING GAMES, TRAUMA, AND IMAGINARIES

Abstract

This essay examines how digital games shape human affective repertoires and envisioned dynamics with nonhuman agents such as robots. Entanglements among humans, machines, and technologies impact essential issues in the historical present: from surveillance, climate change, cultural heritage, art, to the elicitation, habituation, and capturing of feelings. Approaching digital games as frontiers of such entanglements, this essay expounds dynamics among gameplay, affects, and gamic materiality through a case analysis of *Nevermind* (Flying Mollusk), a trauma-themed independent psychological thriller game with affect-sensing technologies. Discussion explores how the game can generatively engage with lived experiences and discourses of grief and trauma; and the relationality among individuals, structures of feelings, and stigmatization. Anchoring the essay is an argument that digital games represent *and* operate with fundamental tenets of posthumanism, communicating meaning across affective and semiotic dimensions, bodies, machines, and sociocultural contexts. This essay emerged from an ongoing project on affective semiotics and social impact game design, in connection with a transnational research project on human-robot interaction supported by the European Research Council.

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Introduction

Pivotal to comprehending "structures of feeling" in Raymond Williams' theorization is an intellectual openness toward exploring dynamic experiences, expressions, and social forms consistently in flux, in the present, and immune to claims of alleged finality. Structures of feeling concern interanimating dynamics between lived experiences and cultural expressions: how the latter shape and express emergent ways of being in the world; and develop understanding of the emergent nature of lived experiences. Digital games encapsulate such dynamics on both micro and macro scales: in the moment-to-moment process of gameplay; and the medium's interactions within particular technocultural contexts and media ecologies, all pertinent to the materialization of artistic and design practices, transmedial relations, and surrounding, media-shaping, social discourses. Thus, it is productive to explore machine feeling through affective digital games, which detect and dynamically respond to players' affective states.

Intersecting affects and emerging technologies, this essay emphasizes the shaping of *affective repertoire*. The concept, as I propose, explores spectra of human capacities to feel, express, and regulate feelings, informed and potentially *expanded, refined, or enframed* by technological facets of lived experiences. Affective repertoire stems from perceiving this malleable range of affects and associated reactions, which may then support individuals to consider and dehabituate certain responses for future affective encounters. Oriented toward posthumanism, this conceptual tool aims to untangle how technological designs prevalent in specific mediated encounters, environments, and sociohistorical contexts, incubate feelings and bodily intensities. Knowledge of such dynamics contributes to work on several fronts. Affect research in the past decade focused on distinguishing the phenomenon from emotions, problematizing the longstanding emphasis on individual intentionality, cognition, and categorical emotions. Recent accounts emphasize the social relationality of affects (von Scheve), cementing the focus on affectivity as processual, transpersonal, socioculturally constituted, and emergent across bodies, including technological systems.

Yet, it remains unclear how the affect-inspired focus on social interactions may constructively engage with trauma, which straddles individual and social realms. Recovering from trauma entails awareness of one's emotions, triggering events, coping mechanisms, and available sources of support, healthcare, and intervention. Difficulties war veterans face in overcoming post-traumatic stress disorder (PTSD) illustrate tensions within such a matrix; challenges confronting marginalized social groups are likewise indivisible from such factors as race, gender, social classes and the cross-generation ramifications.[1] Trauma-themed digital games thus provide a gateway to critically engage with the often unspoken aspects of traumatic experiences, as well as systemic factors that enforce contemporary regimes of silence and stigmatization, by interweaving design, gameplay, narrative, technology, and complex affects.

On affects, the concept of repertoire is under-theorized. This may be due to the seeming incongruence in pairing affects and repertoire. The former has been characterized as precognitive and nonrepresentational; the latter, culminated from learning and curation, concerns competence, contexts of use, and components of identity, as in the example of linguistic repertoire.[2] Conceptualizing affective repertoire is an attempt to question the assumed incompatibility, inviting

inquiries into agency. Proceeding from intention to actions capable in effecting change, agency is essentially constrained by social factors beyond individual control. That said, trauma does not necessarily eclipse agency, when one mindfully engages with feelings, thoughts, and aspects of any experiences that might be uncertain, destabilizing, or otherwise habituated. As Shaun Gallagher observes, the body crucially constitutes the mind, meaning, and communication. A critical orientation toward agency, embodied cognition, and trauma thus builds in parallel with affective repertoire and resilience. As efforts in articulating ontologies of affects and emotions expand, exploring bodily sensations as indexical of affects, emotions, and mobilization of behaviors in digital games brings complementarity. Identifying patterns among game design features and activated affects enable a rethink about the experimental role of digital games and their aesthetic, technological, and sociopolitical importance across alleged confines of the intellect and feelings.

This essay presents excerpted analyses from an ongoing research project on digital games and human-robot interaction (HRI), as illustrative of changing social realities and contemporary concerns. These range from porousness between real and virtual worlds to ethical quandaries regarding artificial intelligence. The driving premise is that digital games are *shifting* our affective capacities, eliciting various affectivities while informing our understanding of the posthuman condition. Readers first find a contextualizing overview of posthumanism, digital games, and current developments in affect-centered game analyses. The section outlines the need to articulate the meaning-making logic of digital games as prominent cultural forms and posthumanizing artifacts of procedural and multimodal complexities. Then, readers find analysis of an independent psychological thriller game *Nevermind*, in support of the argument that, with cogitative design and narrative, the medium can harness affective computing technologies for enhanced gameplay and potential intervention. Finally, the essay affirms a future-oriented perspective, positing a tripartite research methodology to engage digital games as incubators of aesthetic potential, complex affects, and visions of human-technology interaction.

Posthumanism | digital games | affect

Images of human-nonhuman relationships percolate the mediasphere. Their eclecticism manifests across cinema (e.g. *Blade Runner 2049, Ex Machina, The Matrix*), videogames (e.g. *Metal Gear Solid*, *Deus Ex*), television (e.g. *Westworld*, *Humans*), and experimental art that interfaces the body with prosthetics, networked systems, and biotechnology (e.g. Stelarc). Understanding the diversity of such visions, technological innovations, and cultural production carries importance, especially upon our understanding of the "nonhuman turn." Conceptualized in the 2015 eponymous book (Grusin, vii), the nonhuman turn involves intersections among human and nonhuman entities (e.g. bodies, technologies) in tackling issues of the 21st century, including terrorism and climate science. As intellectual inquiry, it decenters the unified human subject through the notion of the nonhuman, finding resonance in affect theory, animal studies, cognitive sciences, and new media theory, to name a few relevant fields of study.

Similarly re-assessing the symbiotic relationships among humans, technologies, and nature, posthumanism challenges social categories and dichotomies with technoscience, inviting philosophical discussion on how

technology fundamentally constitutes the human condition (Haraway; Nayar; Hauskeller, Philbeck, and Carbonell 3). The archetype of cyborg, at once organic and mechanic, has inspired various schools of thought with the potential to steer human development on the scale of civilization. A telling example is the techno-utopian discourse of transhumanism, which embraces technological augmentation, human-machine singularity, and freedom afforded by "anthropo-technologies" (Kurzweil; Sloterdijk). Carrying a more complex outlook than the anti-humanism in transhumanism and the work of Haraway, posthuman humanity centers on creating sustainable human-nonhuman futures (Braidotti 55-104).

Discussions of posthumanism and digital games began from ideas such as narrative, representation, and player-avatar relations. The scope has since expanded to how unconventional game forms and automatic gameplay challenge notions of subject and object; all concerned with the daily entanglements of humans, technology, increasing automation, and environments (Fizek et al.). In this context, I propose approaching digital games as *posthumanizing encounters*. During play, meaning unfolds across technical materiality, bodies, real and virtual worlds (Keogh 14-17; Leino), exemplifying the distributed and emergent characteristics that define posthuman subjectivities (Hayles, *How We Became Posthuman*; "Reconfiguring the Posthuman"). From this baseline, it is feasible to consider games beyond representational and technological terms, exploring their influence on individuals (in subjectivities, feelings, and worldviews), societies (shifts in discourses and practices surrounding games), and how such knowledge informs ways of designing and critically engaging with new media. Digital games are among the fastest growing media with ubiquitous presence, economic viability, congruent progress with affective computing and such technologies as virtual reality (VR) interfaces, increasingly applied in non-entertainment contexts, including education (Gee, de Freitas & Maharg) and military training.[3] It matters to critically engage with the medium in design, gameplay, analyses, and pedagogy. Digital game criticism broadly involves three trajectories: formalist, which explores the aesthetics and form of games; social, which considers the medium in relation to cultures and histories; and integrated approaches, which combine practice and design (Jagoda 213-215). This extends into an expanding network of research areas, methods, and foci, including philosophy, digital humanities, media and cultural studies, platform studies, ethnography, psychology, and political economy. Established in 2001, game studies has observed the development of concepts and analytical frameworks on capacities of games to foster "critical play" (Flanagan 1-17) and function as, for instance, "allegorithm" (Galloway 83) and ethical systems (Sicart). Despite insufficient discussions of posthumanism and games beyond representation, the expanded approaches and concepts indicate a growing field of academic inquiry targeting a fuller understanding of games and their social influence.

A vital aspect to digital game play and research that is gaining traction is affect. In *Playing with Feelings*, Aubrey Anable argues that digital games construe a most significant art form of the 21st century, allowing players to rehearse specific affective states beneficial for contemporary life (e.g. how to relate to work and failure). Her approach highlights the cultural embeddedness and gendering of media artifacts, attending to game types and engagement often overshadowed by mainstream games, including indie games, art games, and casual games. In her argument, affect-mediating processes among players, devices, machines, and code — what is characterized as posthumanizing in this essay

— form a contemporary structure of feeling. It intersects with, for instance, diminishing work-play boundaries, where types of casual games can mitigate what contemporary work culture may lack (involvement, identifiable outcomes, pleasure); and yet commodify affect through in-game microtransactions, resembling capitalist labor. Whereas, games that foster frustration may guide players in understanding and handling failures.

Numerous inquiries examine such multi-level interactions among games, players, and changes in social systems. In support, I propose *posthumanizing affective semiotic operations* as an orientation to build methods and vocabulary that justly examine meaning-making in games. It may likewise complement research on machine feeling. Discourses on machine learning fuse with debates about artificial intelligence and robot ethics, foregrounding concerns like social effects of algorithmic biases (O'Neil), as well as expanded moral and legal responsibilities when autonomous machines factor into romantic relationships, healthcare, and warfare (Lin, Jenkins, and Abney). Against this backdrop, my work on games and HRI explore aspects of machine learning that are perhaps overlooked. In *Nevermind*, affective computing enhances dynamic qualities of gameplay and motivates player reflection of the narrative and their management of emotions. Ethical dimensions of machine learning, such as collection of actual interaction data for training mass-produced social robots, are explored in the collaborative HRI research phase. Lastly, combining corpora and annotation tools with automated analysis components forms a trend in empirical multimodal research, paving way for larger-scale studies of games. These three facets, from games as designed experiences, ethics of data collection and use for machine learning, to changing research methods, explore on different scales the rising influence of games and artificial intelligence. This knowledge, I suggest, invites human interlocutors to ponder ways to critically design, engage, and research emerging technologies.

Unravelling gamic materiality

Digital gameplay experiences are gestalts (combinations of parts) involving procedural, semiotic, and algorithmic elements. A mere dissection of these units does not capture how games mean and elicit feelings. Yet, this dissection is essential to developing a theoretical language to understand interactions among affects and meaning at play. For this purpose, procedural rhetoric and socio-semiotic multimodality present productive perspectives. Procedural rhetoric examines how computational media convey persuasive messages through mechanics and simulation (Bogost 5, 14, 28-29). Rooted in social semiotic theory that views culture as sets of inter-related semiotic systems (Halliday; Halliday and Hasan), multimodality has investigated how media artifacts, experiences, and interactions as sign-complexes communicate through multiple resources termed *modes* (e.g. visuals, language, sound, music, haptics); the usage of which is regularized by communities of sign users, sociocultural contexts, and therefore underlying political, economic, and ideological forces (Kress; Jewitt, Bezemer, and O'Halloran). Multimodal research has explored, for instance, film (Bateman and Schmidt), interactions (Norris), comics, experimental literature (Gibbons), art (O'Toole), mathematical discourse (O'Halloran), movement in space (McMurtrie), and digital platforms (Jewitt). That said, among studies approaching digital games as discourse (e.g. Aarseth;

Ensslin; Gee, *Unified Discourse Analysis*), multimodal research remains nascent. 2019 saw the publication of two books that examine games as persuasive and ludonarrative artifacts from a multimodal perspective (Hawreliak; Toh); and the first collection on videogame discourse and linguistics (Ensslin and Balteiro) appeared in May 2019. Weimin Toh presents a four-level ludonarrative model that, pursuing a similar trajectory as my earlier work to map out meaning-making units and dynamics in games, identifies connections between, for example, gameplay and narrative as "modules": interacting communicative systems realized by various modes and "elements," such as game rules and mechanics (34-47). Jason Hawreliak proposes conceiving procedurality itself as a semiotic mode to highlight how games communicate through processes, not solely representation (80-94). While this attempt of reframe reinforces complementarity between game studies and multimodality, it injects unwarranted ambiguity into core concepts (e.g. mode and affordance) and calls for empirical analyses, to prevent collapsing fundamental strata in theorizing multimodal meaning-making.[4]

My interest to integrate multimodality with digital game criticism lies in its empirical support to systematically tease out the intersemiotic relations and interplay of elements in digital games as affective processes. Stressing meaning-making as sociohistorically-situated media practices, an empirical multimodal approach offers three main insights. They are the re-construal of the notion of media, centrality of discourse semantics, and the analytical concept of "canvases" (Bateman, Wildfeuer & Hippala). Firstly, their theorization re-considers media as historically stabilized sites that use selected semiotic modes according to communicative purposes. This emphasizes the need for interdisciplinary import into examining the foundational meaning-making mechanisms, while clarifying common interpretive ambiguity (e.g. "medium" as intermediary in communication versus "(mass) media" as understood from an institutional lens, 103). Secondly, discourse semantics contextualizes and outlines the range of sensible interpretive possibilities for particular multimodal combinations (116-121). Thirdly, "canvas" introduces an analytical perspective and tool to delineate intersections between the subject and means of communication. It refers to any bearers of perceivable and interpretable material regularities, be they analog, digital, unfolded physically in time, and resulted from technological processes (86-88).[5] This focus on communicative form and intent connects with prior discussions of the "transmission" and "semiotic" components of media (Ryan 1-40); and enables an informed fixing of analytic focus, by systematically "slicing" each communicative situation into various canvases and sub-canvases.[6]

Dependent on genre, mode of gameplay, and context, game analyses involve a range of canvases and analytical units (e.g. narrative, events, and mechanics). The gameplay interface and player enactment possibilities form my material, analytical foci; and on the social dimension, connected phenomena and civic discourses, for instance, how digital games are embedded in and may problematize the military-entertainment complex. To make data analyzable, transcription is a necessary first step. It involves transcoding complex data into an inspectable, manipulable form, commonly as tabulation intersecting analytical units in rows and the information conveyed in columns (Baldry and Thibault), such as shot analyses in film studies.

Figure 1 shows how, previously, I used analytical software to annotate and visualize findings from digital gameplay data, in an attempt to identify the immersion-shaping

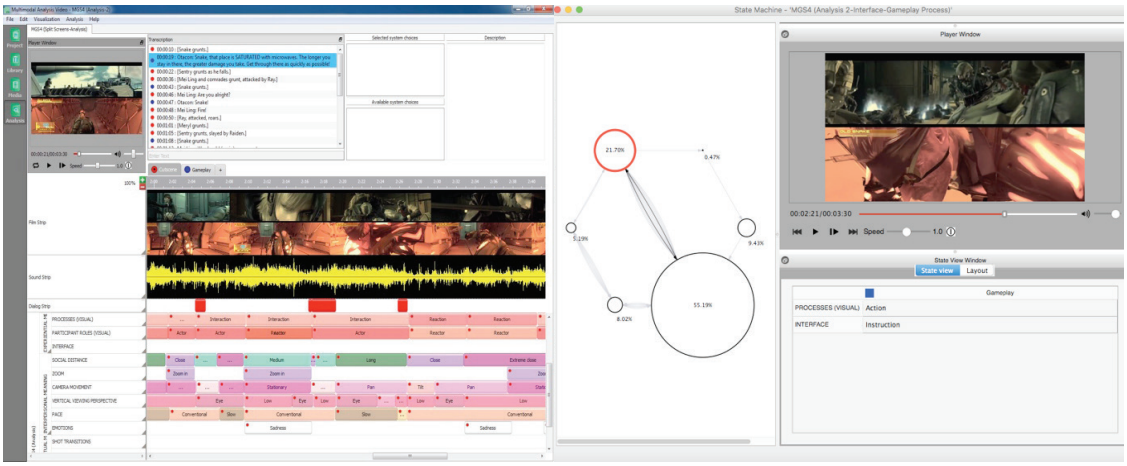

Figure 1: Example of multimodal annotation of digital game with analytical software "Multimodal Analysis Video" (Ng 20-22).

effects co-realized by gameplay mechanics and audiovisual aesthetics. Such fine-grained and structured analyses aim to consolidate empirical research of complex multimodal phenomena. In addition to a range of relatively well-recognized software, such as ELAN, ATLAS.ti, and NVivo, computational approaches to multimodality have begun to incorporate machine learning and deep learning.[7] It is foreseeable that algorithms and automatic processing may support human annotation and thus empirical research of data across levels of multimodal complexity, scale, and methods.

Playing with trauma

One advancement in digital game design is the application of affect-sensing technologies that comprehend and respond to players' emotions. To explore the multilateral meaning-making processes in digital games, I turn to *Nevermind*, a game designed with application potential in public health contexts, such as therapy, with clinical trials in planning (Flying Mollusk, "Therapeutic Applications"). [8] The independent thriller game integrates biofeedback technology with gameplay, centered on psychological trauma in content and puzzle-solving in form. *Nevermind* engages with three significant strands that have emerged from the development trajectory and discourses of affective technologies. Firstly, it highlights a changing focus initiated by affective computing, since conceived by Rosalind Picard in 1997, namely, a re-frame of emotions from static, universal human faculties to dynamic processes that unfold moment to moment in gameplay. Secondly, it evidences a contemporary pursuit for immersion-based innovations, such as VR experiences. These strands in turn dialogue with possibilities and (ethical) questions regarding serious applications of games, machine learning, as well as connections among bodies, feelings, and technologies. My focus is on how digital games afford opportunities to engage the often silenced and stigmatized aspects of trauma, in both discourse and lived experiences.

Memory is at the core of *Nevermind*. Narratively motivated by the recovery and organization of traumatic memories, the gameplay involves exploring the psyche of psychological trauma patients, puzzle-solving, discovering, and sorting memory

photographs into a coherent account of a traumatic event. Patients' subconsciousness are often portrayed aesthetically as twisted, disturbing, and surreal (fig. 2). Five playable cases have been released, tackling topics from child abuse, post-traumatic stress disorder (PTSD), to LGBTQ identity. Gameplay lasts on average four hours and includes six narrative stages: *orientation, development, disequilibrium, crisis, climax, and denouement*.[9] Here, I zone in on the initiating case Client #251 to discuss: (a) how meaning unfolds across mechanics, plot, and multimodal combinations during gameplay; and (b) intersections between digital games and therapeutic interventions, leading into the final discussion on investigating relations between affective experiences and procedural-semiotic patterns in gameplay.

Figure 2: The subconscious landscape of Client #251. © Flying Mollusk.

Experiencing *Nevermind* involves the automated perception of the machine. The 2016 VR edition uses biofeedback technology to detect players' physiological and emotional states, eye movement, and modulates gameplay difficulty accordingly. Physiological biofeedback tracks changes in, for instance, heart rate and pulse as indicators of stress, anxiety, fear, and psychological arousal. Emotional biofeedback concerns detecting players' facial expressions.[10] As the game world and gameplay difficulty adapt to the player's states of stress (fig. 3), *Nevermind* amplifies how digital games constitute posthuman subjectivities. On the one hand, it complicates the layering of human affects and machinic cognition in micro-gameplay moments. This opens up a common notion of gameplay as input-output feedback loop, to consider ways that the medium organizes affectivity by dynamically intersecting player action, design, and levels of algorithm-based thinking (e.g. inferring player emotion by contrasting facial expression data). On the other hand, it gestures toward increased attention to games as serious applications to address current issues (e.g. psychological wellbeing and healthcare).

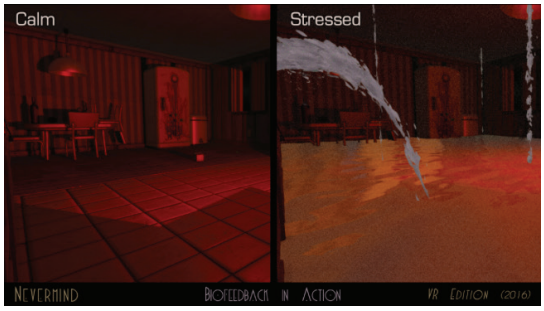

Figure 3: Biofeedback technology in Nevermind. © Flying Mollusk.

Client #251 explores suicide and the witnessing of traumatic events. Analyses identify three connecting motifs. The first motif concerns financial and marriage difficulties between the female client's parents; secondly, the patient's witnessing of a traumatic event and resulted guilt and self-blame; and thirdly, her father's suicide. I refer to these three motifs as M, W, and G respectively. From the opening cutscene, players learn that the patient was informed by her mother since childhood that her father had died in a car accident. However, gameplay and the de-briefing cutscene (i.e. pre-rendered cinematic sequence) reveal that her father shot himself in her presence.

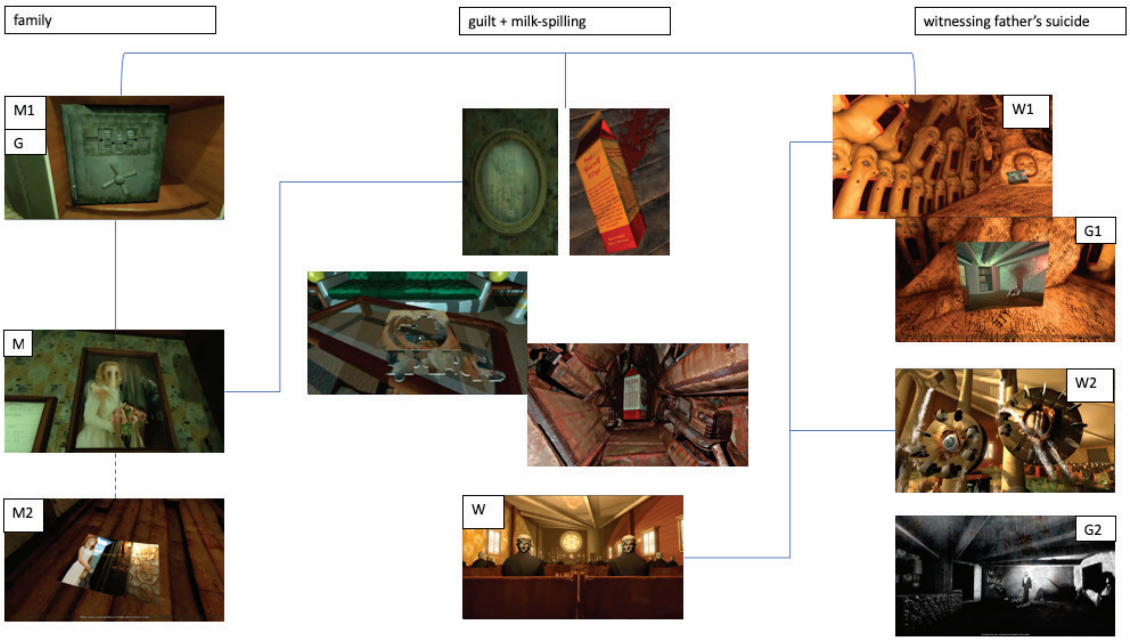

Figure 4. Cohesive connections in *Nevermind*: Client #251 (excerpt).

To understand how meaning traverses gameplay mechanics, narrative motifs, and audiovisual representations, a useful means is to map out their cohesive connections (fig. 4).[11] Situated in the middle is the gameplay-grounding emotion and triggering event: the patient's guilt and having spilt milk as a child. These horizontally connect to the significant narrative motifs identified (M, W, G). Vertically, as gameplay progresses, individual motifs accrue significance by referentiality, recursive representations, gameplay mechanics, and contradictory information. Such representations may take the form of player-maneuverable and contextual objects, diegetic sounds, and sound effects that constitute the game world.[12] For example, a sound of gunshot coupled with fade-out for a gameplay segment at the parents' bedroom (00:06:15) multimodally signals a transition from *orientation* to *development*; simultaneously suggesting gun violence in the death of the patient's father.[13]

The case first connects the motifs of parental issues, milk-spilling, and guilt. In *development*, players find clues to the parents' failing marriage. Washed-out marriage and family photos (M) and a safe-unlocking puzzle (combination: milk, gun, and sorrow) (M1) imply tenuous family dynamics and violence, in contrast with a subsequent memory photo that presents a false, idealized marriage (M2, marked with a dashed line). The patient's guilt from milk-spilling is likewise introduced, first as an accusatory message "You Spilled," written in red, shaky, handwriting-resembling font on the mirror, that cues the correct safe combination. The motif then recurs as milk cartons (printed with guilt-centered texts and nutritional labels) and a memory photo, at *development* (beginning at 00:09:13 and 00:19:17) and *disequilibrium* (00:13:35) respectively. Such recurrence forms a discourse semantics that cues players the sensible interpretations and co-occurs with a build-up of affects and emotions. While the spilling of milk denotes a micro-level, aggravating incident in the patient's childhood, it connotes an overarching sensitivity of guilt, self-blame, and anger.

Gameplay mechanics gradually re-contextualize this guilt-grounded sensitivity, by uncovering the symbolic dimension of a seemingly mundane yet narratively motivated mechanic tied to the motif of witnessing: teacups arranging. First appeared as contextual objects in *orientation*, teacups take on increased puzzle-solving potentials in *development* and *denouement.* To retrieve the final memory photo, the player places teacups to guide water into a burial ground (W2). Eyes on the three water mills peel open, decreasing the violence and fear formerly associated with seeing/witnessing, respectively portrayed as aggressive funeral attendees and female faces with tears and cavernous mouths who visually follow player movements (W and W1). It connotes waking up to the truth, visualized in the graphic memory photo (G1) and the monochromatic visual of suicide in the de-briefing cutscene (G2).

Collectively, the motifs of Client #251, along with the audiovisual aesthetics, gameplay mechanics, and space, create an atmosphere that oscillates among suspense, surrealism, turmoil, and calm. From the choice of landscape, gameplay mechanics (e.g. jigsaw puzzles and teacup arrangement), to various surreal representations, they orient to particular aspects and stages of the narrative, which then structure the gameplay experience. Similarly, shifts in gameplay environment modulate the rhythm and narrative levels in gameplay. As Michael Nitsche illustrates, game spaces evoke narratives by inviting player perception, interaction, and interpretation. The patient's subconscious landscape is comprised of private, public, and fantastical spaces, from idyllic gardens, site of traffic accident, to bizarre and distressing locations not conforming to real-world logics. Analyses observe a concomitant complication in spaces and gameplay mechanics across the narrative stages, creating a prosody in both content and affects (e.g. calm, anxiety, disturbance, and shock). Puzzle-solving concentrates in *development* as scaffolds to access the patient's buried memories; *disequilibrium, crisis,* and *climax* then focus on navigating mazy spaces, often coupled with disturbing audiovisual aesthetics. In presenting a funeral service in the patient's childhood home, *denouement* forms a poignant stage intersecting the motifs of memory, inner and outer life (the emotional tension of which is described in the pre-gameplay cutscene), witnessing, and potential closure, with the recurrent puzzle-solving mechanic of teacup arrangement.

This initial analysis suggests a reflective quality between the gameplay mechanics of *Nevermind* and practices relevant to mood management, trauma processing, and psychotherapy. In particular, the gameplay processes of navigating the clients' subconscious, collecting, and organizing memory photos share a similar focus with therapeutic practices, in building awareness of and vocabulary to process emotions. As expanding research literature postulates, digital games, such as the apocalyptic *The Walking Dead* (Telltale), invite critical dialogues between game studies and trauma studies to explore trauma in games via "interreactivity," empathy, and complicity (Smethurst & Craps; Smethurst). Videogame series such as the Japanese, stealth-based *Metal Gear Solid* (Kojima) and *Max Payne* (Remedy Entertainment/Rockstar Games) illustrate six prevalent motifs of PTSD, including trauma-identity relations (Bumbalough and Henze 15-33).[14] Nonetheless, the focus of these studies remains on representation. A major value in examining *Nevermind*, I contend, lies in how the game design narratively and procedurally aligns with specific principles and techniques in trauma therapy and resilience-building. These include acknowledging

events, mindfulness, affect regulation, and approaching resilience as continuum (Southwick et al), aligning with my proposed concept affective repertoire. In addition to highlighting the expanding applicational scope of digital games, *Nevermind* gestures toward a convergence of social phenomena and discourses pertinent to the technological capture and structuring of feelings. It embodies four *co-emerging* entities or dimensions: the medium of digital games; the developing technology of machine learning; fluctuating affects; and shifting regimes on trauma and mental health, toward increasing destigmatization. The fact that digital games themselves are emerging technologies, in my view, renders them specifically suitable to engage visions of human-technology interaction, new sociocultural norms, and practices as a result of machine learning.

Future directions

The digital present is affective, unfolding, and propelled by human-nonhuman relationships. In this essay, I have explored digital games as posthumanizing encounters integral to such an emergence. Through a case study of *Nevermind*, the essay intersects game studies and multimodality to examine a key phenomenon in this cultural moment: affective digital games. Analysis illustrates how cohering narrative motifs, gameplay mechanics, audiovisual aesthetics, and affect-sensing technologies enables a form of metaphoric play akin to stages of processing trauma. Hence, one aim of the essay has been to further understanding of digital games as complex systems involving affects, multimodal semiotics, proceduralism, and contexts; with the potential to strengthen one's affective repertoire for engaging with complex affects and contemporary challenges.

In the current mediasphere, two trajectories seem to be forming. On expression, mutual influences among designs of digital games, interfaces, and virtual/augmented reality technologies (e.g. Meta AR headsets) signal intersections among media and visions of future human-technology interactions and experiences. On content, representations of human-nonhuman dynamics in mainstream games have expanded, suggesting a shift from war-focused posthumanism (e.g. *MGS* games) to include portrayals of human-robot

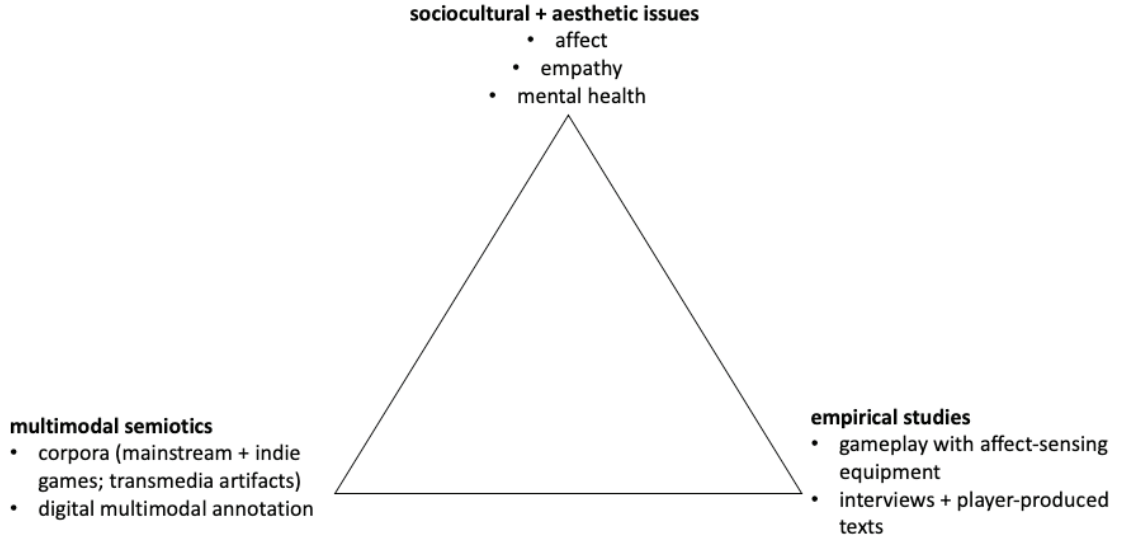

Figure 5: Research methodology.

affective bonds and conflicts (e.g. *Detroit: Become Human*). Such robotic imaginaries form the research focus connecting my work and the collaborative ERC-supported project on HRI and emerging technologies entitled *Emotional Machines: The Technological Transformations of Intimacy in Japan* (EMTECH, 2017-2022). Our inquiries aim to articulate dialectics between imaginaries and realizations of human-robot relationships, specifically processes and effects of forming affective bonds with robots, digital devices, and networked technologies.

Digital games evidence a multidimensional emergence: in media, affects, human-technology interaction, social discourses, and research methodologies. Always fluctuating, affects are nonconscious bodily intensities that underlie thought, behaviors, and yet elude human observation (Massumi; Stewart). They manifest physiologically (e.g. micro facial expressions, pulse, skin conductance) and as a central constituent to meaning-making and behavior, they are yet amply examined from a multimodal lens. Thus, I propose to integrate affect theory, corpus-based multimodal game analyses, with players' biophysical and interview data to empirically expand knowledge on the medium, toward game designs that foster empathy and mental health (fig. 5). The triangulated data is expected to complement ethnographic findings from EMTECH on interactions with digital technologies and robots in homes and public spaces. As importantly, this addresses a methodological need to incorporate discourse analyses for a textured, discursive, view of affects as embodied practices entangled with contexts and social relations (Wetherell). Such data triangulation may also support future research on affective repertoire. Through episodic engagement with affective digital games, researchers and participants may evaluate if, or how, digital gameplay modulates ways of encountering difficult feelings and issues. For design and technology-focused research, examining (dis)connections among meaning-making units in games, intended affective response, as well as the operative and reactive accuracy of affective computing software may contribute to developing affective artificial intelligence in digital games and media.

The still emerging phenomenon and cultural narratives of affective interactions with robots and digital technologies carry ramifications across automation, social intimacies, and war. Confronting the complexities involved demand an engagement with diverse sociopolitical issues, robust research, and designs that explore beyond user-friendly, technological solutions. In the continuing conversations on (post)human-nonhuman developments, critical play and research will inform our participation with perspective, intention, accountability, and openness to engage the associated, diverse, and potentially difficult feelings.

Notes

[1] A developing and debated field called epigenetics explores how changes in environment, effects of stress and trauma could change the expression of genes, with transgenerational effects. Approaching the nature/nurture link, studies are exploring what epigenetic mechanisms (e.g. changes in RNA molecules and DNA methylation) might signal the "inheritance" of trauma, if any. For popular versions debating the plausibility of trauma- transmission, see Henriques, Martha. 26 March 2019, "Can the Legacy of Trauma be Passed Down the Generations?" *BBC Future*, http://www.bbc.com/future/story/20190326-what-is- epigenetics; and Carey, Benedict. 10 December 2018, "Can We Really Inherit Trauma?" *The New York Times*, https://www.nytimes.com/2018/12/10/health/mind-epigenetics-genes.html.

Also, readers can find an overview of epigenetics research and post-traumatic stress disorder in Zannas, Anthony S.; Provençal, Nadine; and Binder, Elisabeth B. "Epigenetics of Posttraumatic Stress Disorder: Current Evidence, Challenges, and Future Directions." *Biological Psychiatry*, 78 (5), 2014, pp. 327-335, https://doi.org/10.1016/j.biopsych.2015.04.003. Rachel Yehuda and scholars conducted a small-scale study of offspring of Holocaust survivors, which is allegedly the first demonstration of epigenetic change caused by preconception parental trauma. The study received much scrutiny, including criticisms of its conclusions, suggesting that further research is necessary. See Yehuda, Rachel et al. "Holocaust Exposure Induced Intergenerational Effects on FKBP5 Methylation." *Biological Psychiatry*, 80(5), 2016, pp. 372- 380, https://doi.org/10.1016/j.biopsych.2015.08.005.

[2] Emotional regime, a concept in the history of emotions literature proposed by historian William Reddy, concerns dominant forms of emotional expression and thought in specific periods and cultural contexts (124-129). The notion is under-explored in both studies of emotion and affect. See Reddy, William M. *The Navigation of Feeling: A Framework for the History of Emotions*. Cambridge University Press, 2001. Repertoire, as a linguistic phenomenon, refers to flexible and dynamic use of language oriented toward social action and contexts. Margaret Wetherell's approach toward affective practice and description of repertoires (135, 138) would prove helpful. See Wetherell, Margaret. *Affect and Emotion: A New Social Science Understanding*. Sage, 2012. For information on conducting discourse analysis via the approaches of critical discourse analysis and discursive psychology, see Phillips, L. and Jørgensen, M. W. *Discourse Analysis as Theory and Method*. Sage, 2004.

[3] The Entertainment Software Association reported in 2018 that the digital game industry contribute a $36 billion consumer spend in the United States (2017) and a GDP of above $11.7 billion. Sources on the military-entertainment complex, or "militainment," include Stahl, Roger. *Militainment, Inc.: War, Media, and Popular Culture*. New York: Routledge, 2010; and Der Derian, James. *Virtuous War: Mapping the Military-Industrial-Media- Entertainment Network*. Routledge, 2009.

[4] The general orientation to semiotic mode adopted by Jason Hawreliak differs from that pursued in multimodality, specifically the empirically-driven approaches increasingly strengthened in state-of-the-art multimodal research. The latter, pursued by such scholars as John Bateman, Janina Wildfeuer, and

I, argues for more discriminating accounts of semiotic modes, emphasizing the role of discourse semantics and resistance of assumed alignment between semiotic and sensory modalities. Detailed theorization of semiotic modes can be found in Bateman, John A., "The Decomposability of Semiotic Modes." *Multimodal Studies: Exploring Issues and Domains*, edited by Kay L O'Halloran and Bradley A. Smith. Routledge, 2011, pp. 17-38.

[5] For example, a classroom communication scenario may be segmented into eight canvases, from interaction between the teacher and blackboard, pupils' use of books, to pupil-to-pupil interactions.

[6] For an overview of conducting multimodal research and the identification of multimodal slices, see Bateman, Wildfeuer, and Hippala, Ch. 7, § 7.1.1 "Media and their canvases" and §7.1.2 "From canvases to analyses."

[7] In a recent, politically significant study, researchers combine multimodal analysis with natural language processing, computer vision, and machine learning to examine the spread and re-interpretation of ISIS propaganda and images via digital networks. See Tan, Sabine; O'Halloran, Kay L.; Wignell, Peter; Chai, Kevin; and Lange, Rebecca. "A Multimodal Mixed Methods Approach for Examining Recontextualisation Patterns of Violent Extremist Images in Online Media." *Discourse, Context & Media*, 21 (March 2018), pp. 18-35, https://doi.org/10.1016/j.dcm.2017.11.004.

[8] *Nevermind* originates from a 2012 graduate research project at the Interactive Media Program at the University of Southern California.

[9] The average time of gameplay is informed by the website "HowLongToBeat": howlongtobeat.com/game.php?id=29412.

[10] *Nevermind* uses Affectiva Affdex technology to detect and measure viewers' facial expressions. The cloud-based solution can identify 7 emotions and 20 facial expressions, based on a database of 40,000 advertisements and 7.7 million faces analyzed. For details, see www.affectiva.com/product/affdex-for-market-research/.

[11] For details on building cohesion chains for audiovisual media, such as film, from the perspective of functional and systemic linguistics, see Tseng, Chiao-I, Cohesion in *Film: Tracking Film Elements*, Palgrave Macmillan, 2013. This analytical form has likewise been applied to comics and graphic novels. In this essay, I select a visual-based format of communication to ensure clarity and accessibility for a broader readership.

[12] For details on categorization of gameplay objects and its application in conducting gameplay analyses, see Ng, *War and Will*, chapters 3 and 4.

[13] Timestamps of gameplay are informed by the author's gameplay experience and approximate average extracted from playthroughs streamed on such websites as YouTube.

[14] The six themes common to the portrayal of PTSD in popular videogames identified include: how characters build trauma into their identity; PTSD interference with personal relationships; representations of trauma through nightmares; self-medication as coping mechanism; personification of PTSD through villains; and how trauma catalyzes digital gunplay.

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