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Adriano D'Aloia & Jacopo Rasmi

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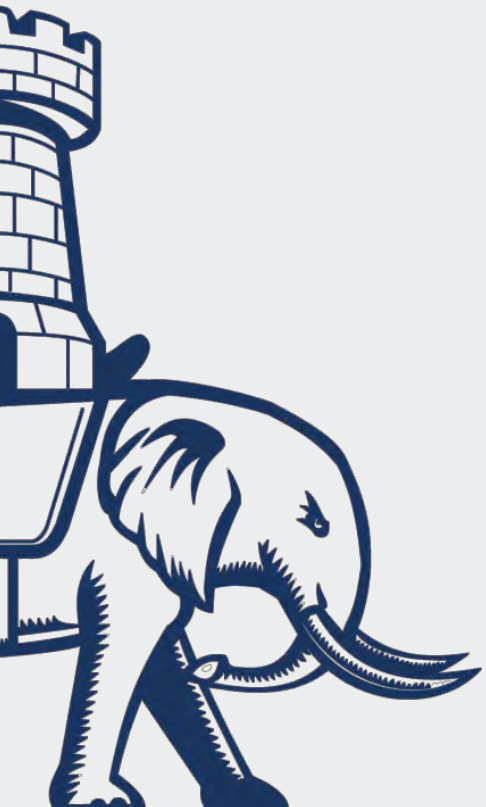

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Vent'anni di laboratorio dell'immaginario

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Direttrice di pubblicazione

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Nel 2004 Alberto Castoldi fondava la rivista elettronica *Elephant & Castle. Laboratorio dell'immaginario*.

Nel giugno 2007 la versione online open access della rivista recuperava nel numero 0 tutti i saggi pubblicati nel triennio precedente.

Dall'8 febbraio 2018 a oggi viene **indicizzata dall'Anvur in classe A per l'intera area CUN 10** e, come dalla sua nascita, prevede – salvo eventuali numeri speciali, doppi o tripli – il lancio di due call for papers trilingue e/o quadrilingue e un'uscita semestrale.

Dal numero 28 di dicembre 2022 *Elephant & Castle. Laboratorio dell'immaginario* assume una nuova fisionomia attraverso la migrazione sulla piattaforma Open Journal System, più funzionale alla diffusione internazionale dei contributi (plurilingue) che ospita e alla circolazione nella comunità scientifica delle idee e delle riflessioni che promuove. La veste grafica della rivista è stata integralmente rinnovata. La consultazione dei fascicoli è facilitata da rimandi interattivi tra l'indice e gli articoli.

La **Presentazione del direttore fondatore Alberto Castoldi**, nella sua concisione, inseriva una serie di **elementi che caratterizzeranno il lavoro ventennale della rivista e il progetto culturale tra parola *e* immagine** portato avanti con i componenti del comitato direttivo — Marco Belpoliti, Jacques Dürrenmatt, Franca Franchi, Anna Maria Testaverde, Alessandra Violi — insieme al nutrito comitato scientifico e redazionale nazionale e internazionale e al Gruppo di ricerca *Arts and Humanities* afferente al Dipartimento di Lettere, Filosofia, Comunicazione dell'Università degli studi di Bergamo, grazie altresì alla cura della Coordinatrice responsabile di redazione Sara Volpi, che dopo anni di intenso e puntuale lavoro passa il testimone, a partire da questo numero, a Giacomo Raccis.

Situata all'incrocio tra la linea Bakerloo e la Northern, la stazione Elephant and Castle della metropo-

Presentazione

"Elephant & Castle", proprio come una nota stazione della metropolitana londinese. Una rivista, dunque, come luogo d'incontro, di incroci e snodi di idee, in cui l'esperienza del transito sia più importante del punto d'arrivo, l'intreccio dei dialoghi più decisivo delle conclusioni: "Tutto il problema della vita è dunque questo - scrive Pavese nel *Mestiere di vivere* -: come rompere la propria solitudine, come comunicare con altri. Così si spiega la persistenza del matrimonio, della paternità, delle amicizie. Perché poi qui stia la felicità, mah! Perché si debba star meglio comunicando con un altro che non stando soli, è strano. Forse è solo un'illusione: si sta benissimo soli la maggior parte del tempo. Piace di tanto in tanto avere un otre in cui versarsi e poi bervi se stessi: dato che dagli altri chiediamo ciò che abbiamo già in noi. Mistero perché non ci basti scrutare e bere in noi e ci occorra riavere noi dagli altri."

Credo che si possa rispondere in svariati modi all'affascinante quesito di Pavese, e mi auguro che gli interventi ospitati su questa rivista ne possano essere l'esemplificazione.

Alberto Castoldi

litana di Londra è tra le prime ad essere state aperte a fine Ottocento. Il logo dell'elefantino che porta la torre, simbolo del quartiere londinese Elephant and Castle e dell'omonima fermata metro grazie a una statua rossa e blu che svetta di fronte al centro commerciale, era situato sul lato sinistro della testata nella vecchia homepage della rivista. Sul lato destro dei piccoli riquadri con immagini erano attraversati dal segno grafico di una spirale rossa che, come una strada ideale su cui si muove l'elefante, intrecciava il suo percorso con le figure. Questo snodo del trasporto e del transito metropolitano è al tempo stesso un riferimento a una mobilità culturale e intellettuale in cui "l'esperienza del transito sia più importante del punto d'arrivo, l'intreccio di dialoghi più decisivo delle conclusioni". La lunga citazione da Cesare Pavese inserita nella Presentazione apre, in particolare, una serie di domande e la chiusura di Castoldi mette in evidenza l'aspetto contraddittorio dell'accostamento fra il dialogo caotico e imprevedibile del crocevia metropolitano e l'ambizione solipsistica dello scrittore: "credo che si possa rispondere in svariati modi all'affascinante quesito di Pavese, e mi auguro che gli interventi ospitati su questa rivista ne possano essere l'esemplificazione". Necessità della comunicazione scientifica e sua potenzialità illusoria, rispecchiamento in sé e negli altri, che ci riflettono: un'ambivalenza del senso e del discorso che il direttore fondatore Alberto Castoldi sembra voler mettere provocatoriamente in moto con questa originale carta d'identità della rivista. La affiancava sulla destra, a completamento di una postura critica che da una parte enuncia il senso dell'operazione e dall'altra lo rende criptico, l'immagine romantica e perturbante del Demone del viaggio. Riprodotta in piccolo formato, priva di didascalia e di riferimenti espliciti nel discorso, è una soglia grafica ai contenuti che la seguiranno. L'immagine risulta dalla passione di Castoldi per le illustrazioni ottocentesche (A. Castoldi, *Grandville & company: il perturbante nell'illustrazione romantica*, Bergamo, Lubrina, 1987). Il demone, gigantesco rispetto alle persone che stanno camminando sul suo corpo seduto e che stanno entrando nella sua bocca, a piedi, in carrozza o a cavallo di animali fantastici, porta sulla testa una donna sdraiata. La bandiera nelle mani della fanciulla ha la scritta *Fantaisie*, mentre sullo sfondo del pozzo nero delle sue fauci aperte si legge *Introduction*. Questa creatura ciclopica ma non terrifica accoglie a occhi e bocca spalancati le persone che accorrono mentre poggia al suolo le sue zampe dagli artigli aperti e sul cui palmo camminano le persone. Il testo cui allude l'illustrazione contiene il senso dell'inserimento visivo: *Voyage où il vous plaira* — Tony Johannot (illustrateur), Alfred De Musset (auteur), Pierre-Jules Stahl (auteur), Paris, Hetzel, 1843. L'avviso al lettore annunciava il progetto di quel volume "avec vignettes": scriverlo e illustrarlo, con la penna o con la matita ("la plume ou le crayon") in modo che rendesse al meglio il pensiero degli autori. Ad aprire la serie di narrazioni fantastiche, il Demone del viaggio dal frontespizio accoglieva i lettori inserendoli letteralmente nel suo mondo narrativo.

La sinergia efficace tra parola *e* immagine si riversa dalle righe e dall'illustrazione della Presentazione alla prassi del lavoro editoriale sui numeri pubblicati in vent'anni di attività. La compattezza delle scelte monografiche fa di ogni uscita una raccolta corale ed eterogenea degli articoli e delle immagini dedicati a **un autore** (a Gianni Celati, recentemente scomparso, è dedicato il n. 19, dicembre 2018, *Lunario del paradiso*), a **un luogo** (il museo, *Dove va il museo*, n. 21, dicembre 2019; i *Modelli abitativi* del n. 11, 2015; le *Prigioni* del n. 9, 2013; la prospettiva *Dall'alto* del n. 4, 2011), a **uno spunto tematico, teorico o metodologico** (*L'Esprit du collage*, n. 26, 2021; *Figure dell'artista*, n. 25, 2021; *Mimetofobia*, n. 24, 2020; Speciale: *30 anni di Twin Peaks*, n. 23, 2020; *Trasparenze*, n. 22, 2020; *Il segreto*, n. 20, 2019; *Postludi. Lo stile tardo* n. 18, 2018; *Il falso*, n. 17, 2017; *Prospettive transmediali*, n. 15, 2016; *Tempo e visione filmica*, n. 14, 2016; *Vulnerabilità/Resilienza*, n. 10, 2014; *Le emozioni*, n. lab 2014; *Le incantatrici*, n. 8, 2013; *narrazione/narrazioni*, n. lab. 2013; *Il frammento*, n. 7, 2012; *Il silenzio*, n. 6, 2012; *L'ombra*, n. 5, 2012; *Natura e metamorfosi*, n. 3, 2011; *Forme del sacro*, n. 2, 2010), a **uno spunto storico** (*La grande guerra*, n. 12, 2015; *undicisettembre*, n. lab. 2011).

Essendo una rivista nata dal progetto di costituire un "laboratorio dell'immaginario" ha aggiunto ai repertori di area una sede editoriale prestigiosa per gli studi sulla visualità e sull'intermedialità. Ne sono diretta dimostrazione, per esempio, gli ultimi numeri pubblicati online.

Il numero 28 (dicembre 2022), a cura di Adriano D'Aloia e Jacopo Rasmi, introduce il neologismo *Mediacene* per stimolare la riflessione, nell'ambito dei *visual media studies*, attorno al ruolo dei media sulla percezione degli effetti della vita umana sul pianeta,

alla luce della nuova attenzione globale alle questioni ambientali. In questa inedita era geologica, l'ambientalizzazione dei media e la mediatizzazione dell'ambiente pongono gli individui e la società al centro di scenari problematici e di fronte a sfide complesse. Le sfere della comunicazione digitale e delle arti visuali svolgono una rilevante – ma talvolta insidiosa – funzione di modulazione e mediazione della *sensibilità ecologica*. Il fascicolo lancia la proposta di una *ecologia visuale* che si affianchi e integri gli strumenti e i ragionamenti consolidati della cultura visuale e dell'ecologia dei media nel progressivo processo di ridefinizione dei criteri di convivenza e reciproca compenetrazione tra esseri viventi, tecnologie e ambiente naturale.

Il numero 27 (novembre 2022) *Animali d'artista. Tra figurazione, astrazione ed ibridazione dal secondo Novecento ad oggi*, a cura di Elio Grazioli e Maria Elena Minuto, parte dalla doppia considerazione che la questione dell'animalità è riemersa dirompente nell'attualità più recente e che l'arte contemporanea non può che trattarla in un modo che non si limita alla illustrazione. Questione millenaria, di respiro etico, filosofico, politico e sociale, la relazione tra arte e animalità affonda le sue profonde e memorabili radici nelle avanguardie storiche. Sintomo dei rivolgimenti della storia, dello sviluppo tecnologico e della crisi ecologica del XX secolo, la questione è stata approfondita poi alla luce di una nuova prospettiva critica, estetica e concettuale che rifletteva sul tempo naturale e culturale dell'Antropocene. Sullo scorcio delle teorie e delle sperimentazioni delle neoavanguardie, correndo lungo le ricerche dei decenni Ottanta e Novanta, fino ad arrivare alle più recenti manifestazioni, questo numero raccoglie contributi storico-critici che analizzano in una prospettiva interdisciplinare e comparatista il tema attraverso figure di diversa rilevanza e diversa espressione, dagli ibridi di Germaine Richier al "bestiario performato" di Julien Blaine, dall'opera di artisti italiani come Franco Vaccari e Gianfranco Baruchello, fino alle recentissime riflessioni sull'estinzione di Marguerite Humeau, passando per cinema (Chris Marker), femminismo (Clemen Parrocchetti), moda.

Il numero 26 (dicembre 2021) *L'Esprit du collage*, a cura di Arnaud Maillet e Andrea Zucchinali, vuole rappresentare il primo passo di un rinnovamento della ricerca sulla complessità e l'attualità del collage, inteso come nozione, tecnica, pratica, processo, oggetto, opera, strumento, principio, paradigma per pensare alla modernità e al suo immaginario. A partire dagli esordi del Novecento le avanguardie artistiche, affascinate da questa pratica in grado di indurre un corto-circuito nell'idea stessa di autorialità, sembrano elevare il collage a principio che comprende in sé diverse pratiche. Per esempio i papiers collés di Pablo Picasso e Georges Braque, i papiers déchirés di Hans Arp, i fotomontaggi Dada, i collage surrealisti, ecc. Ma porta anche altre forme d'arte in dialogo, soprattutto nell'era del postmodernismo, con le tecnologie analogiche e digitali in un mondo di media e interconnessioni generalizzate, in rete o in linea. Nel corso del XX secolo, poi, il principio del collage ha oltrepassato i confini delle arti plastiche, per occupare un ruolo centrale nell'ambito di diverse discipline e forme creative, come la letteratura, la poesia, il cinema, la musica o l'architettura. Data la sua pervasività, questo numero monografico propone quale oggetto di studio la nozione di collage inteso come nodo all'incrocio dei diversi ambiti disciplinari e ospita così contributi che abbracciano la moda, l'arte, la letteratura fino alla game art.

Il numero 25 (giugno 2021) *Figure dell'artista*, a cura di Eloisa Morra e Giacomo Raccis, si concentra sulla rilevanza di questo personaggio, l'artista appunto, nell'immaginario antico e moderno, legato a doppio filo alla stratificazione di significati e pregiudizi che nel corso dei secoli si sono depositati sulla sua figura. Al contempo visto come individuo enigmatico, dotato di facoltà quasi sciamaniche, oppure scaltro falsificatore, interessato solo a colonizzare l'immaginario popolare – e a lucrarci sopra – grazie a 'trovate' a buon mercato ("Per me vale la regola del minimo sforzo, massimo risultato", ha affermato Damien Hirst, 2001), l'artista sembra destinato a essere continuamente oggetto di opinioni polarizzate. Questa polarizzazione riflette una sostanziale difficoltà della cultura contemporanea a comprendere il suo statuto professionale, il suo ruolo sociale e la sua prassi espressiva con importanti ricadute. I contributi raccolti in questo numero chiamano dunque in causa il doppio versante delle forme di rappresentazione e autorappresentazione dell'artista in diversi ambiti d'analisi dalla narratologia alla filologia, dalla sociologia dell'arte ai visual studies, passando per la critica tematica e le teorie della ricezione.

Il numero 24 (dicembre 2020) *Mimetofobia*, a cura di Michele di Monte, Benjamin Paul e Silvia Pedone, dopo tante riflessioni sul tema della paura dell'Altro e dell'alterità, questo numero intende riflettere meglio e

più chiaramente anche sull'"altra metà" del problema, sul timore del simile e della somiglianza. Emerge così come somiglianza e dissomiglianza si co-implichino più spesso di quanto non si escludano, nelle culture visive antiche come in quelle contemporanee. D'altra parte, le pratiche artistiche trovano una loro rispondenza pure nell'ambito della scienza o in quelle aree liminari che stanno al confine tra antropologia, religione, magia e tecnica. Riflessioni che intendono dunque confrontare le ragioni attuali della presunta inattualità del mimetico con quelle antiche, individuando sintomi antropologici che possono iscriversi in linee di forza, magari frastagliate e irregolari, ma di lunga durata.

Il numero 23 (settembre 2020) *30 anni di Twin Peaks*, a cura di Jacopo Bulgarini d'Elci e Jacques Dürrenmatt. Questo numero speciale – dedicato al trentennale della messa in onda di *Twin Peaks* e alla riflessione sulla sua fecondissima eredità nell'evoluzione della complex tv del nostro tempo – prende avvio dall'analisi di come lo show di David Lynch e Mark Frost abbia trasformato, tra le altre cose, il modo con cui al pubblico si chiedeva di guardare una detective story e, più in generale, un prodotto televisivo seriale. Alla luce di queste premesse, il numero affronta la nascita dello spettatore-detective; l'ermeneutica come gioco aperto; la serialità contemporanea; l'eredità di *Twin Peaks* legata al tema della soglia, del limite, del confine; fino a soffermarsi sulla natura ambigua delle immagini e dei suoni in *Twin Peaks* attraverso l'analisi di testi, metatesti e pretesti.

Il numero 22 (giugno 2020), *Trasparenze* a cura di Silvia Casini, Francesca Di Blasio e Greta Perletti, propone un'esplorazione del concetto di "trasparenza" declinato al plurale per evidenziarne l'eterogeneità degli ambiti e delle possibili prospettive di indagine così come la straordinaria potenzialità figurale. Si passa dall'ambito della comunicazione politica e giornalistica ai sistemi digitali e all'accessibilità totale dei dati raccolti. Ma esplorare la trasparenza implica anche riflettere sugli effetti che gli ideali della totale visibilità e della totale esposizione provocano, inevitabilmente, sul corpo. L'attenzione si focalizza allora sull'immaginario letterario, sulle narrazioni improntate al desiderio di aprire il corpo per renderlo trasparente allo sguardo. Ma la trasparenza permea anche l'ambito della poesia, della traduzione, del teatro sino a toccare le *psychological humanities*.

Il numero 21 (dicembre 2019), *Dove va il museo*, a cura di Sara Invernizzi, Arnaud Maillet e Giovanni Carlo Federico Villa, è centrato sul rapporto tra arte, comunicazione digitale, innovazione tecnologica, multimedialità e potenzialità narrative del mondo museografico. Il numero coniuga efficacemente le questioni museali di conservazione con l'urgenza dell'innovazione data da nuove potenzialità tecnologiche e narrative. I temi della comunicazione digitale, della comunità fruitrice degli spazi museali, della loro rigenerazione territoriale e della relazione con ogni aspetto della multimedialità legata alla diffusione dell'arte nell'epoca del *Digital Turn* sono risultati particolarmente consoni nella fase pandemica dell'inverno 2020 che li ha immediatamente seguiti, durante la quale le potenzialità multimediali e transmediali disegnate dagli autori del fascicolo si sono trasformate rapidamente in necessità e risorsa per l'espressione artistica globale.

L'apporto visivo non è infatti affatto secondario in *Elephant & Castle. Laboratorio dell'immaginario*, e si è articolato mediante la presenza di due Gallerie poste al termine di ogni indice, una per tutte le immagini e una per tutti i video del numero. Alcuni ne sono particolarmente ricchi, come ad esempio quello a cura di Elisabetta De Toni dedicato a *Linee della moda* (giugno 2017), nel quale le Gallerie contengono 244 immagini e cinque filmati di Georges Méliès. Oppure quello a cura di Michele di Monte, Benjamin Paul e Silvia Pedone, *Mimetofobia* (dicembre 2020), contenente 101 immagini. Senza dimenticare il numero speciale dedicato ai *30 anni di Twin Peaks*, per il quale era stata appositamente creata un'introduzione visiva (un video documentario di 25 minuti) caricata sia nella galleria video sia sul canale YouTube della rivista.

Se quello ripercorso fin qui è il passato dell'avventura di *Elephant & Castle. Laboratorio dell'immaginario*, il futuro ci riserva certamente altrettanta ricchezza di stimoli e ampiezza di orizzonti. La rivista continua nel solco della tradizione e al contempo si innova e si rilancia per continuare a cogliere le sfide dello studio della consistenza, dei processi e delle tensioni dell'immaginario: un laboratorio costantemente aperto per contribuire al dibattito internazionale in campo scientifico e culturale.

Franca Franchi
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Sensibilità ecomediatica
Ecomediatic Sensitivity
Sensibilité éco-médiatique

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Parole chiave

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Ecologia dei media
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Antropocene
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Anthropocène
Médiacène

Abstract

Viviamo ormai nel Mediacene, un'era geologica caratterizzata dall'impatto cruciale delle tecnologie di percezione, informazione e trasporto sul contesto storico e ambientale in cui viviamo. Divenuti veri e propri ambienti vitali, i media contemporanei sono regolatori di una sensibilità multimodale da cui dipende la nostra consapevolezza delle sfide e delle insidie della crisi ecologica ormai conclamata. Questo numero offre alcuni spunti di riflessione sullo stato attuale del discorso sull'ecologia mediale, alla ricerca di un nuovo paradigma ecosistemico di descrizione del rapporto tra gli esseri viventi e il pianeta.

We now live in the Mediacene, a geological era characterized by the crucial impact of technologies of perception, information and transport on the historical and environmental context in which we live. Having become real living environments, the contemporary media are regulators of a multimodal sensitivity on which our awareness of the challenges and pitfalls of the now full-blown ecological crisis depends. This issue offers some food for thought on the current state of the discourse on media ecology, in search of a new ecosystemic paradigm for describing the relationship between living beings and the planet.

Nous vivons actuellement dans le Médiacène, une ère géologique caractérisée par l'impact crucial des technologies de la perception, de l'information et des transports sur le contexte historique et environnemental dans lequel nous vivons. Devenus de véritables milieux de vie, les médias contemporains sont les modulateurs d'une sensibilité multimodale dont dépend notre prise de conscience des enjeux et des pièges de la crise écologique désormais manifeste. Ce dossier offre un aperçu de l'état actuel du discours sur l'écologie des médias, à la recherche d'un nouveau paradigme écosystémique pour décrire la relation entre les êtres vivants et la planète.

1. Mentre ci apprestiamo a redigere la presentazione di questo monografico[1], nel cuore di Parigi il gruppo di militanti ambientalisti "Dernière Renovation" ricopre di pittura arancione la statua *Horse and Rider* di Charles Ray richiamando l'attenzione sulle scadenze dell'ultimo rapporto del GIEC attraverso un'azione dal considerevole potenziale virale. Nel contempo, tra mille polemiche, il Mondiale di calcio viene inaugurato nel Qatar all'interno di ambienti ultra-climatizzati che rendono "abitabile" per giocatori e pubblico uno spazio che sarebbe insopportabile senza tali mediazioni termiche (Starosielki 2022). Si diffondono sempre più iniziative, come quella di *Citizen Sense*, volte a equipaggiare le comunità di residenti con strumenti tecnici di rilevazione delle condizioni atmosferiche per produrre dal basso e collettivamente dati e conoscenze sullo stato degli ambienti che abitiamo – indagando sulle modalità in cui "le tecnologie del sensibile (*sensing technologies*) attivano i cittadini in quanto entità politiche" (Gabrys 2022). In effetti viviamo in un'epoca in cui la mutazione della situazione climatica è non solo percepita e interpretata tramite reti complesse di sensori e strumenti di calcolo digitale, ma anche stabilizzata e riparata (potenzialmente, per lo meno) da tecniche geo-ingegnieristiche al centro di roventi controversie politiche e scientifiche (Buck 2019). Questa lista di esempi – estendibile a volontà, come lo faranno i contributi di questo numero – imposta il problema a cui abbiamo deciso di dedicare une riflessione collettiva: la correlazione sempre più stretta tra fenomeni ambientali e processi mediali sullo sfondo di un aggravamento della questione ecologica divenuto ormai tangibile e non solamente ipotetico, nonché di un'innegabile scomparsa della rassicurante distinzione tra naturale e artificiale a cui siamo stati abituati.

In virtù della progressiva mediatizzazione delle dinamiche sociali, la prospettiva originaria dell'ecologia dei media, che proponeva di concepire e studiare i media come ambienti di vita (Postman 1979; Man Kong Lung 2006), acquista oggi una valenza non solo più letterale ma anche più complessa e soggetta a un ripensamento etico (Colombo 2020). Alla luce delle circostanze nonché degli studi contemporanei, i media non possono più essere considerati semplicemente come un elemento connettivo del sistema antropico, ma come strutture talmente innervate nei processi e nelle pratiche della vita personale e collettiva da poterne esser considerati delle *intra-strutture* (Barad 2007) ambientali. In tal senso oggi il rapporto tra le società umane e gli ambienti è modulato in modo decisivo e costitutivo dalle tecnologie mediali e non può che essere indagato attraverso un approccio sistemico. Alla luce di questo intreccio tra tecnologie mediali, soggettività collettive ed ecosistemi viventi, la nostra epoca di innegabili sconvolgimenti ecologici deve essere concepita e interrogata a partire dai regimi di mediazione che la tramano e dai loro presupposti tecnici e politici (Guattari 1989), oltre che "geologici" (Parikka 2015).

2. A partire dagli anni Novanta del secolo scorso, l'attenzione degli studi sui media per i temi ambientali ha attraversato diverse fasi, nutrite dall'approccio ecocritico, proveniente in origine dall'ambito letterario e applicato in seguito anche al cinema (Rust, Monani, Cubitt 2012) e più in generale ai media (Cubitt 2005; Rust, Monani, Cubitt 2016). Gli studi ecomediali si sono spesso concentrati da un lato sulla rappresentazione tematica delle problematiche ambientali (allo scopo di aumentarne e modificarne la "consapevolezza"), dall'altro sull'impatto ambientale della produzione mediale (allo scopo di renderla più "sostenibile"): per dirlo in breve, si sono dedicati alla questione dell'ambiente come contenuto del medium oppure come suo contenitore e condizione di possibilità. Allargando e approfondendo la riflessione rispetto a questi contesti ormai accreditati, ci è parso necessario invitare a riflettere non esclusivamente sui modi in cui i media pongono il tema dell'ecologia ambientale o contribuiscono al dispendio inquinante di "risorse", ma anche sugli innumerevoli modi in cui la questione ecologica si radica nella mediazione socio-tecnologica implicando aggiornamenti collettivi dei paradigmi percettivi, dell'attenzione (Citton 2014) e delle forme di conoscenza. In particolare si tratta di indagare le condizioni (variabili) di *sensibilità* implicate nel nesso società-tecnologia-ambiente, posto in tensione dagli interrogativi dei problemi ecologici contemporanei.

Il tema della sensibilità tecnica e più in generale della costitutività mediale degli ambienti vitali nel cosiddetto Antropocene sovrappone e incrocia una varietà di campi e discipline: dalla teoria artistica alla biologia, dall'antropologia alla neurologia. Riprendendo le celebri tesi benjaminiane sulla storicità circostanziale e mobile della percezione (Benjamin 2017), potremmo riformulare tale tema attraverso il termine *sensibiliz-*

zazione per rendere conto del carattere processuale e mutevole della correlazione tra sensibile e contesti socio-tecnici. In ambito estetologico è stata rivendicata la specificità umana dell'estensione della sensibilità attraverso artefatti inorganici in quanto elemento costitutivo dell'immaginazione e della creatività (Montani 2007; 2014), mentre altre prospettive nell'ambito della filosofia della tecnica sostengono un superamento dell'antropocentrismo e sottolineano che l'azione umana si svolge in una rete abitata anche da "attori non-umani" (Latour 2005). I media costituiscono in effetti ambienti percettivi o "ambienti associati" (Simondon 1964) in cui sensibilità, tecnica e natura si compenetrano. Anche nelle scienze cognitive, la svolta "enattivista" ha permesso di concepire l'esperienza e la cognizione come processi non predeterminati, ma emergenti dall'interazione sensorimotoria tra agente e ambiente (Maturana, Varela 1980; Varela, Thompson, Rosch 1991). Applicato al campo dei media, questo paradigma attribuisce alle tecnologie un ruolo centrale negli ecosistemi sociali contemporanei. La loro evoluzione risponde alle incessanti riconfigurazioni del rapporto tra l'essere umano e l'ambiente biologico, psicologico, sociale e culturale, con effetti di retroazione per i quali il divenire umano è costitutivamente determinato dall'influenza dei dispositivi tecnologici (McLuhan 1964). Come dimostrano i riferimenti di molti dei contributi inclusi in questo numero, nella riflessione ecocritica sull'Antropocene, al concetto tipicamente enattivista di "autopoiesi" (la capacità di auto-organizzazione e autosufficienza di un sistema) subentra quello di "simpoiesi" (Haraway 2019), ovvero la condivisione sinergica dell'autopoiesi e dunque la co-determinazione trasversale dei sistemi viventi. Anche l'ecologia dei media così come diffusasi negli anni '70 del XX secolo, acquisisce nuovi significati all'interno dell'ecomediologia contemporanea, ridefinendo il concetto di estensione tecnologica in funzione di una costitutiva incorporazione del non-umano nell'umano e, per converso, aprendo la strada a una concettualizzazione biologica di entità tecnologiche come i dati e gli algoritmi. La tecnologia è oggi pienamente parte della cognizione e della natura umana (Parisi 2019).

Pur nella diversità delle genealogie concettuali e degli ambiti teorici di riferimento, questi apporti – tra i molteplici possibili – convergono nell'optare per una concezione ecologica di esperienza e nell'offrire utili basi per una riflessione sul rapporto tra ecologia mediale ed ecologia ambientale. Su questo fronte specifico si sono affacciate problematizzazioni interessanti, come il concetto di "iperoggetto" (Morton 2013) sviluppato nell'ambito di una ontologia post-antropocentrica e orientata verso gli oggetti (Harman 2018). In quanto entità di dimensioni spaziali o temporali estremamente estese e complesse e nel contempo prossime e pervasive, gli iperoggetti (come il riscaldamento globale o una pandemia), sono entità tendenzialmente invisibili e inavvertibili. Proprio la *percepibilità* sfuggente di tali fenomeni rende complicato (o persino sconveniente) ogni tentativo di piena comprensione e ogni reazione diretta, dando talvolta adito a teorie negazioniste o persino complottiste (Wu Ming 1 2021). Ciò che non si avverte o che si reprime per negazione, non fa immediatamente paura (almeno fino a che non si affacci minacciosamente sopra le nostre teste, come la cometa del recente film *Don't Look Up* di Adam McKay). Al contempo una vasta e sofisticata gamma di sistemi tecnici di rilevazione, calcolo e rappresentazione fabbrica quotidianamente la percezione scientifica e mediatica di tali realtà ambientali furtive, diffuse e potenzialmente rischiose. È a questo livello – quello dei sensori, dei calcolatori, del trattamento e della restituzione dei dati (Gabrys 2016) – che si concretizza la sostituzione sensoriale della percezione umana da parte dei media tecnologici, in un dispiegamento di apparecchiature di captazione e proiezione orientate verso processi planetari (Bratton 2019). Ne derivano una modellizzazione e un design dei dati che elaborano e traducono algoritmicamente l'*insensibile* in una varietà di output informativi volti, nelle migliori intenzioni (ma spesso senza reale efficacia), a ripristinare la sensibilità allo scopo di sensibilizzare razionalmente i destinatari.

3. In che modo i media provocano, sollecitano e modulano la sensibilità alle questioni ambientali? La loro azione non rischia di produrre proposte inefficaci o controproducenti, ovvero di *desensibilizzazione* e perdita di agentività? In che misura le forme visive di modellizzazione e comunicazione delle informazioni ambientali agiscono sulla soglia di percepibilità dei problemi ecologici e permettono una presa affettiva capace di evitare la minaccia del "collasso" (Citton, Rasmi 2020) trasformando comportamenti nocivi per il pianeta? I saggi raccolti in questo numero tentano di rispondere a simili interrogativi, non solo per via affer-

mativa ma anche definendo nuove domande a partire da oggetti di studio, approcci disciplinari e riferimenti teorici singolari.

Alcuni saggi contenuti in questo monografico si concentrano sul ruolo delle immagini nell'attivismo ecologista. Nel suo contributo, per esempio, Giuseppe Previtali si sofferma suo ruolo strategico ricoperto dalla visualità nelle azioni del movimento internazionale di protesta per la giustizia climatica "Fridays for Future". Le immagini prodotte, elaborate o postate sui social network dai giovani che vi aderiscono sono interessanti non solo e non tanto nei contenuti, quanto come pratica visuale di produzione di significato che è integrale alla richiesta di cambiamento da parte di una generazione – idealmente capitanata da Greta Thunberg – a lungo esclusa dai processi decisionali. Laura Cesaro si focalizza invece sul cosiddetto "data activism" e illustra il funzionamento di Forensic Architecture, un centro di ricerca britannico che adotta un sofisticato sistema di sensori e operazioni di calcolo e analizza una varietà di materiali visuali (grafici e modelli 2D, immagini satellitari, droni, social network e dispositivi mobili) come metodologia di investigazione sulla violazione dei diritti umani da parte di Stati, forze di polizia e aziende in tutto il mondo, e di sensibilizzazione della coscienza collettiva. Tra i campi di applicazione di questa metodologia radicata nel campo dell'Open Source Intelligence (OSINT) vi è anche la violenza ambientale (come nel caso, analizzato nel saggio, di "Counterforensics in Palestine").

L'ipotesi epistemologica di un "*prostethic sensorium*" formulata da Jan Christian Schulz descrive la sensibilità come una sfera originariamente composita e delegata, irriducibile al semplice corpo individuale, allargando il concetto di "protesi" a una serie variegata di fenomeni: dal canarino che accompagnava i minatori per rilevare i gas pericolosi nelle gallerie ai primi barometri del XVII secolo, passando per i sensori che alimentano le relazioni dell'Intergovernmental Panel on Climate Change. L'intreccio di questi organi percettivi di tipo mediale costituisce ecosistemi che l'autore denomina "fenotipi estesi". Uno degli ambiti repertoriati da Schulz, quello dell'osservazione della sfera climatica, è approfondito nell'articolo di Chiara Rubessi, interessato al design dei dati prodotti dai sensori atmosferici. Riassumendo alcuni snodi fondamentali, il testo problematizza e storicizza la manifestazione delle informazioni raccolte in quanto regimi di visualizzazioni. Le carote glaciali (*ice-cores*) sono un altro tipo di medium di rilevamento dei cambiamenti del clima su cui lavorano Valeria Burgio e Emiliano Guaraldo nel loro contributo dedicato alla rappresentazione di temporalità profonde e complesse attraverso la materialità del ghiaccio. Questo elemento naturale non è solo considerato nel contesto della ricerca scientifica, ma anche in quello artistico riferendosi alle creazioni di Susan Schuppli o Giulia Bruno e Armin Linke.

L'antropologo Jérémy Damian si dedica a un'analisi critica del "design della fusione" come orizzonte discorsivo, affettivo e strategico dell'industria turistica lavorando principalmente sulle definizioni e sulle proposte che emergono da testi prodotti nell'ambito delle *business school* e della *consumer research*. Il suo saggio ricostruisce le caratteristiche di una serie di operazioni di tipo economico e manageriale che tentano di rendere l'immersione nella natura e l'esperienza degli ambienti montani un prodotto seducente, impadronendosi con ambizioni commerciali della sensazione diffusa di una perdita di contatto e sensibilità rispetto all'universo non-umano. Accanto a una simile sensazione, possiamo annoverare tra le atmosfere disforiche contemporanee anche la sensazione di chiusura o impoverimento dell'orizzonte del futuro, all'ombra di degradazioni e catastrofi ineluttabilmente generate dalla frenesia dell'economia capitalista. Questa situazione è studiata dal saggio di Anna Caterina Dalmasso, concentrato sul motivo della rovina e sulle sue manifestazioni nella cultura visiva contemporanea: dai resti fantascientifici del set di *Star Wars* abbandonati nel mezzo del deserto e fotografati da Rä di Martino fino alle pratiche popolari come l'Urbex o ancora il film *Only Lovers Left Alive* di Jim Jarmusch (2013), la sua analisi prende in considerazione molteplici esempi di un'ossesione recente per le rovine ("*ruinophilie*") letta criticamente tramite autori come Mark Fisher o Franco "Bifo" Berardi. Le immagini delle rovine costituiscono un vettore d'esperienza di altri rapporti (meno scissi) tra il naturale e l'artificiale o il presente e il futuro.

Le ricadute della sensibilità ecologica sull'arte e la capacità riflessiva di quest'ultima sono ampiamente esplorate in questo numero. Il saggio di Paolo Berti analizza le "mostre di pensiero" curate da Peter Weibel e Bruno Latour. Ripercorrendo un'esperienza che si dispiega tra *Iconoclash* (2002) e *Critical Zones* (2020), il contributo riflette sull'impiego dell'ambiente espositivo come un'occasione di attivare, trasmette-

re e prolungare una serie di celebri riflessioni e ricerche scientifiche di marca latouriana che, a cavallo tra estetica e politica, influenzano significativamente il dibattito ecologico contemporaneo. Analizzando alcune installazioni di Anicka Yi, Tomás Saraceno e Philippe Parreno, Vincenzo Di Rosa riflette sulla coazione tra intelligenza artificiale, tecnologie dell'automazione e microorganismi e sulla capacità di quest'ultimi di generare – volontariamente o involontariamente – opere d'arte ed esperienze estetiche in collaborazione con l'artista, in un processo di ibridazione tra macchinico e organico che funge anche da critica all'eccezionalismo umano e apre a nuove modalità di esistenza dell'arte (oltre che a nuove pratiche artistiche ed espositive). Elevando alghe, batteri, vegetali, eventi atmosferici o algoritmi ad agenti estetici ed epistemici post-umani, questi artisti sospingono una "svolta molecolare" che enfatizza, complementarmente a quella macroscopica degli iperoggetti, l'esistenza di microscopici "ipoggetti" capaci di influenzare profondamente le nostre economie e le nostre culture.

Il medesimo approccio è applicato anche all'ambito della produzione audiovisiva. L'articolo di Matteo Quinto si concentra sull'animazione cinematografica contemporanea come luogo elettivo di sviluppo di un approccio ecocritico, volto al superamento del dualismo idealistico umano/non-umano. Ponendo in tensione la relazione tra specie e identità e la gerarchia tra umano e animale, l'ibridazione e la metamorfosi propria di questo genere aprono a un sincretismo ecologico che dota di sensibilità e di agentività la sfera del non umano. Il contributo di Marta Rocchi propone un'analisi di produzioni estetiche *mainstream* prendendo in considerazione il caso del documentario *Seaspiracy* (Netflix, 2021) e prestando attenzione principalmente alla sua ricezione sul social network Twitter. La valutazione automatizzata dei dati testuali contenuti nelle reazioni al film in streaming rappresenta un tentativo di riflessione sulle capacità e i limiti della sensibilizzazione ecologica nell'ambito delle grandi piattaforme che dominano la diffusione audiovisiva contemporanea.

4. Nell'insieme dei contributi che lo compongono, questo numero intende offrire alcuni spunti di riflessione sullo stato attuale del discorso sull'ecologia mediale, alla ricerca di un nuovo bilanciamento tra aspetti culturali e aspetti naturali nella descrizione del rapporto tra gli organismi e l'ampio ecosistema in cui essi vivono. Di qui, la proposta di una *ecologia visuale* che si affianchi e integri gli strumenti e i ragionamenti consolidati della cultura visuale (Pinotti, Somaini 2016; Cometa 2020) e dei *media studies* nel progressivo processo di ridefinizione dei criteri di convivenza e reciproca compenetrazione tra gli esseri viventi e il pianeta attraverso il ruolo mediativo della tecnologia. Inoltre, l'orizzonte (pluralizzabile) dell'ecologia visuale indica una zona di incontro e collaborazione non solo tra discipline esclusivamente "culturali" di impronta socio-umanistica, ma anche tra quest'ultime e diversi ambiti delle scienze dette dure (Cronin, Johnsen, Marshall, Warrant 2014). La costellazione di riflessioni che emergono dai testi riuniti permette di abbozzare un'ulteriore ipotesi di denominazione della fase storica in cui siamo piombati e dei meccanismi che la reggono. Alla luce di questi studi, siamo invitati a chiamare Mediacene "l'evento" (Bonneuil, Fressoz 2019) in cui stiamo tentando di orientarci da alcuni decenni, accanto a definizioni più o meno celebri che mettono in evidenza il ruolo dell'umano (*Antropocene*), di un particolare sistema economico (*Capitalocene*) (Moore 2016), dello scarto e dei rifiuti (*Wasteocene*) (Armiero 2021), di un dispositivo di sfruttamento (*Plantationocene*), dei legami simpoietici (*Chthulucene*) (Haraway 2016). Il termine Mediacene ci consente di evidenziare l'impatto cruciale che le tecnologie di percezione, informazione e trasporto (ovvero i media, in senso ampio) esercitano sul contesto storico e ambientale in cui viviamo e sui fenomeni cruciali di accelerazione, consumo o estrattivismo che lo contraddistinguono. In effetti il regime dell'impatto di cui andiamo discorrendo è complesso e ambivalente: esso implica tanto il coinvolgimento di tali sfere nella degradazione degli ambienti che abitiamo, quanto il loro contributo all'apertura di prospettive desiderabili e alternative di vita e riparazione nel – e oltre il – pianeta danneggiato che condividiamo.

1. While we are writing this text[2], in the heart of Paris the environmental activist group "Dernière Renovation" splashes orange paint on Charles Ray's statue *Horse and Rider*, drawing attention to the deadlines of the latest GIEC report through a action with considerable viral potential. At the same time, amid a thousand controversies, the Football World Cup is inaugurated in Qatar in ultra-air-conditioned environments that make "inhabitable" for players and the public a space that would be hostile without such thermal mediations (Starosielki 2022). More and more initiatives are spreading, such as that of *Citizen Sense*, aimed at equipping communities of residents with technical tools for detecting atmospheric conditions in order to produce collectively and from the bottom-up data and knowledge on the state of the environments we inhabit, investigating the ways in which "sensing technologies activate citizens as political entities" (Gabrys 2022). Indeed, we live in an era in which climate change is not only perceived and interpreted through complex networks of sensors and digital computing tools, but also stabilized and repaired (potentially, at least) by geo-engineering techniques at the core of heated political and scientific controversies (Buck 2019). This list of examples – which can be extended at will, as the contributions of this issue will do – sets out the problem to which we have decided to devote a collective reflection: the increasingly close correlation between environmental phenomena and media processes against the background of a worsening of the ecological issues which are now tangible and not just hypothetical, as well as an undeniable disappearance of the reassuring distinction between natural and artificial to which we have been accustomed.

By virtue of the progressive mediatization of social dynamics, the original perspective of media ecology, which proposed to conceive and study media as living environments (Postman 1979; Man Kong Lung 2006), today acquires a value not only more literal but also more complex and subject to ethical rethinking (Colombo 2020). In light of the circumstances as well as of contemporary studies, media can no longer be considered simply as connective elements of the anthropic system, but as structures so innervated in the processes and practices of personal and collective life that they can be considered as environmental *intra-structures* (Barad 2007). In this sense, today the relationship between human societies and environments is modulated in a decisive and constitutive way by media technologies and can only be investigated through a systemic approach. In the light of this intertwining of media technologies, collective subjectivities and living ecosystems, our era of undeniable ecological upheavals must be conceived and questioned starting from the mediation regimes that plot it and from their technical and political (Guattari 1989), as well as "geological" (Parikka 2015) assumptions.

2. Since the 1990s, ecocritical studies has gone through various phases. This approach originated in the field of literature and was later also applied to cinema (Rust, Monani, Cubitt 2012) and more generally to media (Cubitt 2005; Rust, Monani, Cubitt 2016). Ecomedia studies have often focused, on the one hand, on the thematic representation of environmental problems (in order to increase and modify our awareness of them); on the other hand, they have focused on the environmental impact of media production (in order to make it more "sustainable"). To put it briefly, ecomedia studies have approached the question of environment as either media content or as its container and its condition of possibility. Broadening and deepening the reflection with respect to these accredited contexts, it seemed necessary to reflect not only on the ways in which media pose the theme of environmental ecology or contribute to the waste of "resources", but also on the innumerable ways in which the ecological issue is rooted in socio-technological mediation and implies collective reshaping of perceptual and attentional paradigms (Citton 2014), and forms of knowledge. In particular, it is a question of investigating the (variable) conditions of *sensitivity* involved in the society-technology-environment nexus, placed in tension by contemporary ecological problems.

The theme of technical sensitivity and more generally of medial constitutivity of living environments in the so-called Anthropocene overlaps and crosses a variety of fields and disciplines, from art theory to biology, from anthropology to neurology. Taking up Benjamin's famous theses on the circumstantial and mobile historicity of perception (Benjamin 2017), we could reformulate this theme by using the term *sensitization*

in order to account for the processual and changing nature of the correlation between sensory and socio-technical contexts. In aesthetics, the human specificity of the extension of sensitivity through inorganic artefacts has been claimed as a constitutive element of imagination and creativity (Montani 2007; 2014), while other perspectives in the field of philosophy of technology support the overcoming of anthropocentrism and underline that human action takes place in a network also populated with "non-human actors" (Latour 2005). In fact, the media constitute perceptive environments or "associated environments" (Simondon 1964) in which sensitivity, technology and nature are reciprocally intertwined. Also in cognitive sciences, the "enactivist" turn made it possible to conceive of experience and cognition as non-predetermined processes that emerge from the sensorimotor interaction between agent and environment (Maturana, Varela 1980; Varela, Thompson, Rosch 1991). Applied to the media field, this paradigm attributes a central role to technologies in contemporary social ecosystems. Their evolution responds to the incessant reconfigurations of the relationship between the human being and the biological, psychological, social, and cultural environment, with feedback effects through which human becoming is constitutively determined by the influence of technological devices (McLuhan 1964). As demonstrated by the references in many of the contributions included in this special issue, in ecocritical reflection on the Anthropocene, the typically enactivist concept of "autopoiesis" (i.e. the capacity of a system for self-organization and self-sufficiency) is replaced by that of "sympoiesis" (Haraway 2019), or the synergistic sharing of autopoiesis and therefore the transversal co-determination of living systems. Even media ecology as it was conceived in the 1970s acquires new meanings within contemporary ecomediology, since the latter redefines the concept of technological extension as a function of a constitutive incorporation of the non-human into the human and, conversely, paves the way for a biological conceptualization of technological entities such as data and algorithms. Technology is today fully part of human cognition and nature (Parisi 2019).

Despite the variety of the conceptual frameworks and theoretical approaches, these contributions – among the many possible ones – converge in opting for an ecological account of experience and in offering useful foundations for a reflection on the relationship between media ecology and environmental ecology. On this specific front, interesting problems have arisen, such as the concept of "hyperobject" (Morton 2013) developed in the context of a post-anthropocentric and object-oriented ontology (Harman 2018). As entities of extremely extensive and complex spatial or temporal dimensions and at the same time immediate and pervasive phenomena, hyperobjects (such as global warming or a pandemic), tend to be invisible and imperceptible. Precisely the elusive *perceptibility* of these phenomena makes any attempt at full understanding and any direct reaction complicated (or even disadvantageous), sometimes giving rise to denial or even conspiracy theories (Wu Ming 1 2021). What is not felt or repressed and denied does not immediately frighten (at least until it menacingly appears above our heads, like the comet in Adam McKay's recent film *Don't Look Up*). At the same time, a vast and sophisticated range of technical detection, calculation and representation systems daily creates the scientific and media perception of these furtive, widespread and potentially dangerous environmental realities. It is at this level – that of sensors, calculators, data processing (Gabrys 2016) – that the sensorial replacement of human perception by technological media takes place, in a deployment of capture and projection equipment oriented towards planetary processes (Bratton 2019). The result is a data modeling and design that algorithmically process and translate the *imperceptible* into a variety of information outputs aimed, with the best intentions (but often without real effectiveness), at restoring sensoriality in order to sensitize recipients rationally.

3. How do media provoke, solicit and modulate perception of environmental issues? Don't their actions risk producing ineffective or counterproductive proposals, or rather "desensitization" and loss of agency? To what extent do visual forms of modeling and communication of environmental information act on the perceptibility threshold of ecological problems and allow an affective grasp of them that would be capable of averting the threat of "collapse" (Citton, Rasmi 2020) by transforming behaviors harmful to the planet? The essays collected in this issue attempt to answer such questions, not only affirmatively but also by defining new questions starting from objects of study,

disciplinary approaches and singular theoretical references.

Some of the essays focus on the role of images in ecological activism. In his contribution, for example, Giuseppe Previtali focuses on the strategic role played by visuality in the actions of the international protest movement for climate justice called "Fridays for Future". The images produced, developed, or posted on social networks by the young people who join the movement are interesting not only and not so much in terms of their content, but as a visual practice of production of meaning that is integral to the request for change by a generation – led in spirit by Greta Thunberg – long excluded from decision-making processes. Laura Cesaro, meanwhile, focuses on so-called "data activism" and illustrates the functioning of Forensic Architecture, a British research center that adopts a sophisticated system of sensors and calculation operations and analyzes a variety of visual materials (graphs and 2D models, satellite images, drones, social networks, and mobile devices) as a methodology for investigating how States, police forces and companies around the world violate human rights, and for raising awareness in the collective conscience. The fields of application of this methodology rooted in the field of Open Source Intelligence (OSINT) also include environmental violence (as in the case analyzed in the essay of "Counterforensics in Palestine").

The epistemological hypothesis of a "prosthetic sensorium" formulated by Jan Christian Schulz describes sensitivity as an originally composite and delegated sphere, irreducible to the simple individual body, and extends the concept of "prosthesis" to a variety of phenomena: from the canary that accompanied miners to detect dangerous gases in tunnels to the first barometers of the 17th century, and to the sensors that provide data for the reports of the Intergovernmental Panel on Climate Change. The interweaving of these media-type perceptive organs constitutes ecosystems that the author calls "extended phenotypes". One of the areas listed by Schulz, that of the observation of the climatic sphere, is explored in depth in Chiara Rubessi's article, which is concerned with the design of the data produced by atmospheric sensors. Her text problematizes and historicizes the manifestations of the information collected as regimes of visualisation. Ice-cores are another type of medium for detecting climate changes, one on which Valeria Burgio and Emiliano Guaraldo work in their contribution dedicated to the representation of deep and complex temporalities through the materiality of ice. This natural element is not only considered in the context of scientific research, but also in artistic practice, with reference to the creations of Susan Schuppli, Giulia Bruno, and Armin Linke.

Anthropologist Jérémy Damian's essay is dedicated to a critical analysis of "fusion design" as a discursive, affective and strategic horizon of the tourism industry, and works mainly on the definitions and proposals that emerge from texts produced on the terrain of business schools and of consumer research. His essay reconstructs the characteristics of a series of economic and managerial operations that attempt to make immersion in nature and the experience of mountain environments a seductive product, seizing with commercial ambitions the widespread sensation of a loss of contact and sensoriality compared to the non-human universe. Alongside such a sensation, among the contemporary dysphoric atmospheres can be also included that of closure or impoverishment of the future horizon, due to the darkness of degradations and catastrophes ineluctably generated by the frenzied capitalist economy. This situation is studied in Anna Caterina Dalmasso's essay, focused on the motif of ruin and its manifestations in contemporary visual culture: from the sci-fi remains of the *Star Wars* set abandoned in the middle of the desert and photographed by Rä di Martino, to popular practices such as Urbex or films like Jim Jarmusch's *Only Lovers Left Alive* (2013), her analysis takes into consideration multiple examples of a recent obsession with ruins ("*ruinophilie*") critically interpreted by authors such as Mark Fisher or Franco "Bifo" Berardi. The images of the ruins constitute a vector of experience of other relationships between the natural and the artificial or the present and the future.

The consequences for art of the ways the ecological can be perceived, and the latter's reflective capacity are extensively explored in this issue. Paolo Berti's essay analyzes the "exhibitions of thought" curated by Peter Weibel and Bruno Latour. Retracing an experience that unfolds from *Iconoclash* (2002) to *Critical Zones* (2020), this contribution reflects on the use of the exhibition environment as an opportunity to activate, transmit, and prolong a series of famous Latourian reflections and scientific research which,

straddling aesthetics and politics, significantly influence the contemporary ecological debate. Analyzing some installations by Anicka Yi, Tomás Saraceno, and Philippe Parreno, Vincenzo Di Rosa reflects on the coaction between artificial intelligence, automation technologies and microorganisms and on the ability of the latter to generate – voluntarily or involuntarily – works of art and aesthetic experiences in collaboration with the artist, in a process of hybridization between the machinic and the organic which also serves as a critique of human exceptionalism and opens up new modes of existence for art (as well as new artistic and exhibition practices). By elevating algae, bacteria, plants, atmospheric events, or algorithms to post-human aesthetic and epistemic agents, these artists encourage a "molecular turn" that emphasizes, complementary to the macroscopic one of hyperobjects, the existence of microscopic "hypo-objects" capable of profoundly influencing our economies and our cultures.

The same approach is also applied to the field of audiovisual production. Matteo Quinto's essay focuses on contemporary cinematographic animation as privileged site for the development of an ecocritical approach aimed at overcoming the idealistic human/non-human dualism. By putting the relationship between species and identity and the hierarchy between human and animal in tension, the hybridization and metamorphosis typical of this genre open up to an ecological syncretism that endows the non-human sphere with sensitivity and agency. Marta Rocchi's contribution proposes an analysis of mainstream aesthetic productions, taking into consideration the case of the documentary *Seaspiracy* (Netflix, 2021) and paying attention mainly to its reception on the social network Twitter. The automated evaluation of the textual data contained in the reactions to the film represents an attempt to reflect on the capabilities and limits of ecological awareness within the streaming platforms that dominate contemporary audiovisual distribution.

4. As a whole, the contributions of this special issue intend to offer some food for thought on the current state of the discourse on media ecology, in search of a new balance between cultural and natural aspects in the description of the relationship between organisms and the vast ecosystem in which they live. Hence, the proposal of a *visual ecology* that complements and integrates the consolidated tools and modes of thinking developed by visual culture (Pinotti, Somaini 2016; Cometa 2020) and media studies in the progressive process of redefining the criteria of coexistence and mutual interpenetration between living beings and the planet through the mediating role of technology. Furthermore, the (multiple) horizon of visual ecology indicates an area of encounter and collaboration not only between exclusively "cultural" socio-humanistic disciplines, but also between the latter and different fields of the so-called "hard sciences" (Cronin, Johnsen, Marshall, Warrants 2014). The constellation of reflections that emerge from the collected texts allows us to outline a further hypothesis allowing for the definition the historical phase in which we are plunged and of the mechanisms that support it. In the light of these studies, we are invited to call Mediacene "the event" (Bonneuil, Fressoz 2019) in respect to which we have been trying to orient ourselves for some decades, alongside more or less famous coinages that highlight the role of the human (*Anthropocene*), of a particular economic system (*Capitalocene*) (Moore 2016), of waste and refuse (*Wasteocene*) (Armiero 2021), of an exploitation device (*Plantationocene*), or of sympoietic links (*Chthulucene*) (Haraway 2016). The term Mediacene allows us to highlight the crucial impact that technologies of perception, information and transport (i.e. the media, in a broad sense) exert on the historical and environmental context we live in; and on the crucial phenomena of acceleration, consumption or extractivism that distinguish it. In fact, the regime we are discussing is complex and ambivalent: it implies both the involvement of these spheres in the degradation of the environments we inhabit, as well as their contribution to the opening of desirable and alternative perspectives of life and repair in the – and beyond the – damaged planet we share.

1. Alors que nous nous apprêtons à rédiger la présentation de ce numéro[3], au cœur de Paris le groupe écologiste militant Dernière Rénovation recouvre la statue *Horse and rider* de Charles Ray de peinture orange, attirant l'attention sur les échéances du dernier rapport du GIEC par une action au potentiel viral considérable. Dans le même temps, au milieu de nombreuses controverses, la Coupe du monde est inaugurée au Qatar dans des environnements ultra-climatisés qui rendent "habitable" un espace qui serait insupportable pour les joueurs et les spectateurs sans ces médiations thermiques (Starosielki 2022). De plus en plus d'initiatives, telles que *Citizen Sense*, se répandent pour équiper les communautés d'habitants d'outils techniques de détection météorologique afin de produire à partir de la base et collectivement des données et des connaissances sur l'état des environnements dans lesquels nous vivons – en explorant les façons dont "les technologies de détection activent les citoyens en tant qu'entités politiques" (Gabrys 2022). En réalité, nous vivons à une époque où les conditions climatiques changeantes sont non seulement détectées et interprétées par des réseaux complexes de capteurs et d'outils informatiques numériques, mais aussi stabilisées et réparées (potentiellement, du moins) par des techniques de géo-ingénierie au centre de controverses politiques et scientifiques brûlantes (Buck 2019). Cette liste d'exemples – extensible à souhait, comme le feront les contributions de ce numéro – pose le problème auquel nous avons décidé de consacrer une réflexion collective: la corrélation de plus en plus étroite entre les phénomènes environnementaux et les processus médiatiques, avec en toile de fond une aggravation de la question écologique devenue tangible et non plus seulement hypothétique, ainsi qu'une disparition indéniable de la distinction rassurante entre naturel et artificiel à laquelle nous étions habitués.

En vertu de la médiatisation progressive des dynamiques sociales, la perspective originelle de l'écologie des médias, qui proposait de concevoir et d'étudier les médias comme des milieux de vie (Postman 1979; Man Kong Lung 2006), prend aujourd'hui une signification non seulement plus littérale mais aussi plus complexe et sujette à une remise en question éthique (Colombo 2020). À la lumière des circonstances ainsi que des études contemporaines, les médias ne peuvent plus être considérés comme un simple élément connectif du système anthropique, mais comme des structures tellement innervées dans les processus et pratiques de la vie personnelle et collective qu'elles peuvent être considérées comme des *intra-structures* environnementales (Barad 2007). En ce sens, la relation entre les sociétés humaines et les environnements est aujourd'hui modulée de manière décisive et constitutive par les technologies des médias et ne peut être étudiée que par une approche systémique. À la lumière de cette imbrication des technologies médiales, des subjectivités collectives et des écosystèmes vivants, notre époque d'indéniables bouleversements écologiques doit être conçue et interrogée à partir des régimes médiatiques qui la trament et de leurs présupposés techniques et politiques (Guattari 1989), mais aussi "géologiques" (Parikka 2015).

2. Depuis les années 1990, l'attention prêté par les études des médias pour les questions environnementales a connu plusieurs phases, nourries par l'approche écocritique, issue à l'origine de la sphère littéraire, puis appliquée également au cinéma (Rust, Monani, Cubitt 2012) et plus généralement aux médias (Cubitt 2005; Rust, Monani, Cubitt 2016). Les études écomédiatiques se sont souvent concentrées, d'une part, sur la représentation thématique des questions environnementales (dans le but d'élargir et de modifier la "conscience") et, d'autre part, sur l'impact environnemental de la production médiatique (dans le but de la rendre plus "durable"): bref, elles se sont consacrées à la question de l'environnement en tant que contenu du média ou en tant que contenant et condition de possibilité. En élargissant et en approfondissant notre réflexion par rapport à ces contextes désormais accrédités, il nous a semblé nécessaire de suggérer de réfléchir non seulement aux manières dont les médias posent la question de l'écologie environnementale ou contribuent au gaspillage polluant des "ressources", mais aussi aux innombrables manières dont la question écologique s'enracine dans la médiation socio-technologique, impliquant des mises à jour collectives des paradigmes perceptifs, de l'attention (Citton 2014) et des formes de connaissance. Il s'agit notamment d'étudier les conditions (variables) de *sensibilité*

impliquées dans le noeud société-technologie-environnement, mis en tension par les questionnements écologiques contemporains.

Le thème de la sensibilité technique et, plus généralement, de la constitutivité médiale des milieux de vie dans ce que l'on appelle l'Anthropocène recoupe et traverse une variété de domaines et de disciplines: de la théorie de l'art à la biologie, de l'anthropologie à la neurologie. Reprenant les célèbres thèses de Benjamin sur l'historicité circonstancielle et mobile de la perception (Benjamin 2017), nous pourrions reformuler ce thème à travers le terme de *sensibilisation* pour rendre compte du caractère processuel et changeant de la corrélation entre le sensible et les contextes socio-techniques. Dans le domaine de l'esthétique, la spécificité humaine de l'extension de la sensibilité à travers des artefacts inorganiques a été revendiquée comme un élément constitutif de l'imagination et de la créativité (Montani 2007; 2014), tandis que d'autres perspectives dans le domaine de la philosophie de la technologie plaident pour un dépassement de l'anthropocentrisme et soulignent que l'action humaine se déroule dans un réseau également habité par des "acteurs non humains" (Latour 2005). En effet, les médias constituent des environnements perceptifs ou "environnements associés" (Simondon 1964) dans lesquels la sensibilité, la technique et la nature s'interpénètrent. Même dans les sciences cognitives, le tournant "enactiviste" a permis de concevoir l'expérience et la cognition comme des processus qui ne sont pas prédéterminés, mais qui émergent de l'interaction sensorimotrice entre l'agent et l'environnement (Maturana, Varela 1980; Varela, Thompson, Rosch 1991). Appliqué au domaine des médias, ce paradigme confère aux technologies un rôle central dans les écosystèmes sociaux contemporains. Leur évolution répond aux reconfigurations incessantes de la relation entre les êtres humains et l'environnement biologique, psychologique, social et culturel, avec des effets de rétroaction par lesquels le devenir humain est constitutivement déterminé par l'influence des dispositifs technologiques (McLuhan 1964). Comme le montrent les références de nombreuses contributions incluses dans ce numéro, dans la réflexion écocritique sur l'Anthropocène, au concept typiquement énactiviste d'"autopoïèse" (la capacité d'auto-organisation et d'autosuffisance d'un système) succède celui de "sympoïèse" (Haraway 2019), c'est-à-dire le partage synergique de l'autopoïèse et donc la détermination croisée des systèmes vivants. L'écologie des médias, telle qu'elle a été popularisée dans les années 1970, acquiert également de nouvelles significations au sein de l'éco-médiologie contemporaine, redéfinissant le concept d'extension technologique en fonction d'une incorporation constitutive du non-humain dans l'humain et, inversement, ouvrant la voie à une conceptualisation biologique des entités technologiques telles que les données et les algorithmes. La technologie fait désormais pleinement partie de la cognition et de la nature humaine (Parisi 2019).

Malgré la diversité des généalogies conceptuelles et des champs de référence théoriques, ces références – parmi les nombreuses possibles – convergent vers l'adoption d'une conception écologique de l'expérience en établissant des bases utiles à une réflexion sur la relation entre écologie des médias et écologie environnementale. Des problématisations intéressantes ont fait surface sur ce front spécifique, comme le concept d'"hyperobjet" (Morton 2013) développé dans le contexte d'une ontologie post-anthropocentrique et orientée vers l'objet (Harman 2018). En tant qu'entités aux dimensions spatiales ou temporelles extrêmement étendues et complexes, et en même temps proches et omniprésentes, les hyperobjets (comme le réchauffement climatique) sont des entités qui tendent à être invisibles ou inaperçues. C'est précisément la perceptibilité insaisissable de tels phénomènes qui rend toute tentative de compréhension complète et toute réaction directe compliquée (voire incommode), donnant parfois lieu à des théories négationnistes ou même conspirationnistes (Wu Ming 1 2021). Ce qui n'est pas ressenti ou est réprimé par le déni n'est pas immédiatement effrayant (du moins jusqu'à ce qu'il se profile de manière menaçante au-dessus de nos têtes, comme la comète dans le récent film *Don't Look Up* d'Adam McKay). En même temps, une gamme vaste et sophistiquée de systèmes techniques de détection, de calcul et de représentation fabrique les perceptions scientifiques et médiatiques quotidiennes de ces réalités environnementales furtives, diffuses et potentiellement risquées. C'est à ce niveau – celui des capteurs, des calculateurs, du traitement et de la restitution des données (Gabrys 2016) – que se réalise le remplacement sensoriel de la perception humaine par les médias technologiques, dans un déploiement d'équipe-

ments de capture et de projection orientés vers les processus planétaires (Bratton 2019). Le résultat est une conception de la modélisation et des données qui traite et traduit de manière algorithmique l'insensible en une variété de représentations informationnelles visant, dans les meilleures intentions (mais souvent sans réelle efficacité), à créer une sensibilité en sollicitant rationnellement les destinataires.

3. Comment les médias provoquent-ils et modulent-ils la sensibilité aux questions environnementales ? Leur action ne risque-t-elle pas de produire des propositions inefficaces ou contre-productives, c'est-à-dire une désensibilisation et une perte d'agentivité ? Dans quelle mesure les formes visuelles de modélisation et de communication des informations environnementales agissent-elles sur le seuil de perceptibilité des problèmes écologiques et permettent-elles une prise en main affective capable d'éviter la menace d'"effondrement" (Citton, Rasmi 2020) en transformant les comportements nuisibles à la planète ? Les essais rassemblés dans ce numéro tentent de répondre à ces questions, non seulement par l'affirmative mais aussi en définissant de nouvelles questions à partir d'objets d'étude, d'approches disciplinaires et de références théoriques singuliers.

Certains des essais de cette dossier portent sur le rôle des images dans l'activisme écologique. Dans sa contribution, par exemple, Giuseppe Previtali se concentre sur le rôle stratégique joué par les supports visuels dans les actions du mouvement international de protestation pour la justice climatique "Fridays for Future". Les images produites, traitées ou postées sur les réseaux sociaux par les jeunes qui y adhèrent sont intéressantes non seulement et pas tant en termes de contenu, mais en tant que pratique visuelle de construction de sens qui fait partie intégrante de la demande de changement d'une génération – idéalement guidée par Greta Thunberg – longtemps exclue des processus décisionnels. Laura Cesaro se concentre plutôt sur ce que l'on appelle "l'activisme des données" et illustre le fonctionnement de Forensic Architecture, un centre de recherche britannique qui adopte un système sophistiqué de capteurs et d'opérations informatiques et analyse divers matériaux visuels (graphiques et modèles en 2D, images satellitaires, drones, réseaux sociaux et appareils mobiles…) comme méthodologie pour enquêter sur la violation des droits de l'homme par les États, les forces de police et les entreprises du monde entier, et pour éveiller la conscience collective. Parmi les champs d'application de cette méthodologie ancrée dans le domaine de l'Open Source Intelligence (OSINT) figure également la violence environnementale (comme dans le cas, analysé dans l'essai, de "Counterforensics in Palestine").

L'hypothèse épistémologique d'un "*prostethic sensorium*" formulée par Jan Christian Schulz décrit la sensibilité comme une sphère originellement composite et déléguée, irréductible au simple corps individuel, étendant le concept de "prothèse" à une série variée de phénomènes: du canari qui accompagnait les mineurs pour détecter les gaz dangereux dans les tunnels aux premiers baromètres du XVII^{e} siècle, en passant par les capteurs qui alimentent les rapports du GIEC. L'entrelacement de ces organes perceptifs médiés constitue des écosystèmes que l'auteur appelle "phénotypes étendus". L'une des sphères répertoriées par Schulz, celle de l'observation de la sphère climatique, est explorée d'une manière plus approfondie dans l'article de Chiara Rubessi sur le design des données produites par les capteurs atmosphériques. En résumant certains moments-clé, le texte problématise et historicise la manifestation des informations collectées en tant que régimes de visualisation. Les carottes glaciaires ("*ice-cores*") sont un autre type de support de détection du changement climatique sur lequel travaillent Valeria Burgio et Emiliano Guaraldo dans leur contribution consacrée à la représentation de temporalités profondes et complexes à travers la matérialité de la glace. Cet élément naturel n'est pas seulement considéré dans le contexte de la recherche scientifique, mais aussi dans celui de l'art, en référence aux créations de Susan Schuppli ou de Giulia Bruno et Armin Linke.

L'anthropologue Jérémy Damian se consacre à une analyse critique du "design de la fusion" en tant qu'horizon discursif, affectif et stratégique de l'industrie touristique, en travaillant principalement sur les définitions et les propositions émergeant des textes produits dans le contexte des écoles de commerce et de la *consumer research*. Son essai reconstruit les caractéristiques d'une série d'opérations économiques et managériales qui tentent de faire de l'immersion dans la nature et de l'expérience des environnements de montagne un produit séduisant, saisissant avec des ambitions commerciales le sentiment répandu d'une

perte de contact et de sensibilité par rapport à l'univers non-humain. À côté d'un tel sentiment, on peut également compter parmi les atmosphères dysphoriques contemporaines le sentiment de fermeture ou d'appauvrissement de l'horizon du futur, à l'ombre des dégradations et des catastrophes générées inéluctablement par la frénésie de l'économie capitaliste. Cette situation est étudiée dans l'article d'Anna Caterina Dalmasso, qui se concentre sur le motif de la ruine et ses manifestations dans la culture visuelle contemporaine: des vestiges du décor de *Star Wars* abandonnées en plein désert et photographié par Rä di Martino aux pratiques populaires comme l'Urbex ou encore au film *Only Lovers Left Alive* (2013) de Jim Jarmusch, son analyse considère de multiples exemples d'une obsession récente pour les ruines ("ruinophilie") lue de manière critique à travers des auteurs comme Mark Fisher ou Franco "Bifo" Berardi. Les images de ruines constituent à son avis un vecteur d'expérience d'autres relations (moins clivées) entre le naturel et l'artificiel ou le présent et le futur.

Les répercussions de la sensibilité écologique sur l'art et la capacité de réflexion de ce dernier sont largement explorées dans ce numéro. L'essai de Paolo Berti étudie les "expositions de la pensée" organisées par Peter Weibel et Bruno Latour. Retraçant une expérience qui se déroule entre *Iconoclash* (2002) et *Critical zone* (2020), sa contribution réfléchit à l'utilisation de l'environnement de l'exposition comme une occasion d'activer, de transmettre et de prolonger une série de réflexions et de recherches signées par Latour qui, à cheval entre l'esthétique et la politique, influencent de manière significative le débat écologique contemporain. En analysant certaines installations d'Anicka Yi, Tomás Saraceno et Philippe Parreno, Vincenzo Di Rosa réfléchit à l'interaction entre l'intelligence artificielle, les technologies d'automatisation et les micro-organismes et à la capacité de ces derniers à générer – volontairement ou involontairement – des œuvres d'art et des expériences esthétiques en collaboration avec l'artiste, dans un processus d'hybridation entre le machinique et l'organique qui sert également de critique de l'exceptionnalisme humain et ouvre de nouvelles modalités d'existence de l'art (ainsi que de nouvelles pratiques artistiques et d'exposition). En élevant des algues, des bactéries, des plantes, des événements atmosphériques ou des algorithmes au rang d'agents esthétiques et épistémiques post-humains, ces artistes propulsent un "tournant moléculaire" qui souligne, outre l'existence macroscopique d'hyperobjets, celle d'"hypobjets" microscopiques capables d'influencer profondément nos économies et nos cultures.

Cette enquête est également appliquée au domaine de la production audiovisuelle. L'article de Matteo Quinto se concentre sur l'animation cinématographique contemporaine comme lieu électif pour le développement d'une approche écocritique, visant à dépasser le dualisme idéaliste humain/non humain. En mettant en tension la relation entre espèce et identité et la hiérarchie entre humain et animal, l'hybridation et la métamorphose inhérentes à ce genre ouvrent un syncrétisme écologique qui confère à la sphère du non-humain sensibilité et agentivité. La contribution de Marta Rocchi propose une analyse des productions esthétiques grand public en considérant le cas du documentaire *Seaspiracy* (Netflix, 2021) et en prêtant principalement attention à sa réception sur le réseau social Twitter. L'évaluation automatisée des données textuelles contenues dans les réactions au film en streaming représente une tentative de réflexion sur les capacités et les limites de la conscience écologique dans le contexte des grandes plateformes qui dominent la diffusion audiovisuelle contemporaine.

4. Dans l'ensemble des contributions, ce numéro entend offrir des pistes de réflexion sur l'état actuel du discours sur l'écologie des médias, à la recherche d'un nouvel équilibre entre les aspects culturels et naturels dans la description de la relation entre les organismes et le vaste écosystème dans lequel ils vivent. D'où la proposition d'une *écologie visuelle* qui complète et intègre les outils et les raisonnements consolidés de la culture visuelle (Pinotti, Somaini 2016; Cometa 2020) et des études sur les médias dans le processus progressif de redéfinition des critères de coexistence et d'interpénétration mutuelle entre les êtres vivants et la planète à travers le rôle médiateur de la technologie. En outre, l'horizon (pluralisable) de l'écologie visuelle indique un espace de rencontre et de collaboration non seulement entre des disciplines exclusivement "culturelles" d'empreinte socio-humaniste, mais aussi entre ces dernières et divers domaines des sciences dites dures (Cronin, Johnsen Marshall, Warrant 2014). La constellation de réflexions qui émergent des textes rassemblés permet d'esquisser une autre hypothèse

pour nommer la phase historique dans laquelle nous sommes plongés et les mécanismes qui la régissent. À la lumière de ces études, nous sommes invités à appeler le Médiacène "l'événement" (Bonneuil, Fressoz 2014) dans lequel nous tentons de nous repérer depuis plusieurs décennies, à côté de définitions plus ou moins célèbres qui mettent en avant le rôle de l'humain (*Anthropocène*), d'un système économique particulier (*Capitalocène*) (Moore 2016), des déchets et des rebuts (*Wasteocène*) (Armiero 2021), d'un dispositif d'exploitation (*Plantationocène*), ou de liens sympoiétiques (*Chthulucene*) (Haraway 2016). Ce terme permet de mettre en évidence l'impact crucial que les technologies de perception, d'information et de transport (c'est-à-dire les médias, au sens large) exercent sur le contexte historique et environnemental dans lequel nous vivons et sur les phénomènes cruciaux d'accélération, de consommation ou d'extractivisme qui la caractérisent. En effet, le régime d'impact dont nous parlons est complexe et ambivalent: il concerne à la fois l'implication de ces sphères dans la dégradation des environnements que nous habitons, et leur contribution à l'ouverture de perspectives souhaitables et alternatives de vie et de réparation dans – et au de là de – la planète endommagée que nous partageons.

Note | Notes

[1] Questo testo, al pari dell'impianto generale del numero monografico di cui costituisce una introduzione, è stato concepito congiuntamente dai due autori. Materialmente, il paragrafo 2 e la prima metà del paragrafo 3 sono attribuibili a Adriano D'Aloia; i paragrafi 1 e 4 e la seconda metà del paragrafo 3 a Jacopo Rasmi.

[2] This text, like the general structure of the monographic issue of which it constitutes an introduction, was conceived jointly by the two authors. Materially, section 2 and the first half of paragraph 3 are attributable to Adriano D'Aloia; sections 1 and 4, and the second half of paragraph 3 to Jacopo Rasmi.

[3] Ce texte, comme la structure générale du numéro monographique dont il constitue une introduction, a été conçu conjointement par les deux auteurs. Matériellement, la section 2 et la première moitié de la section 3 sont attribuables à Adriano D'Aloia; sections 1 et 4 et la seconde moitié de la section 3 à Jacopo Rasmi.

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Images for a World to Come. Visual Practices of Ecological Activism

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Abstract

Between the more interesting political phenomena of the last few decades, collective uprisings are still partially overlooked. This global spread of rebellions, regardless of their specific political motivations, seems to be characterized by a recurring set of visual practices, thus urging a reflection on the political roles of the images in contemporary politics. Following the theoretical framework recently proposed by Didi-Huberman, the essay will try to sketch some preliminary thoughts on this regard, analyzing the forms of visual agency that emerge from the collective occupation of public (and political) spaces, also trying to consider the progressive emergence of a specific emotional dynamics. After this theoretical introduction, the essay will focus on ecological and environmental activism, and specifically on the Fridays for Future's phenomenon, discussing some of the political functions that images assume in this context.

It was August 2015 when a fifteen-year-old girl, Greta Thunberg, firstly declared a school strike whose consequences were destined to greatly influence the political agenda on a European and global level. She performed a simple but powerful action, sitting outside the Swedish Parliament every school day, demanding urgent measures to contain the already visible consequences of climate change. Relatively soon, many other people joined her, receiving unforeseeable attention.[1] The creation of the hashtag #FridaysForFuture which progressively went viral and the rise of similar actions in other parts of the Western world (and beyond) led to the creation of a structured and defined transnational movement, that firstly played a major role in the process of raising the younger generations' awareness on the issue of climate change, and is currently experiencing what we may call, adopting a classic partition of sociological theory (Blumer 1969; Mauss 1975; Tilly 1978), a phase of progressive institutionalization.

Almost a year later after the first strikes, the wave of protests ignited by Greta spread to a point that she was invited to speak in relevant political arenas, where with great courage and a passion usually unseen in those contexts, she accused the global political-economic leadership of being the main responsible for the environmental changes that are affecting the planet. In June 2019, she gave a speech in front of the UK Parliament, in which she pointed out the "lack of future" that her generation is doomed to experience in a world that is becoming more and more inhabitable and hostile:

> We probably don't even have a future any more. Because that future was sold so that a small number of people could make unimaginable amounts of money. […] You lied to us. You gave us false hope. You told us that the future was something to look forward to. And the saddest thing is that most children are not even aware of the fate that awaits us. […] And yet we are the lucky ones. Those who will be affected the hardest are already suffering the consequences. But their voices are not heard (Thunberg 2019a).

The same accusatory message was delivered, just a couple of months later, at the UN Climate Action Summit, where Greta's intention to hold the global economic elite accountable for its dissolute actions was even more explicit. With anger in her voice and tears on her face, she pointed out that her generation is no longer willing to accept the institutional laxity in these matters and is finally ready to take position on this issue: "You are failing us. But the young people are starting to understand your betrayal. The eyes of all future generations are upon you. And if you choose to fail us, I say: We will never forgive you" (Thunberg 2019b).

Following Thunberg's strong statements and the international success of the Fridays For Future initiative, this essay will try to conceptualize ecological and environmental activism within the larger context of the various uprising movements that characterize the contemporary political world. If mass revolts can be analyzed as a transnational and transpolitical tendency, ecological protests seem one of the more relevant and transgenerational, but they are still in need of a full recognition as visual phenomena. On a very preliminary level, it should be noted that Fridays For Future, as many other forms of protest, produce what Nicholas Mirzoeff (2017) identified as two different "spatial forms", a "kinetic" one, that has to do with physical proximity and a "potential" one, that emerges through various forms of mediatization. This distinction is particularly relevant in the case of environmental activism because it highlights the fact that – in the contemporary visual ecosystem – actions and images are both quintessential to maintain the focus on the issue of climate change.[2] In order to better understand the role played by visuality in this context, however, some general ideas on contemporary revolts as political and aesthetical events, seems to be needed.

Conceptualizing revolts

At the beginning of the 21st century, Hardt and Negri (2000) theorized the emergence of an imperial and postmodern form of sovereignty to make sense of the new world order that followed the dissolution of the Soviet Union. In this political context, what they labelled "the Empire" is not necessarily a specific political reality, but rather a governance paradigm that is able to favor the accumulation and reproduction of capital in a techno-economy of instant and digital monetary flows. In this sense, the ideology of the Empire cannot be isolated from the economic politics that made it possible and, as we will see, this issue has important consequences from an ecological point of view.

If the events of 9/11 and the subsequent polarization of the Western world in the so-called "War on Terror" seemed to confirm Hardt and Negri's theories, the authors themselves were capable of detecting, within this imperial context, the progressive emergence of a series of counter-hegemonic movements that were able to question and even deconstruct from within the logic of the Western political system. What they labelled "the Multitude" was defined as a collective social subject capable of creatively act to produce alternative visions of the world, moving from what the members of this heterogenous mass have in common (Hardt, Negri 2004). Hardt and Negri's political perspective, recently implemented with a further focus on the emergence of new horizontal, non-hierarchical, and "leaderless" movements (thus privileging the bottom-up dimension of protests; Hardt, Negri 2017), is extremely significant, because it makes clear that the germs of contestation are consubstantial to the rigid paradigm of a capitalist structure that is more and more hoarding and violent.

This idea of counter-movements capable of disrupting the political order from within is useful to understand the rise of various form of collective uprisings in the last decades, regardless of their geographical localization, national or supernational reach and political background. This does not imply that the specificity of the political demands of those movements should be overlooked, but rather that the simultaneous emergence of so many different yet similar phenomena does not necessarily imply a set of homogenous foundational claims. In cases such as the No-Global Front (1999), the No-Tav movement in Italy (especially from 2004), the Arab Springs and the subsequent Syrian Revolution (2010), Occupy Wall Street (2011), Black Lives Matter (2013 and 2020), the Jilet Jaunes in France (2018) and, of course, the Fridays for Future (2018), what is at stake is a demand to re-define what is and can be considered political, to promote a new sense of participation and belonging, to collectively articulate the possibility of a different future (Rancière 1999 and 2004; Koukal 2010: 114). Also, following an ingrowing strand of literature (Milan 2013; Carty 2018; Foellmer, Lünenborg, Raetzsch 2018; Crick 2020; Flesher Fominaya, Gillan 2020; Alperstein 2021), it is relevant here to ask what role is played by digital visuality in the orchestration of these collective phenomena, promoting a systemic (and eventually comparative) approach able to consider technologies, platforms, power structures, performative identities etc. In other words, how is the dynamic relationship between "in the streets" presence and digital activism structured? Given that definitive answers exceed the introductory aim of this article, we may notice that these various forms of collective activism seem to share a series of common features that were recently explored from a variety of different perspectives and that can help us build a transdisciplinary framework (moving beyond the perspective of social movements theory while necessarily taking it into account) to better understand the visual practices that they implement.

To begin with, it seems crucial to clarify an important distinction between revolt and revolution. While the latter is surely a fundamental political category (Bongiovanni, Bravo 1995; Traverso 2021), the unpredictable uprising of a group of people can be better understood as a revolt, a "practice of irruption" (Di Cesare 2020: 21) that proceeds horizontally and often without hierarchy in order to ask for a drastic change, to outline a radical refusal of the (social, cultural, political, and/or economical) *status quo*. In the eternally identical time imposed by the neo-liberal system, the ones who revolt end up creating a *vulnus*, a difference that is able to produce a suspended and heterogeneous temporality (Amato 2019: 30-34), in a way that is highly reminiscent of what Benjamin said about what he called revolutions, but we might better call revolts: "the awareness that they are about to make the continuum of history explode is characteristic of the revolutionary classes at the moment of their action. The great revolution introduced a new calendar" (1968: 261).

In no other author more than Camus the distinction between revolt and revolution is more prominent. According to his interpretation, the revolt is a radical negative gesture born from the exhaustion of patience, from the decision to actively pursue the "good of which [the individual] suddenly become[s] aware" (Camus 1984: 8). If the revolution constitutes a negative perversion of the original and creative spirit of revolt, Camus is very clear in pointing out that revolting against the ruling power, one of the "constitutive possibilities of the human being" (ivi: 10-11), is never "egoistic", in the sense that it undermines the entire relevance of the individual within the political. In this

sense, Camus' perspective is extremely pertinent here, because it helps us understand that the mass in revolt is by definition a construction, something that does not pre-exist the struggle, but is rather defined and generated by it. In one of her most recent interventions, Judith Butler directly explored this same issue, analyzing the consequences of a collective occupation of public spaces, considered as a crucial opportunity to rethink what we identify as political:

> Over and against an increasingly individualized sense of anxiety and failure, public assembly embodies the insight that this is a social condition both shared and unjust, and that assembly enacts a provisional and plural form of coexistence that constitutes a distinct ethical and social alternative to "responsabilization". […] These forms of assembly can be understood as nascent and provisional versions of popular sovereignty. […] This assertion of plural existence is not in any way a triumph over all forms of precarity, though it articulates through its enactments, an opposition to induced precarity and its accelerations (Butler 2015: 15-16).

Being together in the public space, marching, protesting or even just staying still, means asking for recognition and legitimacy, producing provisional connections with the others who are there, sharing the same conditions. This kind of alliance is necessarily fragile and temporary, but precisely for this reason it proves to be creative and inventive, to an extent that the monadic "I" is no longer the main subject of the political discourse: "I am the complexity that I am, and this means that I am related to others in ways that are essential to any invocation of this 'I'" (ivi: 68). The collective subject that can be called "We" is defined precisely by its being an *assemblage*, a performative construction made of interconnected openness that stay together to produce an emotional assertion:

> Vulnerability may be a function of openness, that is, of being open to a world that is not fully known or predictable. Part of what a body does […] is to open onto the body of another, or a set of others, and for this reason bodies are not self-enclosed kinds of entities (ivi: 149).

> If we accept that part of what a body is […] occurs in its dependency on other bodies – on living processes of which it is a part, on networks of support to which it also contributes – then we are suggesting that it is not altogether right to conceive of individual bodies as completely distinct from one another […]. The body, perhaps precisely by virtue of its boundaries, is differentiated from and exposed to a material and social world that makes its own life and action possible (Butler 2020: 134-135).

Given the provisional and temporary nature of the bonds that make uprising people stay together, a specific attention towards the moment that generates and makes the revolt happen is indeed needed. In fact, as various recent and more historical uprisings seem to demonstrate (from the Mothers of Plaza de Mayo to the Arab Springs or Black Lives Matter), a crucial role in the ignition of a revolt is played by what we can call an inaugural and unjust death, that catalyzes collective feelings of anger and despair (ivi: 78-79; see also Crimp 1989; Nancy 1991: 15) while also re-creating the bonds and the connections within a certain group. A remarkable example is the desperate act of Mohamed Bouazizi, whose public self-immolation ignited the Arab Springs and highlighted the dramatic life conditions of many young people in vast parts of the Arab world.[3] It is of course well-known that the subsequent attempts of social and political renovation have been highly unsuccessful, but what is relevant to notice here is the amount of collective political potentiality that was unleashed by the death of Bouazizi and the role that collective grief played in the first part of the revolutions.

In a recent analysis of Ejzenstejn's *Battleship Potemkin*, Georges Didi-Huberman focused specifically on the third act of the movie (significantly titled "A Dead Man Calls Out"), in which the Odessa's population visits the dead body of the rebel sailor Vakulinchuk. In this long sequence, a mass of people cries and gesturally expresses sorrow for the death of the man, while progressively acquiring a form of "collective consciousness" (Durkheim 1997). The experience of sharing a radical pain creates a bond and a connection that progressively become anger and desire to act (Didi-Huberman 2016a: ch. III). Moving from an articulated tradition of gesture studies (Grespi 2019), Didi-Huberman shows how the bodily expression of certain feelings (mainly sorrow and anger) progressively and mysteriously become collective, in a sort of contagion [**Figg. 1-2**] that ends up rebuilding the bonds of the collectiveness. Sharing a set of beliefs and values, both in the physical arena or in an immaterial digital

Figg. 1-2 | The gestural eruption depicted in *Battleship Potemkin* (still frames from the movie)

setting, is in this sense the necessary precondition to generate a feeling of belonging within the mass, that is *created* as a political subject precisely by this experience.

The act of uprising is thus inseparable from the pain upon which it is built (Didi-Huberman 2019: 41). It is precisely this common feeling that grants the collectivity the possibility and the courage to act in order to resist an unjust *status quo*, to put into question the unfairness of power and to imagine the possibility of a different future. There seems to be here a crucial intersection between the practices of revolt and the category of desire, already highlighted by Didi-Huberman (2019; 2016b; 2021) and recently used as a key concept in the field of queer political theory (Muñoz 2009; Halberstam 2011; Cuter 2020). The collective desire to act in order to create something different is then enacted through a series of practices that – as already stated – act as irruptions in the dominant aesthetic regime. As many dramatic examples in Palestine (Snowdon 2020), Syria (Della Ratta 2018) and other parts of the world (Yuen 2019) taught us, these acts always imply a certain amount of risk, because they are able to put into question the legitimacy of ruling powers and may thus cause exposure to police or military violence, leading to forced containment or even death. Michel Foucault (2011a; 2011b) devoted his last courses at the Collège de France to the concept of *parrhēsia* and to its archaeology in Platonic and Cynic philosophy. Although unable to reflect on the political value of the concept in the contemporary world due to his death, Foucault provided us with an interesting way of conceptualizing the brave acts of revolt and denunciation that are performed in the public space by uprising groups. In his lectures, Foucault progressively points out two different meanings of *parrhēsia*, showing how both can be conceptualized as forms of truth-telling that someone performs in the face of power while consciously exposing himself to dangerous consequences, or even death:

> For there to be *parrhēsia* […] the subject must be taking some kind of risk [in speaking] this truth which he signs as his opinion, his thought, his belief, a risk which concerns his relationship with the person to who he is speaking. For there to be *parrhēsia*, in speaking the truth one must open up, establish, and confront the risk of offending the other person […] of making him angry and provoking him to conduct which may even be extremely violent (Foucault 2011b: 11).

Through an analysis of Plato's *Lachete*, Foucault goes further in pointing out that the pharresiastic performance is somehow "validated" by the speaker's life, by his desire to put into question his (and others') way of life in order to live rightly and in accordance with his desires (ivi: 149). The *pharrēsia* is then also something that opens the speaker to another risk, that has been more explicitly codified by the Cynic tradition: "this truth-telling now faces the risk and danger *of telling men what courage they need and what it will cost them to give a certain style to their life*" (ivi: 161; emphasis added). In so doing, the pharresiast performs an act of care for the collectivity that is potentially extremely radical; with a performance that can cost his life, he puts himself on the line to denounce an unlivable present or to announce a different possible future. The collective uprisings seen in the past few years seem to be based on a similar dynamic and this focus on the dimension of future (of a specific nation, class, or of the whole planet and of all the creatures that live in it) is particularly poignant in the case of ecological activism and of Fridays For Future more specifically.

Ecological Activism and its Images

If we consider the various forms of uprising that characterized the 21st century, in the always unstable dynamic between embodied spatial performances and online presence, two recurring traits seem to emerge: (i) they were mainly urban phenomena; (ii) almost all of them shared a common desire to question the legitimacy of the economic-political ensemble. Given the fact that contemporary cities are highly controlled and often securitized spaces, it is not surprising that

they proved to be the main spots where insurgencies have begun (Harvey 2012: 117-118). The connection between mass revolts and the dramatic implication of late capitalism at an economic and social level is so crucial that, according to Harvey (ivi: 127-128), any project that aims at reform the *status quo* needs to address as mandatory issues "the crushing material impoverishment of the world's population […]; the clear and imminent dangers of out-of-control environmental degradations and ecological transformations […] and an historical and theoretical understanding of the inevitable trajectory of capitalist growth".

The economic exploitation of the planet in terms of resources and energy reserves has generated enormous transformations that, despite being for a long time at the core of an extensive intellectual debate (Iovino 2008), never really entered the global political agenda until the last decades. The spread of the term "Anthropocene", firstly used by Crutzen and Stoermer (2000) to indicate the current era, testifies to a new sensibility towards our role in the destiny of the Earth as an interconnected system. A growing body of literature has begun to examine the contradictions on which the current environmental crisis is built upon, analyzing the "intersectional" and "hyper-objectual" nature of the phenomenon (McNeil, Engelke 2013; Morton 2013), as well as the economic inequalities that it contributes to generate and that also helps to reinforce (Keucheyan 2016; Dyer-Witheford 2018). The dissemination of other terms such as "Capitalocene" (Moore 2016) or "Plantationcene" are significant as well, because it highlights the will to get a more nuanced understanding of the dynamics involved in these transformations. Still, as Missiroli (2022: 91) has pointed out, these definitions have to do exclusively with the problem of the origin, with identifying what ignited the transformation that we are now living in; in this sense, they seem to lack the ability to help us imagine possible solutions or new ways of inhabiting this world.

To compensate this limitation, two other traditions of environmental thought can be put productively into dialogue to better frame and understand the political potential of Fridays For Future. On the one hand, we can consider the emerging non-anthropocentric paradigm of environmental philosophy (Iovino 2008: 42-66) as an important chance to rebuild the broken bonds with non-human life forms and to expand our conception of what is human to include forms of contamination, co-implication and mutual dependence that were long ignored or overlooked (Kohn 2013; Haraway 2016; Morton 2019; see also the pioneering work by Lovelock 1979). On the other hand, the emergence of collective and radical forms of environmental activism represents a significant but sometimes unacknowledged precedent to contemporary protests. Against the so-called "climate stoicism", a resigned attitude towards the inevitability of the climate collapse (see Scranton 2015), it is necessary to learn how to act and fight back in a transindividual and non-anthropocentric manner, paving the way to another kind of Anthropocene (Stolze 2018: 324, 327). In this sense, the possibility of a "climate insurgence" (Brecher 2017), the necessity to act violently against the capitalist structures behind the environmental crisis (Malm 2021) and the case of the "environmentalism of the poor" (Marinez-Allier 2002; Nixon 2011) are all examples of how it is possible (and necessary) to take action in order to disrupt the *status quo*.

As an ever-growing amount of literature demonstrate (among the others: Graf 2016, chapters 2 and 4; Newlands 2018; Gabrielson 2019), it is not surprising that – in the contemporary interconnected mediasphere – any form of ecological uprising includes visual and media elements in its repertoire. This does not refer solely to the fact that the protests are themselves highly mediatized events, but also to the idea that, when gathering together in a public space, young people participating to the Fridays For Future tend to produce a significant amount of textual, visual and verbo-visual materials. Nevertheless, the idea of meticulously archiving this fragile mass is *per se* complex and not exempt from contradictions if, as Snowdon (2020: 13-21) pointed out, these kinds of archives are constitutively transient, vernacular, and anarchic in their structure. A systematic and quantitative analysis of this extensive set of images – following O'Neil (2019) – although absolutely necessary, goes far beyond the purpose of this article. Without any claim to be exhaustive, what we would like to do here is rather to focus on some recurring kinds of images produced in the Fridays For Future actions, thus sketching a first and provisional typology, that can serve as a basis for future and more structured inquiries in this field. We will focus primarily on images posted on some of the official social pages of the movement on mainstream

Fig. 3 | A meme concerning the gratuity of public transportation posted on the Instagram profile "Fridays For Future Italia" (August 18, 2022)

social media,[4] considering them as well-recognized encapsulations of the organization's core values.

A first category of images that is recurring on these platforms is offered by photo reportages that offer visual evidence of how the great upheavals that we are experiencing impact on specific geographical areas, thus counter-acting the "invisibility" in which the systemic dimension of climate change is relegated (Morton 2013). A more numerically relevant type of image is provided memetic visual remixes produced through a bottom-up approach [**Fig. 3**]. In this case, a creative gesture that is typical of Gen Z is used politically (Hurrelmann, Albrecth 202, ch. 6), adapting well-known cultural contents (such as scenes from *Stranger Things*, *Indiana Jones*, *Rick and Morty* or *Avangers* and many others) to a new context. These images share a generational value, and, in this process of re-appropriation, they become icons of new bonds generated by a common sensibility towards environmental issues. Besides these still very relevant types of images, the vast majority of the visual material presented on the social network pages of Fridays For Future has to do with pictures taken directly from the streets where the collectives' main activities take

Figg. 4-5 | Images of a Fridays For Future Italia's action in Turin (July 28th, 2022)

place. Through both photographic posts and Instagram stories, the user that navigates on these pages can get an idea of what it means to invade the public space together, asking for a change that needs to be both radical and impactful. On July 28th, 2022, for instance, following the activities of one of the Climate Social Camps promoted by Fridays For Future, nearly 500 activists carried out a series of actions in the city of Turin, Italy [**Figg. 4-5**]. Besides the occupation of streets and of other key points of the transportation infrastructures, cloth signs and murals were crafted as forms of protest and denunciation. This practice contributes to transform what can be seen as sites of power (such as the local headquarters of Snam, a gas supplier, or the Intesa Sanpaolo bank) into places where other narratives have the chance to flourish, disrupting the original ones (Della Ratta 2018: 84).

Another image widely displayed during Fridays for Future's collective protests is the picture of planet Earth, depicted in a variety of ways that more or less explicitly recall the famous *Blue Marble* photograph taken in 1972. This choice may at first seems predictable, but it is worth some further analysis. The original image presented the Earth adopting an external point of view, thus abstracting it from the consequences of late-capitalist exploitation, producing a "no-blame" narrative reinforce the ideology upon which the current socio-economical system is built upon. Non coincidentally, this image is often used as a rhetorical device of legitimization for the dominant techno-imperialistic narrative of algorithmic omniscience (see Farman 2010). The presence of this ideological connotation is possibly one of the reasons why the image of the planet became so relevant for Fridays For Future, which even recall it in its official logo. It seems that,

behind the many more or less creative iterations of this image in the public space, a radical desire to reclaim the Earth as it was (and as it may be once again), to detach it from selfish capitalism and its self-destructive consequences, is involved. In this sense, the many images reminiscent of *Blue Marble* seem to serve at least two different functions when re-mixed during the Fridays for Future. On the one hand they metonymically represent the lucrative desire of capitalist governments to squeeze every ounce of residual energy availability from the planet (as metaphorically depicted in **Fig. 6**), while on the other they always imply the possibility (and the desire) for a new beginning, a "return" to a more livable condition [**Fig. 7**].

These images seem to act as icons in the sense outlined by Pavel Florenskij in his quintessential *Iconostasis* (2000). According to Florenskij, the icon entertains a particular relationship whit what it depicts, because it acts as a field of articulation between two different ontological plans: the material (the "here and now") and the divine/immaterial. This in-between dimension generates a specific relationship with the image, that is therefore seen as the place where another world becomes imaginable and visualizable. The figures depicted within the icon are something that physically inhabit a world of possibility that exists and communicates with the material plan. Something similar seems to be at play in the case of the images displayed in the Fridays For Future's mobilizations: the verbo-visual signs that are proudly shown by the participants are platforms that give visibility to the possibility of a different future, while performatively asking for radical political initiatives able of making it possible. If one of the main problems of the contemporary world, especially for the younger generations, is the possibility to reclaim the present in order to imagine the future differently, the "iconic" use of images displayed during collective environmental uprisings is significant of a shared need that belongs to this (partially digital) "imagined community". Through its visual practices, Fridays For Future demands and performatively makes possible a new protagonism for younger generations, whose voice were traditionally excluded by political decisions. What is at stake is the possibility to re-articulate one of the key issues of political activism, that is the right to speak in the decisional process, the possibility to take the floor not just for "us", but for who will inhabit the world in the future, granting them a livable environment.

Fig. 7 | Picture taken during the Fridays for Future mobilization in Rome (March 25, 2022)

Fig. 6 | Picture taken during a mobilization against the decision to include gas investments in the European Taxonomy for Sustainable Activities (May 23, 2022)

Notes

[1] According to the official data concerning climate strikes collected in the Fridays For Future website, in the period between November 30th 2018 and March 25th 2022, more than 15 million people participated directly in protests and forms of collective environmental activism. It should be noted, however, that the major core of this collection of data comes from a bottom-up strategy of strikes report using a Google Form that is currently closed.

[2] The dynamics between the kinetic and the potential dimension of contemporary activism is crucial in a more general sense. While in some cases the media proliferation of revolts' images is the consequence of physical mobilization, in other circumstances the aggregation of bodies begins after and in response to the circulation of visual materials (such as in Rodney King's case; Crenshaw, Peller 1993). The intersections between these two aspects are one of the key points in the contemporary debate on social movements, but at the same time, also other and more "distant" forms of mediated participation, as the so-called hashtag activism (Jackson, Bailey, Foucault Welles 2020), need to be considered in this sense.

[3] The same goes also for other episodes of systematic violence mentioned by Della Ratta 2018 and Snowdon 2020.

[4] Such as the Facebook profiles "Fridays For Future International" (https://www.facebook.com/FridaysForFuture.org) and "Fridays For Future Italia" (https://www.facebook.com/fffitalia), as well as the Instagram profile "Fridays For Future Italia" (https://www.instagram.com/fridaysforfutureitalia).

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On the Aesthetics of Environmental Data. The Work of Forensic Architecture between Forms of Reporting and Artistic Practice

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Abstract

In the framework of theoretical analyses proposed by studies of the "geographies of the Anthropocene", attention is focused on the representation of territories in the convergences between media, technologies and digital cartography. This aesthetic approach finds favourable ground in protest movements which remain as yet unexamined in any depth. Among these, Forensic Architecture – the University of London's whistleblower research centre at Goldsmiths, founded in 2010 – stands out. Composed mainly of scientists, architects, journalists and filmmakers, the team carries out rigorous mapping of environmental data which focuses on imaging as a diagnostic practice, analysing the environmental situation, transforming the way in which data is visualised in civic practice through artistic and performative initiatives, and expanding the canonical boundaries of the fruition of forensic art. This paper aims to focus attention on the practices of Forensic Architecture, whose work is regularly shown in international art or architecture exhibitions, and its reuse of images which find form in denunciation and collective awareness. The article will also examine the audiovisual products documenting a decade of research in the territories of Palestine: "Counter-forensics in Palestine" (2012-2022).

Awareness of the emerging environmental crisis, which has resurfaced strongly in the last decade, is largely defined by the media (Fay 2018; Cubitt 2017; Rust, Monani, Cubitt 2013; Maxwell, Miller 2012), thanks to which there has been a proliferation of representative and self-representative images of social change that has contributed to modifying "or even modulating the ways in which we look at the world" (Lancioni, Villa 2021: 5-11). This has resulted in an iconographic environment 'connoted by' and at the same time 'connoting' a witnessing dimension: the image has become the embodiment of experience and awareness, but it is above all a tool for initiating debate and a necessary part of the social practices of protest (Wilson, Serisier 2010).

From the global communication infrastructure to humanitarian organisations and from community forums to mobile platforms, social networking sites and pages, the media demonstrate that this iconographic environment has become an essential part of the discourse, launching effective alerts and consolidating key elements of a broader information landscape on the crisis (Vaughan 2018). As Josh Greenberg and Joseph Scanlon point out, they do this by hosting the voices of a range of actors, including governments, humanitarian organisations, civic groups and corporations important for the construction of "an imagined community of fate (Anderson, 1990) through which people are bound by a shared experience, however traumatic it may be" (Greenberg, Scanlon 2016: 3).

The element that unites and makes the experience and actions of these actors a community, as Greenberg and Scanlon state, is the image as the embodiment of experience and awareness and as the instrument of a social practice of protest. Image narration takes on a double connotation in this context: firstly, it reproduces reality, raising awareness of events and catastrophes and documenting an event in space and time (Taffael 2016). Secondly, when possible points of view of the event are obscured – and a reconstruction is necessary – it depicts them in an enunciative key: this is a computational image (Eugeni 2021). This view is also chosen because it neutralises the point of view, guaranteeing in addition to the immediacy of the reading - objectivity about the facts. A nearing of the image and what is represented is effectuated, becoming an operational reading of the world.

It is also though a theory of the social uses of technology and data. As a practice – as repeatedly stated by academic Miren Gutierrez, to whom we refer for a more detailed discussion – this data activism practice is becoming prevalent due to the expansion of technology, open-sourced software and surveillance tools (Ottinger 2010), emerging from the hacker and open-source movements and spreading to non-governmental organisations (Milan, Gutierrez 2015). Data activism can include a range of practices

> from digital humanitarianism that uses crowdsourced data collected from victims of disasters and crises (Gutierrez 2018) to environmental sensing by communities concerned with how climate change affects them […]. Several universities – including Amsterdam, Sheffield and Cardiff – and scholars are producing systematic studies to capture the activist practices enabled and constrained by the data infrastructure (Gutierrez 2021: 3).

Data activism can therefore be conceptualised from various perspectives. Firstly, the different methods of data collection can include the use of informants, open and public platforms and registries, crowdsourcing platforms, scraping and appropriation tools, sensors, drones and other primary research (Gutierrez 2018), so the study amounts to an analysis of the devices used. Secondly, it is possible to study the way activists communicate their findings, the practices they adopt – the aesthetic and formal modes (Vercellone 2022). Maps and timelines are the methods most often used to visualise data, but these vary aesthetically depending on the domains in which they are required: human rights sharing and networking platforms, museums, urban spaces, courts and film festivals, to name a few.

The orientation allowed by this image is what Felix Guattari theorised as a possible "response to the ecological crisis […], a political, social and cultural revolution that knows how to reorient its objectives" (ecosophy). The French philosopher stated that this could only happen on a planetary, through practices of experimentation on a social level on shared planes: these practices should be closer to the way of working "of an artist, rather than of the professionals psychiatrists who are always haunted by an outmoded ideal of scientificity" (Guattari 2000: 35).

Instead, we propose to consider a more recent initiative: the whistleblowing action promoted by Forensic Architecture, which investigates violations 'of

human rights, state and corporate violence, but especially what concerns the built and natural environment' (Weizman 2017: 14).

Unlike other agencies,

> FA's participatory practices and new forums build bridges to connect counter-stories with audiences. FA employs what Ristovska calls strategic testimony or new approaches to content distribution (Ristovska 2016). Similarly, FA videos build bridges between counter-stories and different audiences, using new spheres of dissemination and performance. Several elements of FA's activist practices translate into credibility (Gutierrez 2021: 16).

The basic idea is that when applied as a method of scientific investigation to the destruction of the environment (be it built or natural), architecture, a constructive science, can historicise its process by identifying causal chains, making them visible through the tools of the trade and thus leading to the identification of causes and culprits.

In contrast to the usual practice of representing data collected and analysed by other institutions (Parikka 2015; Goddard, Parikka 2011), Forensic Architecture also demonstrates the methods and tools of observation and measurement: inept attempts at concealment or denial of facts, beyond the threshold of perceptibility, are often unmasked. We will give an account of this in the following pages in which an initial analysis of forensic investigation methods is proposed.

With the intention of clearly highlighting the elements that characterise the evolution of the working methods and applications used by Forensic Architecture, the paper will then proceed to an analysis of the audio-visual products documenting a decade of research in the territories of Palestine: "Counterforensics in Palestine" (2012-2022).

Forensic Architecture

Forensic Architecture is a whistleblower research centre at the University of London at Goldsmiths. The agency was founded in 2010 by Eyal Weizman together with a group of fellow architects, artists, filmmakers, journalists, scientists, and lawyers, who undertake independent research or act on commissions from international prosecutors and environmental and/or local groups.

Dealing with the work of Forensic Architecture involves engaging an expressive language characterised by *assemblage* in the first phase of work (until 2019) and visual layering in the second and more recent phase. This contributes to the creation of unique documentaries. The performative character of its work is the rendering of the environment through an analysis and contextualization of amateur visual material, time-lapse (reference to the works of Godfrey Reggio) and infographics as the outcome of studies and research at the Centre.

Recently, in line with the latest forms of spatial representation and in dialogue with interactive spatial and temporal cartographies, from traces either open source – images of control produced "from below" and circulated on blogs and social media – or released by governments (only in the environmental sphere; on other macro-themes such as violence, Forensic Architecture's analysis starts from audio files), the spaces where crime or violence have occurred are reconstructed.

As Weizman, Forensic Architecture's founder, recalls, there are three phases of work (Weizman 2017: 31-42) through which the collective moves: the *field*, where data is sought and collected; the *laboratory*, where it is analysed; the *forum*, that is the moment of publication of the data and thus of visibility, as the very etymology of the forensic word suggests.

Weizman says: "We use the term 'forensic', but our work seeks to reverse forensics as currently practiced and to restore the *forensic turn*", understood as the ways in which state agencies, police or intelligence services examine the people they seek to control. Forensic Architecture monitors state agencies (and sometimes corporations), challenging their claims and, to the extent possible, their near monopoly on information. Implementing a reversal of gaze produces a process called 'counterforensics', a neologism of Weizman's. Counterforensics turns the state's means against the violence it commits. This depends on both opacity and transparency, with the former being the condition for the latter: "camouflage from state and corporate surveillance, data protection and anonymization, as those who work in this field know well, are the necessary prerequisites for reporting political crimes" (ivi: 68).

The task of the forensic architect, in addition to investigating the state's means of inquiry, is to examine the politics of the forums in which evidence is presented. The forensic architect must assume that no forum is neutral: it is necessary to dig into sources and produce real data, an action that is not always immediate. Most investigations take place in border areas with extraterritorial conditions that are outside the established state jurisdictions and their criminal justice frameworks. These are places where sovereign jurisdiction is not clear

> such as in the Mediterranean Sea, [she] has disintegrated (as in some parts of Somalia or Yemen, where militants headquarter and drone assassinations take place), or has been suspended and is under siege (Waziristan, Gaza, the West Bank, or the remote highland frontiers of Guatemala in the 1980s). To that extent *forensis* is forensics where there is no law (ivi: 69).

In order to make their research accessible and thus to reach the third and final phase of work – the *forum* – the group carries out rigorous mapping centred on imaging as a practice of environmental data diagnostics: it processes the environmental situation, transforming ways of visualizing data through artistic and performative action (Fuller 2005; Montani 2017) – in the perspective proposed by Guattari (2000) – as a univocal language.

The procedures that mobilise the collective are condensed into three, sometimes converging, tendencies: the emergence of telling a fact, the inability of locals to publicize the issue, and the availability of footage or documentation to be made public. This network of implications is grafted onto the productions attributable to whistleblower artists and to videoactivism (Wilson, Serisier 2010; Waltz 2005) practices,[1] Harding's definition dating back to the late 1990s (Harding 2001). It refers to authors who use video as a tactical tool to deter violence, document abuse or expose misconduct of a government authority: three actions that form the basis of Forensic Architecture's research activity.

Through a wide and sophisticated range of technical detection, calculation and representation systems, Forensic Architecture fabricates in the laboratory the scientific and media perceptions of stealthy, widespread and potentially environmental dangerous phenomena on a daily basis.

> It is at this level – that of sensors, calculators, data processing and rendering – that the sensory delegation and replacement of human perception by technological media takes place, in a deployment of totally non-human capture and projection equipment oriented towards equally more-than-human environmental processes. The result of these processes is a modeling and a data design that algorithmically elaborates and translates the *insensitive* into a variety of informational outputs (D'Aloia, Rasmi 2021),

with the intent of rationally raising awareness. The laboratory itself spreads across space in Guattari's vision of creating a device aimed at ensuring a production of collective subjectivity that is free and capable of reforming itself within and through the device itself.

The next phase is the forum, which is no longer confined to closed arenas but is increasingly spread across a broad spectrum of forms and channels of media. The data collected and transformed into data visualization (graphs and 3-D models), footage from above (satellites, drones) or below (helmet cameras, social media, electronic devices) and interviews are made edited into videos of between 10 and 20 minutes in length. These present not only the issue in question but also the way of working, the types of sources and the methods of investigation which are meant to be presented in restricted environments such as international tribunals, truth commissions, city courts, human rights and environmental reports and, as was the case on one occasion, at the UN General Assembly. Above all, the goal is to expand the canonical boundaries of fruition. The researchers display their work in exhibitions and in cultural, architectural or art institutions that allow the work to be presented in its historical and theoretical context, in publications in order to generate debate on the issues and on their own personal websites in order to nurture shared knowledge and consciousness: "Evidence never speaks for itself, but it does speak through its surrogate experts" (Weizman 2017: 68) says the founder of Forensic Architecture. Such visual elements are an integral part of the ecological activism promoted by the agency, which, as stated above, are not activated through media events or shared protests on a local or global scale, but rather create awareness-raising artifacts in a context of public entertainment.

To facilitate dissemination, the idea of meticulous-

ly archiving content which is otherwise difficult to find and analyse becomes important. This is where video activist action, in itself formally anarchic and a form of protest, adopts a revolutionary (social, cultural and visual) approach. And herein lies the putting into practice of the concept of ecosophy promoted by Guattari: in addition to identifying the methodologies of analysis (3D modelling, cartographic regression, machine learning, photogrammetry, virtual reality), the Thesaurus proposed by the site becomes a visual tool, whose references can be political (sorting the contents 'By Category', i.e. Chemical attacks, Environmental Violence, Fire, Forensic Oceanography) and geographical (sorting them 'By location' and through the map).

Despite the relative newness of the center, the immense amount of work it has produced prevents an analysis of all its video material to date. We will therefore proceed with an analysis of the most used practices that demonstrate an evolution in academics' treatment of environmental data by analysing the studies contained in the "Counterforensics in Palestine" series. Palestine is the birthplace of the story that led to the creation of Forensic Architecture. Also, these investigations mark the launch of the FAI Unit, the first of its kind in the Middle East: a new generation of visual investigations to monitor and document Israeli war crimes and apartheid.

Through the analysis of these works produced ten years later, we attempt to intuit what has been the ecosophical response of Forensic Architecture's research in relation to the recent accelerations in visual practice (mentioned in the first paragraph) and environmental changes, along with political and research challenges.

The Environment is not Collateral Damage: Only Time will Tell

The environment, whether built, natural, or a mixture of both, is not a neutral backdrop against which violence takes place. Whether the cause is world market domination or the Cold War, the environment is the main protagonist and not unintentional collateral damage of attacks. It is precisely the study of "Counterforensics in Palestine" that embodies the statement of the agency's founder. Fifteen videos, five of which incisively denounce environmental violence: *The use of White Phosphorus in Urban Environments* (2012); *Destruction and Return in Al-Araqib* (2017); *Conquer and Divide* (2019); *Herbicidal Warfare in Gaza* (2019); *The shelling of Khudair Warehouse: chemical warfare by Indirect Means* (2022).

A decades-long and ongoing history of colonisation, domination, partition, and violence, a history so generously offered by the Palestinian conflict, might otherwise seem futile. It is an example of how architecture is used to create "assemblages of evidence" that locate elements in space and study the spatio-temporal relationships between them.

Until *Herbicidal Warfare in Gaza*, the studies conducted by Forensic Architecture were characterized by a uniquely ecocritical reading. Let us look in detail at this 2019 work to better understand how the narration of this type of violent attack had changed in just three years. The 2019 study was conducted over a five-year period in collaboration with the Israeli NGO B'Tselem.

But let us make some preliminary remarks. The occupied Gaza Strip has been slowly isolated from the rest of Palestine and subjected to repeated military incursions. These incursions intensified from September 2003 to fall 2014. Over the decade the borders have continued to be changed, with the local population losing more and more territory.

The borders around Gaza – one of the most densely populated areas on Earth – continue to be hardened and heightened into a sophisticated system of under- and overground fences, forts, and surveillance technologies. Part of this system has been the production of an enforced and expanding military no-go area-or 'buffer zone'-on the Palestinian side of the border (Forensic Architecture).

Since 2014, the Israeli army's clearing and demolition of agricultural and residential land near Gaza's eastern border has been supplemented by unannounced aerial spraying of crop-killing herbicides. This continued practice has not only destroyed entire areas of what was once arable land along the border fence, but also crops and farmland hundreds of meters deep into Palestinian territory, resulting in the loss of livelihood for Gaza farmers. Working closely with the Gaza-based Al Mezan Center for Human Rights, the Tel Aviv-based Gisha Legal Center for Freedom of Movement, and the Haifa-based Adalah Legal Center for Arab Minority Rights, Forensic Architecture examined the environ-

mental and legal implications of the Israeli practice of aerial herbicides spraying along the Gaza border. The result is the extirpation of the local culture by destroying vital resources, drying up cultivated fields, forests and water sources. The goal is a long to critically erode life-sustaining water sources over a long period of time. When working in Palestine, researchers state that they sometimes feel like coroners - investigators of a spatial murder – the "spatiocide" (Hanafi 2004). The effects of environmental degradation can linger for years after the fighting ends, leading to all-encompassing devastation.

> Our investigation shows that each spray leaves behind a unique destructive signature. No two aerial sprays will have the same effect, nor can their damage be reasonably predicted by the army, since the location where the toxic chemicals land, and their respective concentrations, depend heavily on the direction and speed of the wind relative to the flight path of the aircraft. This practice weaponizes herbicide spraying as a belligerent act, designed to 'enable optimal and continuous security operations' (Forensic Architecture).

The images of seemingly nonviolent events – an airplane flying over plots of land – that follow one another in the video are cases in point of how Forensic Architecture's analysis demonstrates how vital a thorough reading of the visual material and a frame-by-frame analysis is in the context of denouncing anthropocentrism. They provide a broadening of the perspective of the representation of violence, and consequently also of what constitutes evidence of it: first and foremost, the data-images from the studies conducted by the agency's visual architects on the repertoire of images produced from below. These consequently trigger a search for data in order to produce device-images from datasets that, though disconnected from the amateur datasets, are made to engage in a dialogue with them. In this, as in previous works, it is the timeline (repeatedly staged as in *Destruction and Return in Al-Araqib* in 2017) which drives this dialogue.

Everything starts with amateur videos denouncing and documenting the facts: a form of surveillance from below conducted by the inhabitants of Gaza towards the oppressor; a form of "counter-surveillance". Methodologically, this material seeks to demonstrate a shift between two distinct architectural approaches: on the one hand, the source material for the study is remote sensing in the field and culture monitoring through satellite imagery. This is followed by the second approach: data images generated with reconstructions in fluid dynamics which are fundamental to the understanding. The latter practice is used for issues involving fluid action: the space occupied by the gas becomes a grid for calculating the most severely damaged areas. On satellite photographs, environmental degradation on an extended time scale is highlighted. The effects of environmental degradation can linger for years after the fighting stops, leading to totalising devastation.

As much as actions of environmental degradation such as this are not considered violence, Forensic Architecture's initiative demonstrates how there needs to be a broadening of the concept of what can constitute violence, and consequently also what amounts to evidence.

The use of environmental data as evidence of armed conflict raises not only scientific, but also legal, political and, above all, representational questions. The representation of the causes of environmental violence requires the creation of complex structures useful for dissemination, with the specific intent of highlighting the issue but also reclamation of a world which no longer exists. In this sense, the narrative technique used by Forensic Architecture is temporal reconstruction: forensic analysis allows the creation of visual timelines through which it is possible, in the immediate future, to have a complete picture of change over an extended period of time.

Two years after *Herbicidal Warfare in Gaza*, the same geographical area, the same motivation: Forensic Architecture documents yet another violent environmental attack. But the technique has changed. If the only possible reading in the previous case was temporal and the only source was visual processing (we said fluid dynamics, but thermodynamics is also often used), from 2020 onwards the *forensic turn* seems to remodel the vehicle of the message. It relies solely on a visual apparatus in which a strong ontological realism and the perception of what happened (epistemic realism) coexist. There is no longer an assemblage but a superimposition of data: the study of time is superimposed on the study of space. Forensic Architecture calls this distinctive line 'field causality', referring to indirect, multidirectional forms of causality distributed over extended space and time. The in-

creasingly pervasive presence of camera devices has allowed the agency to expand artistic experimentation in this way.

This is evident in *The Bombing of the Khudair Warehouse: Chemical Warfare by Indirect Means,* where the aesthetics of data presentation become more refined and complex. On the evening of 15 May 2021, Israeli occupation forces bombed the Khudair Pharmaceuticals and Agricultural Tools Company, Gaza's largest agricultural chemical warehouse, in Beit Lahiya, where around 50 per cent of all the vital agricultural chemicals used in the besieged Strip were stored. The warehouse consisted of six rooms totalling 2,700 square meters and was surrounded by Palestinian houses and agricultural fields. Incendiary shells detonated tonnes of toxic pesticides, fertilizers and agricultural chemicals, triggering a toxic cloud that enveloped the northern Gaza area.

Among the innumerable video and audio documentary material assembled, it is no coincidence that, with regard to crimes against the environment, the analysis always begins with an image, be it a photo or a frame from amateur videos. The investigation begins with the subject-eye; next, the laboratory considers and reworks only video material capable of making evident the need to simultaneously communicate material, media and testimonial content. Forensic Architecture calls it "Architectural Image Complex":

> What we refer to as the architectural image complex is a method of assembling image evidence in a spatial environment. The architectural image complex can function as an optical device that allows the viewer to see the scene of the crime as a set of relations between images in time and space. It can also be used as a navigational device to help move between images, exploring a space that is at once virtual and photographic (Weizman 2019: 100).

The 'complex', to which Weizman convincingly refers, belonging to the architectural image, thus replaces both the thematic classification system of the archives and the linear transition between the images in the before-and-after montages, as was the case in previous works.

The main consequence is that this type of image confronts us with reality and the testimonial power of the source image as much as with the depiction of the data. This is possible, as anticipated, thanks to the layering of data present in the device-image; the technique most widely adopted in this regard, and seen widely in use for example in pandemic reports, is photogrammetry:

> Photogrammetry is a process by which large numbers of still photographs, of an object or environment, can be combined to create a precise and navigable 3D model. Photogrammetry software computes distances within a 2D image by a process of triangulation, taking into consideration metadata such as the focal length of the lens of the camera that captured the image Specific technical software then arranges every pixel from multiple overlapping images in 3D space, creating a 'point cloud' made of often hundreds of millions of individual pixels, or 'points'. This point cloud can be anchored to its location in the real world (Forensic Architecture).

Let us examine the details of *The Shelling of Khudair Warehouse*. Original photos and drone footage and dozens of images and videos of the site available online, as well as CCTV footage, are used in order to construct a 3D model of the warehouse. To authenticate this 3D model, fragments of photos are superimposed. The study related to the Architectural Image Complex also refers to the process the agency undertakes in order for the images to 'speak for themselves' and to assign realistic value to them as well as to contextualise them.

For example, none of the CCTV videos found contained an exact date. Looking for time indicators, the investigators conducted a shadow analysis to determine the approximate time of the attack. They then synchronised the videos to determine the timing of events, establishing the time when the first canister hit the warehouse at around 17:46, geolocating the camera and identifying the projectiles as coming from the southeast. In addition, the study of the trajectory and smoke tail allowed the architects to recognise the M150 Smoke HC 155mm ammunition developed by Israeli arms manufacturer Elbit Systems: an 'advanced smoke projectile' and a new type of projectile designed to split into five separate containers, all of which emit high-density smoke.

A second example is a video by Abdelsalam Abu Halime. On the 15th of May at 5:52 pm Abu Halime filmed a thick column of black smoke rising from the Judea warehouse. The agency geolocated two frames of this footage and measured the size of the plume. To

estimate the extent of the plume they used meteorological data such as wind direction from the day of the attack. Within the first hour the toxic plume had affected an area of approximately five point seven square kilometres, spanning Bethlehem and its agricultural zones as well as a densely populated Jabaliya refugee camp. The air concentration of some of the chemicals exceeded acute exposure guideline levels or Acute Emergency Levels (AEGL). Mapping extracted from a satellite image showed the data from the soil acidity study of the surrounding areas.

> We shared our findings with experts at the UK-based conflict and environment observatory, which stated that the nature of the chemicals stored suggested a risk of significant environmental harm. The observatory also pointed out that chemicals discharged into the underlying soils with water from the fire, potentially contaminating groundwater beneath the site (Forensic Architecture).

Areas hundreds of metres away from the warehouse have concentrations of sulfur dioxide and phosphorous pentoxide exceeding AEGL 2, causing irreversible damage to land and human health. This attack was the first in a series of punitive strikes – near Jabaliya, an area east of Shejaiyyeh, in Gaza – by the Israeli occupation forces, which deliberately targeted civilian economic infrastructure and the agricultural sector.

Geological resources were once mapped through surveys and field observations, and today are mapped with advanced remote sensing technologies. As Eyal Weizmann suggests, this reckoning of the earth is now more closely linked to the 'increasingly complex bureaucracy of calculations that include sensors in the subsurface, ground, air and sea, all processed by algorithms and related models'.

Similarly, the practices of meteorology become media techniques that make sense of the dynamics of the sky; geology is an excavation into the earth and its secrets that allows us to see not only the present moment unfolding into a potential future of exploitation, but also the past buried beneath our feet. Depth becomes time.

This brings to mind a link with what Georg Simmel (Simmel 1998) pointed out in a short essay on ruin, also highlighted by sociologist Sonia Paone, who states how

> architecture is a victory of the spirit over nature, a balance between mechanical matter and the formative spirituality that transforms it. But this marvelous equilibrium is broken the moment the building falls into ruin, revealing a cosmic tragic nature. This cosmic tragic nature, which in the cases considered by Forensic Architecture is not due to decay and neglect but to violence, thus becomes the starting point to return to a state of equilibrium in which the reconstruction of form, albeit virtually, is not so much and only a victory. It is the affirmation of truth and justice (Paone 2022, my trans.).

Forensic Architecture does so by analysing the causes and the repercussions – in the short and long term – of environmental disasters that affect populations all over the world, choosing to communicate through, as Guattari suggests, a universal language: the art of producing images.

Notes

[1] Video activism arises from the need to reconstruct news from the bottom up to prevent commercial and institutional media from giving only one interpretation of the facts.

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Prosthetic Sensorium

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Collective sensitivity
Environmental protheses

Abstract

This article investigates the transition of the individual body sensorium into a collective global techno-sensorium extending the perception and mediating the ecological sensitivity of the human. Examples of extended body protheses (e.g. satellites, sensor technologies) and their functioning are used to explain the inter-relationships of a proliferating techno-sensorium that activates environmental protheses such as “biorocks”, glacier blankets or anti-forestation listening technologies.

The following work discusses the *intra-actions* and relationships of humans and non-humans within the environment. In co-evolution with their technologies, organisms perform material engagements in which they transform matter into *prosthetic* body extensions, that allow them to expand their *intra-acting* capacities within the world. This work illuminates the developments and impacts of *extending* organisms with a special focus on the humans' expansion of their sensorium and cognitive perception through the media of sensor technologies. Electronic sensors – a primary prosthetic sense in the contemporary era – are joined together into monitoring stations, extended multisensorial bodies floating as buoys in the ocean, integrated within forests, erected on mountains, and jettisoned into planetary orbit. Increasingly connected and complemented by world-spanning network systems like the internet, this *techno-organic sensorium* constitutes an environmental *intra-structure*, allowing the human to perceive the Earth as such, and even to "feel" it on an affective or emotional register. As planetary crises mount, this sensitivity is a necessary precondition for survival, inculcating the possibility of political action and policy change. It acts as the ground for the emergence of *environmental prostheses*: human-made interventions augmenting and supporting dysfunctioning ecosystems and their inhabiting lifeforms. At the same time, these technological assemblages consume massive amounts of material resources and energy, at once expanding knowledge of the planet's delicate ecological relations and contributing to their destruction.

The Naked Body in the Chaos of Lifeforms

Throughout time, the human species – in the same manner as other lifeforms – has developed and sharpened its capacity to sense environmental phenomena in order to survive in harsh environments. Based on the experience connected to the stimuli from the outside world, the human learned to rely on its senses. The ability to detect chemicals in the air (Curnoe 2015), taste potential toxins in the food, hear the presence of a predator, or feel the earth-shaking, constitute a multisensory learning-act that attributes experiences with meaning. Feeding the senses with new experiences was crucial to understanding the environment and navigating through a chaotic world full of potential threats for one's survival. Each form of bodily sensed stimuli affected, and still affects, an organism's decision-making, reaction, and intervention within its surrounding ecosystem. These sense-mediated interlocking feedback loops of living beings establish an *environment* through *intra-action*, a term coined by physicist Karen Barad to describe the mutual constitution of entangled agencies. Compared to *interaction*, which assumes that there are separate individual agencies that precede their interaction, the conception of *intra-action* recognizes that distinct agencies do not precede, but rather emerge through, their *intra-action* (Barad 2007).

Considering an environment as being a space where living entities are *intra-acting* in complex dependencies, the notion of an individual organism separate from its environment dissolves. Instead, the individual might only come into being *through* its environment, in a process that philosopher Alfred North Whitehead calls *concrescence*. Jennifer Gabrys, a researcher on the environment and digital technologies, summarizes Whitehead's theory of *concrescence* describing it as "ways in which actual entities and actual occasions are realized and joined up as distinct and immanent creatures" (Gabrys 2016).

Philosopher Timothy Morton suggests that "what is called environment is just lifeforms and their extended genomic expressions" (Morton 2021), referring to Richard Dawkins' concept of the *Extended Phenotype*. Based on the *theory of evolution by natural selection*,[1] Dawkins states that characteristics of a lifeform's genes express beyond their individual bodies, affecting and shaping their environment. This concept, for example, takes form in the creation of bird's nests [**Fig. 1**; **Fig. 2**] or termite's mounds [**Fig. 3**] and in parasitology, even through "the expression of a parasite's genotype into the phenotype of its host" – manipulating their host's morphology and behavior (Mehlhorn 2008). Morton summarizes, "when you think of things like that, there's really no difference between thinking about what is called an ecosystem and what is called a single lifeform" (Morton 2021).

The applied conceptions of *intra-action* and *concrescence* might only establish an environment *through* organisms sensing their surroundings and reacting according to the sensed *stimuli* – an operation leading to the reciprocity of actions with other enti-

Fig. 1 | *JoaodeBarroemguanandi*, Mauro Halpern. Rufous Hornero in its nest. Their extended phenotype is made out of large thick clay placed on structures like trees, buildings or telecommunication posts. Besides being of use as a breeding site, the enclosed shape of the nest also reduces predation risk

Fig. 2 | *Namibia Webervogel-Gemeinschaftsnest*, Kürschner. The shared nests of the Sociable Weaver are a collectively constructed extended phenotype of the species. They are used over generations and can host hundreds of birds incl. other species

Fig. 3 | *Paesaggio savana con termitai in Guinea-Bissau*. Termite mounds are a collectively constructed extended phenotypes serving as common dwellings for the termite tribe

Fig. 4 | *Prosthetic toe,* Jon Bodsworth

ties. This continuous *intra-play* of lifeforms and their extended phenotypes is mediated by the organism's sensing and responding capacities. The *environment*, then, constitutes by living entities and the transformation processes of matter into their bodily extensions. All these converging agents – organisms and their extensions alike – are effects of their *intra-actions*. According to Lambros Malafouris, professor of Cognitive & Anthropological Archaeology, organisms perform a process of cognitive becoming through "a saturated, situated engagement of thinking and feeling with things and form-generating materials" (Malafouris 2014). Organisms that feel the environment and feel themselves in this environment, do so not least because – as media philosopher Pietro Montani explains – their body and sensorimotor apparatus become *all one* (Montani 2020) with their *extensions*, as a result of material engagements. In an environment that – as a whole – is an effect of *intra-actions*, the exchanges between organisms and matter are a substantial part in the process of an ever-evolving material ecology in which bodily *extensions* are technological *pathways* (Bateson 1987) of mutual *becoming* and *acting* because of their fusing powers capable of linking entities within the environment.

A Cosmos of Extended Phenotypes

On a day in 1997, archaeologists examined an artifact in the cemetery of Sheikh 'Abd el-Qurna at Western Thebes (University of Basel) that researchers from the University of Manchester (University of Manchester 2010) would later describe as likely to be the world's oldest prosthesis. The *Cairo Toe*, crafted out of wood components and bound together with leather thread, was found on the right foot of a female mummy [**Fig. 4**]. Scientific tests dated the prosthesis back to the time between 950 to 710 BCE (Ibidem). Next to being a cosmetic replacement of a missing body part, this prosthesis was designed to help its carrier to walk correctly and to improve their balance.

The term *prostithenai* emerged in Greece in the 16th century and is composed of the prefix *pros* "in addition" and the verb *tithenai* "to place" – today meaning "an artificial part of the body". Following this definition, the *Cairo Toe* represents well what is commonly known to be a prosthesis. However, the term *prosthesis* includes per definition more than only a medical body-replacement. The psychoanalyst Sigmund Freud described the human as a *prosthetic God*, that – through the use of science and technology – creates prosthetic tools that are "perfecting his own organs, whether motor or sensory, or is removing the limits to their functioning" (Freud 1930). Freud displays the human body as fundamentally imperfect and dependent on tools to extend its natural capabilities to protect itself against the forces of nature (Ibidem). These prostheses enhance parts of the body to expand the physical or cognitive capacities of its carrier. In the words of architect Mark Wigley, prostheses are essential foreign elements (Wigley 1991) that reconstruct the human body, transform its limits and extend and convolute its borders.

The concept of a *prosthesis* can essentially be understood as one of an *extension*. However the term *prosthesis* is being used due to its additive, enhancing, and integrative nature as a thing that itself exists in a temporary state of technological evolution and allows an entity to prosthetically expand its capacities of action within its environment. Malafouris sees *things* as "dynamic, perturbatory, mediational means whose presence has the potential of altering the relationships between humans and their environments. New artefacts create novel relations and understandings of the world. New materialities bring about new modes of acting and thinking" (Malafouris 2019). His conception of the mediative capacity of *things*, however, cannot be applied to humans alone but counts for any other entity that is able to extend itself through the means of prostheses. The creation of an extension implies having an intended benefit of some kind for the organism that creates or *carries* it and can therefore be understood as a prosthesis for this entity. From the perspective of other entities that come in contact with that prosthetic intervention and are affected by it, but not intentionally profiting from its enhancing functions, it would not necessarily be perceived as a prosthesis to them. In that case, however, the prosthesis of one or multiple organisms still becomes a *pathway* to other entities as well, mediating certain possibilities of *intra-action* between them.

As supplements for human capabilities, prostheses are often created with the intention to protect or mobilize the body, for the communication of thoughts and ideas, the production and archiving of knowledge, and much more. Considering the expanded definition of *prostheses*, tools like hand axes, created 1.8 million years ago (Columbia Climate School 2011), could already be seen as the earliest prostheses. Playing an essential role in the history of human evolution, Malafouris understands the making of stone tools not as the product of thinking, but as a way of thinking, in which they "bring forth and constrain the organism's possibilities for action and imagination". He further argues: "Our forms of bodily extension and material engagement are not simply external markers of a distinctive humanmental architecture. Rather, they actively and meaningfully participate in the process we call mind" (Malafouris 2019). Continuing this train of thought, the organism's mind stretches beyond its skin into the environment and takes form in the material world.

Next to those early invented stone tools, the aforementioned conception of prostheses would also include the huts found on the archaeological site Terra Amata in Nice, dating back about 380.000 years (Tattersall, DeSalle 2019). Their simple architecture out of a stone circle and branches served as a prosthetic shelter. It extends the *skeleton* of the human bodily structure to protect it from the elements, predators, and other people (Lorek 2018). Likewise other lifeforms', humans' *extended phenotypes* take shape as

prosthetic extensions that expand the bounds of the living organism (Feerick 2019) under the influence of their environment. Both determined by and mediated through technology, the organic evolution of the human species continues (Neutra 1954) and materializes within the transformation of raw matter into prostheses that express in myriad variations of extended phenotypes. In this way, "we have always become the humans that we are in interaction with the technologies that we work with", states Peter-Paul Verbeek (2021), philosopher and expert in the ethics of technology.

The media theorist Friedrich Kittler instead, radically detaches technology from its role of prosthetically *serving* the human and declares in an interview, that "one can construct a completely independent history of technology in which one machine replaces another machine, and no machine replaces man" (Bramkamp, Fedianina 2002). Following this notion, Kittler attributes machines with a certain autonomy and grants technology an evolutionary development equal to one of living beings such as humans. In contrast, thinking his idea along the lines of Barad's conception of *intra-action* and Montani's understanding of our relationship with technology as one of reciprocal "feedbacks continuously modify[ing] the practical and cognitive behavior of the human being" (Montani 2020), there can be no autonomously developing entities in this world. Nevertheless, Kittler offers a non-hierarchical way of thinking in which technology is recognized as an agency that has an equal share in the simultaneous evolution and establishment of co-constitutive relationships amongst other lifeforms within the environment.

The notion that a separate *natural* environment exists in parallel with a human-made *artificial* one dissolves when considering that the extended phenotypes of all living things arise from the same process of converting matter into bodily extensions. There is no difference between a spider's woven web to catch prey and prosthetic tools built by humans to hunt other lifeforms for food. Or between a beaver's dam and the human wooden huts in Terra Amata – or even contemporary architecture. If viewed in this way, they may differ only in the sense that the human creates prostheses on a different level of complexity. By virtue of their materialization, humans' prosthetic extended phenotypes coexist with non-human extended phenotypes and collectively establish and constitute the environment.

Some prostheses might serve a collective body more than the individual one and obviously, every prosthesis has its limitations within its operating context and by its material, construction, or aesthetic properties. The extended phenotype of the humans reveals itself in a scaffolding of complex chains of prostheses – each of their links is unique in its performing actions and operational *pathways*, yet depending upon one another to supplement each other's functions. It might need some mental deconstruction work to recognize the purpose of highly intertwined and complex societal ones compared to an individual's endogenous body parts like the lungs, the heart, or the brain. Yet, as distant as these systems might seem from the fleshly organism, they are the product of its mental capacity and were brought into existence by its mind (Feerick 2019; Malafouris 2019). Therefore every human artifact, whether the hand axe, the wheel, architecture, governments, the Internet, or the 7139 worldwide spoken languages (Ethnologue), are to a lesser or greater extent advanced manifestations of the human extended phenotype. All of these prostheses share their enmeshment within the environment as interstitial elements extending, connecting and affecting the actions of humans and non-human entities alike – sometimes they do so in unfolding their function as intermediary agents to such an extreme that they forge mutual or even parasitic and suppressive relationships between other entities.

Constructing a Prosthetic Sensorium

The sensorium mediates the humans' perception of the environment. Over the entire evolutionary history, this sense-apparatus developed through natural adaptation (Krantz 2012) to ensure survival in the best possible way. The interplay of many sensory organs like eyes, mouth, ears, nose, and skin form the humans' sensorium which is responsible for the reception and interpretation of stimuli from the phenomenal world (Ingold 2000). Stimuli, such as light or sound, are the data organized and interpreted by the brain. This data becomes information and constitutes a subjective reality, based on previous experiences and their attributed meaning. This perception of the world determines the behavior of humans; making them responsive, and guides their invention of prostheses. In

turn, the prosthetic body augmentations mediate human actions within the environment. In other words, how humans understand and respond to the world is equally enabled and limited by their sensorium.

The sensorium and perceptive register, however, stretches beyond an organism's body through their technological extensions. The anthropologist Tim Ingold concludes Bateson's example of *the Blind Man's Stick*,[2] stating: "It would be more appropriate to envisage mind as extending outwards into the environment along multiple sensory *pathways* of which the cane, in the hands of the blind man, is just one". Bateson, an anthropologist and social scientist, essentially conceives body-extending "objects" as *pathways* through which information can travel. In his understanding, this "includes the *pathways* of sound and light along which travel transforms of differences originally immanent in things and other people – and especially in our own actions" (Bateson 1987).

Incoming sunlight might stimulate – sometimes even overstimulate – one or multiple sensory organs that receive the data. The eyes and the skin activated by the sunlight transform the sensed data through receptor cells into electrochemical signals (Eagleman 2015 quoted in Park; Aldermann 2018) that are sent to the central nervous system. After entering the brain, these signals get processed and actuate the body to react to the sensed signal. This process creates a very personal experience of the surrounding world – an individual reality – that activates a very individual response as a reaction to the sunlight. One kind of reaction to protect the eyes could be the creation of a prosthetic body extension that covers them from the bright light and simultaneously enhances sight [**Fig. 5**].

Seeing the human species as an *intra-acting* organism within the environmental context, one might notice that it relies not only on its own senses to survive. The individual's sensed reality can fuse with the sensing abilities of non-human lifeforms. Observing how other beings behave in specific contexts and interpreting their actions can already be seen as a form of extended human sensing capacities. For example, experiencing that some lifeforms suddenly start to flee might be construed with a correlating danger that can also become a threat for the human – it need not matter whether it is due to a predator or an earthquake approaching. Reading and understanding other lifeforms' behavior is a form of hijacking their sensing capacities for one's advantage. The coal miners actively practiced this living augmentation throughout the 20th century, using the canary's sensing abilities as a prosthetic utensil to extend theirs. The appropri-

Fig. 5 | *Inuit Snow goggles from Alaska*. Made from carved wood (top) and Caribou antler (bottom), Jaredzimmerman (WMF). Eyewear designed by civilizations in Alaska and Greenlan

Fig. 6 | *Pigeoncameras*, Julius Neubronner, Neubronner's pigeon cameras were meant to be used during the First World War and are an early precursor to drones.

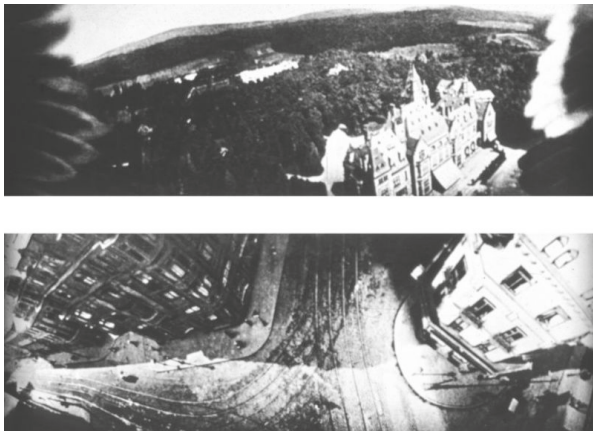

Fig. 7 | *Pigeon wingtips*, Julius Neubronner. Aerial photograph taken by a pigeon

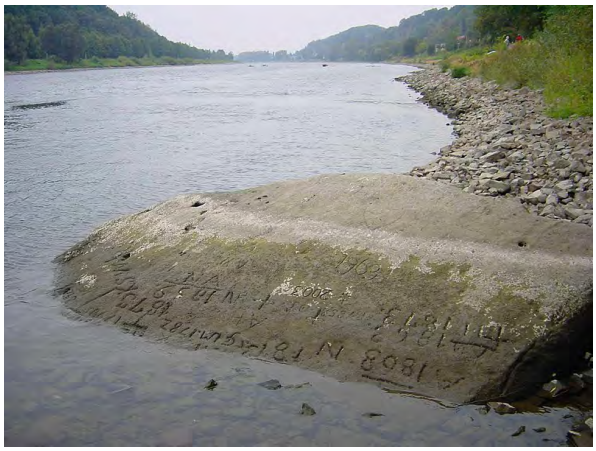

Fig. 8 | Hungerstein Elbe bei Pirna, Hunger Stones are communal monitoring-prostheses that only become visible during droughts when the water level of the rivers begins to fall

Fig. 9 | *Tatev Gazavan*. In the Tatev Monastery in Armenia, the resident monks constructed an eight-meter high prosthetic sense-extension as a response to a devastating earthquake. Erected in 904, the Gavazan obelisk expanded the monks' collective bodily capacity to detect seismic activity, warning them by tilting back and forth when slight seismic oscillations shook the ground. The hinged connection allowed the twelve segments of the octahedral structure to swing like a pendulum, turning back to its original position when when danger was over. (Karakhanian; Abgaryan 2004) The researcher Vazgen Gevorgyan suspects an alternative function of the Gavazan in the form of a celestial compass. Aligned with the Orion belt, it served the monks as a prosthetic astronomical instrument for conducting time calculations, such as the duration of a year (Avetisyan 2018)

ation of non-human capacities to advance the human sense is exercised to the present day. In some cases, hybrids of non-human beings and humans' prosthetic extensions have emerged, such as the augmentation of pigeons with cameras for aerial observation [**Fig. 6**; **Fig. 7**].

It might seem to be a logical consequence that – to understand better the complex system the human finds itself in – prosthetic tools emerging from *material engagement* processes are needed to extend bodily perception and knowledge. Monitoring technologies such as *Hunger Stones* [**Fig. 8**] or the *Gavazan* [**Fig. 9**] are forms of humans' extended sense-organs and mark the early beginnings of a collective prosthetic *techno-organic sensorium*.[3] They are stationary on-site monitoring systems that detect and visualize changes within the local environment, to inform multiple people or even whole regions. Their design is a form of a shared extended phenotype that expands the individual perception of environmental processes to a communal one. Making the sensed data visible, recording, and comparing them, are practices of pattern

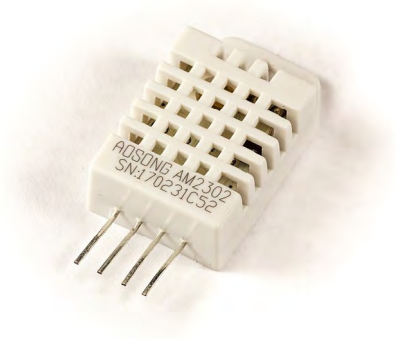

Fig. 10 | *DHT22-Temperatur-Sensor*, Ubahnverleih. Temperature sensor to detect and quantifiy the temperature changes

Fig. 11 | *Garden Wall Weather Station*, MT, U.S. Geological Survey, Monitoring station for weather

recognition that allow for predictions about potentially upcoming threats. However, due to the immobility of these early prosthetic sensing instruments, the collected data was spatially limited to the region. The responding prosthetic interventions to prevent natural hazards or mitigate their destructive power were likewise on a local scale.

Over the centuries, scientists and engineers began to design prosthetic instruments that were handily sized and portable, which enabled them to study changes in the environment wherever their users took them. The invention of tools like thermometers or barometers for measuring atmospheric pressure were starting to augment the human body in the 17th century already. In continuous development, they were later equipped with calibrated scales that facilitated precise measurements of changes in weather conditions and generate quantifiable data. Combining the recorded data of multiple devices extended the humans' *techno-organic sensorium* and made weather forecasts possible, which were crucial for farming practices on land and navigating the sea. Archiving-prostheses such as logbooks supplemented the humans' capacity to store their experiences of environmental phenomena. At the 1853's *First International Marine Conference* held in Brussels, a standardized *Abstract Log* was designed to collaboratively record and exchange international weather data. By founding this international sensing network, the conference marks the origin of a global weather information infrastructure (Edwards 2013). Yet, processing and interpreting the amounts of data promised to create an understanding of environmental phenomena was manual work that required time and effort. The ability to perceive the environment on a grander scale grew in the 20th century with the ongoing advancement of sensing instruments and network technologies. As the shortwave radio transmission untethered telegraphy, the speed and scope of communication webs extended. These infrastructures converge ever more tightly, forming the connective tissues and *circulatory systems* (Ibidem) of the human's expanded *techno-organic-body*.

With each passing decade, prosthetic technological sense-extensions shrunk in size while growing in complexity. Their design has a biological paragon and reveals the close kinship to the human's organic sensory system. Likewise bodily sense-organs, sensors work as electronic devices attuned to register physical input and detect changes within environments. The incoming data is transmitted through cables or antennas functioning like the receptors in an organic sensory transduction process. In the same way, as human senses operate, their technological relatives convert the sensed environmental stimuli into electrical signals, processed by computational *brains*. Contemporary sensors are tiny prosthetic sense-extensions often manufactured out of metal, plastic, glass and ceramic components combined with materials sensitive to specific mechanical or chemical input. They perceive electromagnetic radiation on a vast spectrum of light, making infrared, ultraviolet, or nuclear radiation visible. Sensors *listen* to ultrasound, register

temperature [**Fig. 10**] differences to several decimal places, *smell* gases, track moisture levels in soil or air, measure the acceleration of things, estimate the flow of water and its pH level or *feel* the slightest vibrations on the surface of the planet. Joint together as they become multisensorial-bodies floating as buoys in the ocean, integrated within forests, erected on mountains [**Fig. 11**], and placed in orbit to free fall in space. All of them share their connection to extensive communication networks that transmit and distribute the sensed data.

In 1999, the journalist Neil Gross predicted the upcoming century's future of sensor technologies, imagining that "planet earth will don an electronic skin [using] the Internet as a scaffold to support and transmit its sensations" (Gross 1999). Only nine years later, the *Internet of Things* was born when the increasing growth of electronic devices connected to the Internet outnumbered the total number of people living on the earth (Evans 2011). A growing computational power that processes the worldwide data flow enables algorithms to observe anomalies in real-time. They detect specific changes in cloud formations that might indicate the emergence of hurricanes (Tan et al. 2022), reveal pollution sources of algal blooms by tracing color changes in water bodies (Sagan et al. 2020), and point out flooding risks when abnormal dike behavior occurs (Pyayt et al. 2011).

Incessantly designed over time, humans collectively established a *techno-organic sensorium* in the form of a hyperconnected extended phenotype that expands the communal experience to a planetary-scaled one. As a result, the individual reality increasingly becomes part of a *shared reality*[4] – not necessarily only between humans but also with the realities of the sensed entities. With the expansion of humans' prosthetic sensorium, their sensing instruments become increasingly pervasive, seeping into every corner of the Earth and beyond. Their original purpose of augmenting the human capacity to detect potential dangers and understand the interconnections within the environment has not changed to this day. However, compared to past millennia, the dimension of temporospatial perception achieved in the 21st century reveals complex phenomena on Earth and activates accordingly sized prostheses in reaction to the new knowledge.

Fig. 12 | *Lawinenschutz und Hangaufforstung*, Walter Frehner, avalanche barriers lining up along the mountain slope.

The Rise of Environmental Prostheses

Humans dramatically redesign the ecosystem with prostheses that are often thought to sustain the survival of the species in ways that protect them from the forces of *nature*. Compared to sunglasses or raincoats that protect the individual body, spatially increasing issues are mostly responded to with an accordingly-sized prosthesis that is *worn* by a communal body and through which it becomes a collective extended phenotype. These local interventions such as dikes and dams, avalanche barriers [**Fig. 12**], straw mats used to counter desertification, and many more prostheses have a long history and are mainly created to tame and subjugate the environment for collective human advantage.

If the more frequent occurrence of natural hazards had not indicated an imbalanced planetary ecosystem already, the growing distribution of humans' *techno-organic sensorium* vitally substantiated it with significant data. The prosthetic sensorial-extensions enabled the human to transform data from sensed environmental processes into something visible, through a certain level of sensor-input. This revelation extended the perception of humans' inbuilt sensory system and began to influence the way humans think and act (McLuhan, Fiore 1967). According to Ingold, the recordings of the phenomenal world through sensor media create "a reality [that] is given quite independently of our experience of [the environment] and that we can [assumingly] only know or only know correctly through

the compilation of datasets drawn from detached observation and measurement and relayed back in the forms of maps, graphs and images" (Ingold 2010: 18). These representational forms translate the environment in an abstract version of it and therefore alter the human-environment-relationship in certain ways that might detach or intensify their relations.

Sparked by early satellite imagery and supported by pervasively expanding *techno-senses*, new forms of knowledge constitute and establish a consciousness that slowly acknowledges the *intra-connectivity* within the environment. This epistemic perception-shift conceives an environment as a world that can only exist in an *intra-dependence* and thus gave rise to what is here coined as *environmental prostheses*.[5]

What defines certain prostheses as *environmental* is the specification that they are a response to the cognition that the environmental equilibrium needs to be preserved in order for the human species to survive. Prostheses, which up to this point had in many cases augmented the human body as protection *against* the environment, now transitioned into prostheses meant to support a dysfunctional ecosystem. *Environmental prostheses* are therefore a form of counteraction that is trying to cope with the consequences caused by humans destructive behavior, such as *Global Warming*. Inventions like *Gazex* that actively manages snowbodies to slide downhill are a violent prosthetic reaction to e.g. foregone human deforestation that in turn caused the slope to be less stable. Although interventions such as these are placed within the environmental body, they are not *environmental prostheses* as they mainly supplement the human body as media for different suppressive purposes. They do not unfold new opportunities for the local ecosystem to thrive, compared to *Biorocks* [**Fig. 13**] which support the preservation and flourishing of lifeforms in the surrounding space.

All prostheses – whether mainly augmenting the human body or the environmental one – coexist next to or *within* each other and are a result of sense- and sensor-mediated human experiences. As prosthetic interventions explicitly activated by and targeted towards environmental phenomena, they share their coming-into-existence through invasive practices of power and control. *Environmental prostheses* are a very special kind of human extended phenotype: they

Fig. 13 | *Biorock Reef Indonesia*, U.S. Fish and Wildlife Service Headquarters. Biorocks are a form of environmental prosthesis that makes use of the process of mineral accreation that occurs when low voltage of direct current is put on the metal structure: through an electrolytic reaction a stable substrate of calcium carbonate grows like a rocky coating on the metal frame. The deposited layers of calcium carbonate are become sturdy and fertile grounds for corals and other marine organisms to flourish

are extensions designed by humans, even though they seem to augment the capacities of non-human entities. However, the biosphere appears to profit from these prostheses, these forms of interventions still root to a big extent in the very human intention to mitigate, or slow down [**Fig. 14**], the self-caused imbalances within the environmental system that becomes a threat for its own survival.

Since they co-emerged with their technologies, humans and other organisms are *forming* the Earth's environment through material engagements, expressed in their extended phenotypes. Maybe less perceivable in the past, humans are nowadays im-

Fig. 14 | *Rhonegletscher*, Nikater. To prevent or slow the melting of glaciers, some – often those that serve strategic economic purposes – are augmented with gigantic blankets. These prostheses support the glacier, however they also serves the human as protection-prostheses against potential flooding or water shortages depending on the season. Properly applied within the annual cycle of snow accumulation and snowmelt, the use of glacier blankets can build up snowpack and restore glacier strength

pacting the environment to such an extent that the concept of *terraforming,* as one that comprises the transformation of a planet's environment for the benefit of human life, enters an even vaster dimension in which the Earth becomes substantially inhabitable for other life forms including the human itself. *Environmental prostheses* take an active role in the process of intervening in the relations of terrestrial life – however, they challenge the conception of *terraforming* as one of exclusively human advantage.

Prosthetic actions such as the ones of *Conservation International* currently leading the worldwide largest tropical reforestation effort, aiming to restore 73 million trees in the Brazilian Amazon, are interventions within the environment that pursue to give a living-space for non-human organisms and counter the human-created effects of rising carbon dioxide levels in the atmosphere. Operating on a large spectrum of timescales, some *environmental prostheses* activate a more immediate effect of environmental transformation than others. The demolition of *Glines Canyon Dam* in Washington State as part of the *Elwha River Ecosystem Restoration Project* was the largest dam removal in history. In this case, a previous human intervention within the *intra-active* flow of the ecosystemic life regulated by the river has been removed and therefore becomes a prosthetic action that undoes a previously constructed material barrier of human domination – in a physical sense but also in a relational one.

The emergence of *environmental prostheses* – even though their main goal is a functioning *intra-acting* ecosystem that ultimately supports human survival – also testifies to attachment and care towards the non-human inhabitants of the earth. Something as simple as a bird-house created by the human organism can be seen as a form of *environmental prosthesis* that is not primarily extending the human capacities to expand its body, but the bird one's within the environment. This extension – even though human-made – is not a human-augmenting prosthesis but becomes a *pathway* to *intra-act* and establish a relationship between the human and the bird. *Environmental prostheses* can therefore be seen as a form of *meta-prostheses* as they operate beyond supplementing the mere human body. Some have little effect on the lifeforms around, others express themselves as constructions on national or planetary scales and have the power to influence whole ecosystems. Thinking of an entities phenotypical extension as a prosthesis acknowledges the close and entangled *intra-dependency* within its operating environmental system. Their coalescence inherits a certain kind of fragility in which both the prosthesis and its *carrier* complement each other – all prostheses, therefore, exist as agents coupling the human-environment-relationship.

Vision and Conflict of a Prosthetic Equilibrium

With the emergence of the *techno-organic sensorium*, a shared extended phenotype was constructed that expands the dimension of human sensitivity. Nowadays it operates on the temporospatial scale of the planet, configuring a reality of the world that is no longer limited to the sensory system of the individual's body and mind. Instead, a collective multi sensorial experience is established – transmitted over the planet, open to everyone who connects to it. Information, distributed by the *pathways* of the *techno-organic sensorium* in near real-time, guides its recipients' decisions and behavior within the environment. Observation and perception of events that could pose a potential danger to humans were the primordial drivers for the development of sensory enhancements. Mille-

nia later, however, these prosthetic extensions reveal environmental changes activating an epistemic shift in which humans have to acknowledge that the main danger threatening their survival does not only come from the forces of *nature* but themselves. The massive amounts of extracted resources and energy consumed to acquire those enlightenments, however, renders the apparent necessity of such paradoxical undertakings absurd. A total view of the planet – even though this perspective implies a superior position of control – seems needed to organize and react to the perceivable dysfunctions of the planetary ecosystem (Gabrys 2016). Yet, the *techno-organic sensorium* enables humans to learn about the *naturally* existing *eco-homeostasis*[6] and the symbiotic relations of all living and non-living things. Along with these realizations, forms of reflexivity and responsibility emerge that actuate ecological thinking. By doing this, the *techno-organic sensorium* becomes not only a human extension but obtains a *concrescing* agency that develops social relationships among humans and sensed entities. These mediating processes inherent a chance of becoming environmental through technology and might allow a step into what philosopher Glenn Albrecht names *Symbiocene* – an era constituting a community of interconnected relationships with mutual benefits for all living beings (Albrecht 2015). *Environmental prostheses*, which emerged from the knowledge that life on Earth can only survive through the preservation of an ecological equilibrium, might navigate first transits into the new age. Some express as interventions in local regions, while other prostheses act on country-size scale as they become implemented into national constitutions in the form of *Earth Rights* [**Fig. 15**]. Organizations like the *Intergovernmental Panel on Climate Change* are prosthetic responses that operate internationally, such as the *techno-organic sensorium* that once activated the knowledge about the phenomenon after which the *IPCC* is named. Even though these substantial *environmental prostheses* have the power for a worldwide impact, they are enmeshed within political, religious, and economic systems – prosthetic societal frameworks. Being tied to these existing structures and their ideologies might supplement the execution of the necessary goals or inhibit it – perhaps making it impossible.

The imagined state of an ideal equilibrium is also one of constant conflict between *intra-acting* agents

Fig. 15 | Prankster, Whanganui river. *Earth Rights* is a jurisprudential theory that recognizes ecosystems and species as distinct personalities and gives them rights, similar to the concept of fundamental human rights. In 2012 a treaty agreement between the government and the indigenous group Maori iwi established the Whanganui River, and its tributaries as a legal entity with its own standing

whose relations adapt to shifting power-dynamics. A growing influence of human activities on Earth and beyond demands a change in the intentions of their prosthetic extensions as mainly *serving* the human. To reach a more balanced state of ecosystemic relationships, some human agents more than others have to attune the impact of their prosthetic extensions, give up or share their intervening powers, or distribute their actions to open *pathways* that equally include the needs of non-human entities. The environment as a dynamic space of conflict requires prosthetic extensions that consider and establish a harmonic co-existence with mutual benefits among the living entities of the Earth – if existing parties dismiss that and do not change their actions accordingly, the invention of new prostheses is needed that counter or replace lack of human-centered-thinking extensions. As much as humans prove ingenuity in designing prostheses, so much are their future actions for preserving the earth's ecosystem guided by and entangled within the pre-established constraints of their prosthetic world.

Notes

[1] *Theory of evolution by natural selection*: conception independently developed by Charles Darwin and Alfred Russel Wallace who propose the idea of evolution of living things based on variation and natural selection.

[2] The "Blind Man's Stick" is a thought experiment in which Gregory Bateson opens the question of where to localize the mind of a blind person whose tactile perception is sensorially connected to its environment through the stick.

[3] Coining the term "techno-organic sensorium": it comprises the whole of all technological sense-extensions (e.g. sensors and monitoring stations) including their connection to communication network infrastructures (e.g. Internet) that complement the humans' organic, endogenous sensory system.

[4] *Shared realities* are constituted on the basis of information and experiences distributed through the techno-organic sensorium and collectively received by the humans connected to it.

[5] Coining the term "environmental prosthesis": metaprosthesis that operates as a supporting augmentation/intervention for the environmental- and non-human-body.

[6] "Eco-homeostasis" is a state of balance in which an intra-acting dynamic ecosystem mutually regulates itself.

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Visualiser des données météorologiques. Représentations des phénomènes atmosphériques

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Abstract

La technologie de visualisation des données a rendu de nombreuses bases de données visibles et intelligibles, et la question de l'accès, de l'analyse, de l'utilisation et de la visualisation des données est l'un des problèmes de la société numérique. Dans cette perspective, la représentation des phénomènes et conditions météorologiques soulève une série de questions sur les modalités de visualisation adoptées. Comment sont représentées les données des phénomènes météorologiques ? A partir de cette question, la contribution vise à analyser certaines représentations en 2D de la météorologie à travers l'outil de la visualisation de données afin d'observer la manière dont les phénomènes atmosphériques s'enracinent dans la médiation technologie.

En 2018, une équipe de scientifiques a remporté le prix Gordon Bell[1] pour avoir conçu un modèle de *deep learning* capable de révéler des informations détaillées sur les événements météorologiques extrêmes qui étaient auparavant perdues dans les données météorologiques collectées. Les scientifiques ont utilisé un superordinateur équipé d'une unité de traitement graphique (GPU) efficace pour manipuler les interfaces graphiques et le traitement des images.

Bien que l'apprentissage profond soit un moyen établi dans l'analyse d'images, son utilisation en tant qu'outil de découverte scientifique, et en particulier pour des données complexes telles que les données climatiques, est relativement nouvelle (Russell, Norvig 2021). L'apprentissage profond (ce qui en fait un outil important pour l'analyse du *big data*), à comprendre comme une branche de l'intelligence artificielle, est un apprentissage machinique réalisé à l'aide de plusieurs couches d'éléments informatiques simples et ajustables (Ibidem).

Dans le domaine de la météorologie avancée, un certain nombre de facteurs, tels que l'augmentation de la densité d'observation et la diversité des sources de données, ont conduit à une augmentation de la taille et de la complexité des *big data*[2] et, par conséquent, à des défis plus importants pour leur visualisation et leur compréhension dans la science météorologique. Ce phénomène fait partie d'un horizon culturel par lequel nous imaginons et construisons des réalités. Comme le dit Niklas Luhmann, "la technologie est un phénomène de simplification fonctionnelle, c'est-à-dire une forme de réduction de la complexité qui peut être construite et réalisée même si le monde et la société dans lesquels le phénomène se produit sont inconnus" (Luhmann 1998: 6-7). En effet, la prévision d'un processus atmosphérique spécifique a un impact sur les décideurs, tels que les gouvernements, les entreprises et les médias qui s'appuient sur ce processus pour comprendre la réalité.

L'avancée significative des technologies informatiques dans le domaine du climat et la visualisation des données – entendue comme une représentation graphique qui vise à rendre les données lisibles afin d'en comprendre le contexte et le sens (Halpern 2014) – renforce la question de l'accès, de l'analyse, de l'utilisation et de la représentation, ouvrant des enjeux dans la société numérique contemporaine (McCandless 2012). En effet, les stratégies de représentation des données nous permettent de saisir des relations, des rapports et des évidences qui ne se seraient peut-être pas manifestés sans l'élaboration de signes graphiques appropriés à leur affichage. La visualisation de données transforme un ensemble d'informations complexes en une représentation visuelle, parfois attrayante et suggestive (Rubessi 2021).

Compte tenu de ces prémisses, nous souhaitons contribuer dans cet article, certainement pas de manière exhaustive, à analyser certaines représentations en 2D de la météorologie à travers l'outil de la visualisation de données afin d'observer la manière dont les phénomènes atmosphériques s'enracinent dans la médiation technologie (Latour 2000). L'utilisation du *big data* impacte donc les stratégies de visualisation; les planificateurs et les ingénieurs tentent d'utiliser les données générées par ces systèmes pour révéler certains détails climatiques afin d'améliorer la compréhension des changements climatiques.

Si notre sensibilité, comme l'explique Montani, "a atteint un gradient d'externalisation technique si élevé qu'elle est désormais tout à fait disposée à autoriser une délégation technique sans réserve" (Montani 2014: 17-18), les formes que prennent les phénomènes atmosphériques sont révélatrices de représentations sensibles du changement climatique qui ont un impact sur la visibilité (Calvino 2016) des questions environnementales en contribuant à leur affichage et à leur interprétation.

Dans un premier temps, nous envisagerons la nature de la visualisation de données. Ensuite, nous allons nous concentrer sur la visualisation de la météorologie pour comprendre comment certains phénomènes atmosphériques sont représentés.

Visualisation des données

La visualisation de données, dans un sens général, vise à représenter un certain nombre de données collectées et analysées. Comme l'affirme Halpern (2014: 94), "la visualisation de données est de plus en plus reconnue comme une forme significative d'expression créative transformée en environnement et en processus par un nouveau sens computationnel". Par conséquent, les visualisations de données représentent des éléments, des sujets et des événements du monde physique par le biais d'interprétations graphiques de données générées par une enquête ou une recher-

che (Bihanic 2014). Les graphiques informatiques ont donné une forte impulsion à la visualisation de données qui ont d'abord été collectées, puis encodées et ensuite représentées grâce à l'utilisation de formes et signes graphiques (Bertin 2013). En effet, les technologies créatives permettent l'analyse et l'exploration de données en configurant, par exemple, une carte des arbres dans les grandes villes du monde dans le projet *Treepedia* mis en place par le Senseable City Lab-MIT dirigé par Carlo Ratti.[3] Dans ce projet est visualisée la végétation urbaine (les arbres de rue) dans les villes afin de sensibiliser les individus sur l'aménagement des espaces verts urbains qui contribue à abaisser les températures urbaines en bloquant le rayonnement à ondes courtes et en augmentant l'évaporation de l'eau.

Lorsque les données à visualiser ont une dimension physique, on parle de visualisation scientifique (Hansen, Johnson 2004). Cette dernière s'attelle à visualiser des phénomènes naturels (voir l'invisible) ou des expériences scientifiques dans le but de comprendre et d'assimiler des informations par le biais de mécanismes perceptifs (McCormick 1987). La visualisation scientifique est la discipline qui fournit des techniques et des méthodes de calcul pour créer des représentations visuelles et interactives de données afin d'amplifier nos capacités cognitives (Marmo, Valle, Zannoni 2005). Dans cette perspective, la visualisation des données météorologiques, qui est basée sur la réalité physique, fait appel à des méthodes de visualisation scientifique comme les données vectorielles définies dans un volume (*streamlines*) où une densité de données est représentée par des courbes de champs vectoriels servant à modéliser par exemple la vitesse et la direction du vent dans l'atmosphère (Ibidem).

Le processus de visualisation des données se situe à mi-chemin entre l'analyse des données (principalement statistiques, mais pas seulement) et la représentation graphique (conception graphique de l'information); les concepteurs indiquent les formes graphiques à reproduire sur la base d'images ou de modèles qui doivent activer une communication visuelle immédiate et globale afin d'en saisir le sens et de fournir un aperçu de ce qu'il représente. À cet égard, Halpern (2014: 21) considère la visualisation de données non seulement comme un processus, mais aussi "comme un objet, un sujet et une discipline, une vocation, un marché et une épistémologie". Suivant la pensée de Halpern, la visualisation de données est de plus en plus reconnue comme une forme significative d'expression rendue un environnement et un processus à travers un nouveau sens computationnel.

Dans le contexte des études météorologiques, en 1988, le météorologue McIntyre a soutenu que la perception visuelle humaine – comprise comme un processus mental visant à convertir les données sensorielles en concepts ayant un sens – est la plus puissante des interfaces de données entre les ordinateurs et les humains (Rautenhaus et al. 2017). Nous pouvons donc envisager la visualisation selon deux définitions distinctes mais liées. La première s'inscrit dans l'action de voir, au moyen de la fonction visuelle, la représentation finale des données. La seconde, en revanche, concerne la production des données. Le processus de production des données à visualiser est un mécanisme complexe qui nécessite un filtrage et une abstraction pour pouvoir être interprété. À cet égard, l'opération de présentation visuelle des données nécessite l'identification de modes de simplification et de critères de classification sémantique et esthétique, afin de faire communiquer les données avec l'utilisateur visé par le projet et d'atteindre ainsi les objectifs spécifiques.

Visualisation de la météorologie

Traditionnellement, les météorologues et les scientifiques ont utilisé une variété de cartes et de diagrammes 2D dessinés à la main. Par exemple, Christiaan Huygens, un physicien, astronome et mathématicien néerlandais du XVII[e] siècle, a esquissé de nombreux dessins de la forme de Saturne avant de pouvoir reconnaître les anneaux de la planète avec un télescope. Ce scientifique a dessiné un diagramme, appelé diagramme de Huygens, pour expliquer comment les aspects des anneaux de Saturne changent lorsqu'on les regarde depuis la Terre (Ibidem). Entre les années 1940 et 1950, l'architecte et inventeur Richard Buckminster Fuller a été le pionnier de la visualisation de données en concevant, puis en brevetant, une projection cartographique bidimensionnelle du globe, appelée la carte du monde Dymaxion (acronyme de Maximum Dynamic Tension) (Grimaldi 1990). La carte, composée de formes triangulaires et carrées, représente le globe comme une île dans un océan, sans

distorsion visuellement apparente des formes et tailles relatives des zones terrestres et sans division des continents. Une carte sur laquelle la succession des terres et des mers s'enroule obliquement, provoquant un effet de renversement – selon la tranche triangulaire du globe que nous avons sous les yeux – des terres contre la surface uniforme des mers.

De nombreux articles et études ont exploré la visualisation de la météorologie au niveau technologique. Dans son ouvrage sur la météorologie, Saucier a classé les représentations en usage dans les années 1950 en cartes météorologiques, cartes en coupe, cartes verticales et cartes en coupe temporelle (Saucier 1955). Ces représentations météorologiques en 2D comprenaient des formes de visualisation du terrain telles que les courbes de niveau, les vecteurs de vent et les lignes d'écoulement.

Dans les années 1980, une grande attention a été accordée aux aspects psychophysiques, en particulier à la perception visuelle de la météorologie (Papathomas, Schiavone, Julesz 1988; Kepes 1990). De ce point de vue, les défis concernaient la visualisation et la perception (en expérimentant également la troisième dimension), notamment l'utilisation correcte des indices visuels pour créer l'illusion de la profondeur, la composition de l'interface, les performances du système et la gestion des observateurs finaux. Les études de Hibbard se sont concentrées sur la modélisation 3D d'images de trajectoires de vent, de surfaces de contour et de données radar, notant que les visualisations nécessitaient des améliorations, notamment en ce qui concerne la perception spatiale – comprise comme la position du regard de l'observateur –, l'utilisation de la couleur, la visualisation combinée de multiples variables et une plus grande efficacité pour améliorer l'interactivité (Hibbard 1986). En outre, à cette époque, les techniques d'infographie ont été utilisées dans de nombreux domaines (Mazza 2007), ce qui a permis de manipuler des images et des films (avec le soutien de scénaristes, de conseillers artistiques et de travailleurs de la post-production)[4] pour la visualisation des données météorologiques.

Depuis les années 1990 environ, l'amélioration des programmes graphiques a permis le développement d'outils de visualisation interactive dans le domaine de la météorologie. Par exemple, les données relatives au vent peuvent être représentées par des graphiques vectoriels, avec des lignes de flux et de trajectoire (Rautenhaus et al. 2017). La visualisation 2D est encore très présente dans la représentation de la météorologie contemporaine, malgré les efforts réalisés dans les années 1980 et 1990 en matière de modélisation 3D.

Les météorologues s'intéressent principalement aux mouvements horizontaux exprimés par les modèles météorologiques (pour lesquels une représentation sur une carte 2D est appropriée), à la plus grande clarté des cartes 2D par rapport à la perception spatiale plus complexe, à la transmission d'informations quantitatives et, enfin, à une certaine raison historique de s'entraîner avec des modes de visualisation 2D au fil du temps (Rautenhaus et al. 2017). Ces représentations météorologiques en 2D comprenaient des formes de visualisation du terrain telles que les lignes de contour, les vecteurs de vent et les lignes d'écoulement.

La conception d'une visualisation météorologique est cruciale pour la compréhension des données visualisées et la construction d'un modèle mental reproductible. Un certain nombre d'études donnent des conseils sur la façon de réaliser des cartes météorologiques en examinant, au niveau cognitif, comment les éléments d'une visualisation sont perçus. Par exemple, l'utilisation de la couleur dans les cartes météorologiques a été récemment étudiée par un groupe de chercheurs qui ont discuté de l'utilisation de la teinte perceptive, à travers le modèle de couleur HCL,[5] dans l'espace couleur d'une carte, vérifiant l'avantage d'une meilleure lisibilité, par exemple, entre les nuances de couleur (Stauffer, Mayr, Dabernig, Zeileis 2014). Observer devient ainsi une expérience esthétique consistant en l'exploration focale directe de l'image afin d'élargir la connaissance des caractéristiques de composition de l'interface de visualisation des données.

D'autres études ont porté sur la conception de l'interface utilisateur, en expérimentant des alternatives graphiques à la représentation de la circulation atmosphérique (vents, marées, air, particules, etc.). Des approches alternatives pour représenter le champ vectoriel du vent sur des cartes 2D ont été explorées, dans différents domaines, en utilisant des interfaces statiques avec des éléments animés composés de différents schémas de couleurs et textures (Pilar, Ware 2013). Par exemple, la plateforme interactive EARTH[6] réalisée par Cameron Beccario offre à l'utilisateur une représentation des flux de vent sur un globe sur fond noir à travers des graphiques vectoriels, colorés

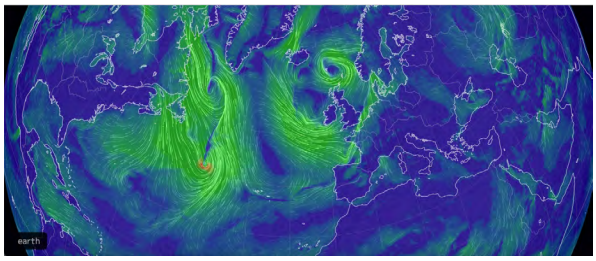

Fig. 1 | EARTH, donnée visuelle: vitesse des ventes à la surface (20 octobre 2022)

et animés [**Fig. 1**]. Les données de vent sont représentées en 2D sous forme de lignes de courant et de lignes de trajectoire. EARTH offre un accès aussi direct que possible à un type de visualisation dynamique destiné à représenter les données sur le vent à l'échelle globale.

En revanche, dans le projet WIND MAP[7] de Fernanda Viégas et Martin Wattenberg, respectivement concepteur informatique et informaticien, un flux de vent animé est représenté sur une carte statique en 2D des États-Unis, en noir avec des signes graphiques blancs. Dans ces exemples, la trajectoire du vent est représentée par des lignes de flux combinées basées sur la vitesse, la trajectoire et la densité de courant [**Fig. 2**]. Les lignes d'écoulement permettent un meilleur échantillonnage spatial de l'écoulement, capturant parfois des structures à petite échelle. En outre, l'utilisation d'une animation 2D pour obtenir une visualisation dynamique du flux a permis de percevoir les variables du flux éolien dans la durée.

Un autre mode de représentation des phénomènes météorologiques consiste à concevoir des représentations alternatives dans des diagrammes en spaghetti, composés de lignes multicolores en forme de spaghetti se ramifiant d'un axe *y* à l'autre. Le "spaghetti plot" est une méthode de visualisation des données dans des cartes bidimensionnelles pour représenter les flux possibles du système, qui est utilisée dans les scénarios de prévisions météorologiques "d'ensemble"[8] (Ferstl, Kanzler, Rautenhaus, Westermann 2016). Elle permet d'obtenir une image, plus ou moins indicative, de la façon dont le temps peut évoluer sur une période donnée, en visualisant les données dans un graphique qui suit l'évolution des températures (axe des ordonnées) et des précipitations (axe des abscisses).

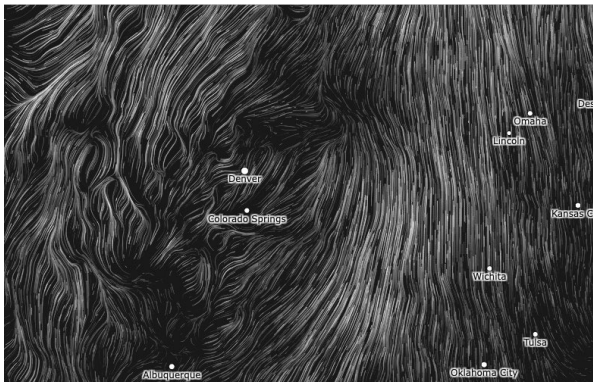

Fig. 2 | WIND MAP, donnée visuelle: vitesse des ventes à la surface (20 octobre 2022)

Ce bref aperçu de la visualisation des données météorologiques montre comment, au fil des ans, l'analyse des ensembles de données a alimenté des idées pour aborder les études de visualisation, où le facteur de probabilité d'évolution du scénario élargit les problématiques liées à la représentation des phénomènes atmosphériques. En fait, les défis actuels des scientifiques sont liés à la représentation à temps des phénomènes atmosphériques intenses, en décrivant plus précisément la composition de l'air, les nuages, etc. Dans le paysage actuel, les chercheurs en météorologie devront envisager l'augmentation des volumes de données et l'avancement des connaissances sur les techniques de visualisation (comme l'analyse visuelle interactive qui met l'accent sur la typologie des données) qui incluent, par exemple, l'utilisation de la 3D pour donner une perception spatiale et immersive aux phénomènes atmosphériques. Il s'agit de réfléchir à la capacité de la 3D d'explorer la scène de manière continue et fluide et de parcourir les données en modalité interactive (Sidonie, Gautier, Chapron, Riley, Masson 2022). Par exemple, la 3D peut apporter à la représentation climatiques une illusion de profondeur, le choix d'un bon rapport d'aspect pour éviter les angles et les pentes trompeurs dans l'affichage, les performances du système et la manipulation de l'utilisateur (exploration interactive). En plus, la 3D peut élaborer des abstractions visuelles comme alternatives aux tracés "spaghetti plot".

Conclusion

S'il est vrai que le progrès continu des technologies de visualisation offre la possibilité de représenter et d'interpréter la grande quantité de *big data*, favorisant des traitements de données différentes, il est également vrai que l'environnement technologique dans lequel nous vivons impose de nouvelles façons de représenter les données que nos esprits acquièrent constamment en s'adaptant à une réalité hybride construite à partir de structures à la fois physiques et informationnelles (Lupi 2017). Les formes de visibilité que prennent les phénomènes météorologiques identifient un régime de pensée spécifique, un mode d'articulation entre des manières de faire – les formes de visibilité – et des manières de penser leur relation.

L'explosion des données simulées et acquises dans de nombreux domaines allant des activités scientifiques aux activités industrielles, fait de la visualisation un outil pour décrire, de plus en plus, les phénomènes environnementaux suivant une vision algorithmique capable de délibérer des scénarios futurs. La visualisation des données météorologiques (en tant que technologie médiatique) participe du socle pour la compréhension des phénomènes climatiques en véhiculant des informations et des repères. Les codes qu'il adopte, les couleurs et les signes graphiques qu'il propose peuvent apporter des informations précises, profondes mais aussi synthétiques et partielles.

En conclusion, on perçoit que les technologies de visualisation des données en météorologie nécessitent une discussion sur le mode et la diversité de la représentation, le degré de perception de l'événement par l'individu et, enfin, leur impact global sur la compréhension des phénomènes atmosphériques et sur la crise écologique à l'heure de l'anthropocène.

Notes

[1] Cfr. https://cs.lbl.gov/news-media/news/2018/lawrence-berkeley-oak-ridge-national-labs-share-2018-acm-gordon-bell-prize (consulté le 15/10/22).

[2] Dans une perspective future, ces ensembles de données contenant des trillions de mots de texte, d'images, d'heures de voix et d'audio vidéo, ainsi que des quantités importantes de données génomiques, de clics, de réseaux sociaux, etc. sont appelés à croître.

[3] Cfr. https://senseable.mit.edu/treepedia (consulté le 23/11/22).

[4] À ce propos, je rappelle le projet *Teasing New Weather TV: Post-Producing Global Views* (multi-channel video installation, 25 mins) de Simone Fehlinger sur la visualisation météo et l'anthropocène. Voir https://www.citedudesign.com/en/a/teasing-new-weather-tv-post-producing-global-views-2039 (consulté le 23/11/22).

[5] Un modèle basé sur trois paramètres (teinte, chrominance et luminance) conçu pour s'aligner sur la manière dont la vision humaine perçoit les attributs de la création de couleurs. Voir Ihaka 2003.

[6] Cfr. https://earth.nullschool.net (consulté le 15/10/22).

[7] Cfr. http://hint.fm/wind (consulté le 15/10/22).

[8] La prévision d'ensemble est une méthode utilisée dans le cadre de la prévision numérique du temps. Au lieu de faire une seule prévision météorologique la plus probable, on produit une série (ou un ensemble) de prévisions. Cet ensemble de prévisions vise à fournir une indication de l'éventail des états futurs possibles de l'atmosphère. Voir: https://en.wikipedia.org/wiki/Ensembleforecasting (consulté le 20/10/22).

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Ice Core Verticality. The Eloquence of Ice and the Visual Construction of Deep Time

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Abstract

Ice cores are fundamental techno-scientific components of the visual culture of the Anthropocene. Through the eloquence of ice, the Anthropocene sets the tone for its own narration, one made of impending apocalypse, planetary boundaries, and irreversible tipping points, while, at the same time, attesting for the "lively materiality" of ice, and of its past and present states. This essay analyzes and determines the narrative agency and the semiotic complexity of ice cores within the contested terrain of the Anthropocene thesis and presents two recent art-science collaborative projects exploring the aesthetic dimension of ice cores: Susan Schuppli's *Ice Cores* (2019) and Giulia Bruni and Armin Linke's *Earth Indices* (2022).

A Glacial Anthropocene

In the year 2000, Nobel Prize-winning atmospheric chemist Paul Crutzen and ecologist Eugene Stoermer introduced the public to the Anthropocene thesis on the International Geosphere-Biosphere Programme's *Global Change Newsletter* (Crutzen, Stoermer 2000: 17-18). Crutzen and Stoermer's groundbreaking proposition represented the culmination of a vast and diverse body of scientific research on the Earth system (Ellis 2018; Uhrqvist, Linnér 2015; Waters et al. 2014) that had been developing since, at the very least, the 1960s. The unprecedented planetary change associated with the notion of the Anthropocene was soon conceived as the combination of key phenomena affecting the planet, such as the increase in atmospheric carbon dioxide concentrations and the alteration of biogeochemical cycles; deforestation and mass extinction events; human exploitation of natural resources and anthropogenic climate change (Steffen et al. 2005; Grinevald 2008). Since its first appearance in scientific and non-scientific contexts, the Anthropocene thesis has sparked an intense – and still ongoing – debate about the criteria for the stratigraphic evidence and its legitimacy (Lewis and Maslin 2015; Zalasiewicz et al. 2011) and the methods to establish accurately and formalize the start of this "era of man". The proposal for this new geological epoch has also generated a variety of origin stories that locate the start of the Anthropocene at different times, from the Neolithic and the Industrial Revolution to the "Great Acceleration" in the mid-twentieth century (Schwägerl, Crutzen 2014; Scott 2015; Steffen et al. 2011; Yusoff 2016), together with reconceptualizations and critiques stemming from the humanities and the social sciences, as well as arguments for alternative, more politically conscious definitions and recenterings (Bonneuil, Fressoz 2016; Chakrabarty 2009; Moore, Altvater, Crist 2016; Haraway 2016; Tsing 2018; Stiegler 2018; Luisetti 2019; Demos 2017).

Within the public sphere, climate change and its anthropogenic origins have become common objects of data visualizations and modeling, often promoted and popularized by intergovernmental policy-making organizations and scientific institutions,[1] but also dramatized and aestheticized in mainstream media and the visual arts.[2] In this context, the imagery connected to the ice masses of the planet occupies an important role in offering tangible and accessible proof of the geo-physical transformations caused by industrialization, fossil economies and global extractivism. In the Anthropocene, the various forms of visuality associated with glaciers, ice sheets, icebergs, the Arctic ice pack, perennial snows, ice masses, polar landscapes, tundras, and ice cores are deeply embedded within the global visual culture of climate politics and environmental activism. Historical, satellite, and infrared photography, as well as computer generated visualizations and speculative scenarios are mobilized to depict global warming and its effects in an immediate and relatable way. Centuries and decade-long processes such as the retreat of glaciers, the calving of icebergs, and ice-shelf thinning become thus accessible to the public through chronological comparison with historical data and images, and elicit a sense of urgency aimed at political action and participation. Moreover, the graphic images of melting and dissolution of ice landscapes caused by global warming prove, persuasively, even to skeptical and uninformed audiences the magnitude of the ecological disaster endangering the geo-physical equilibrium of the earth. Within the visual and media arts and design, impactful public projects such as Olafur Eliasson's *Ice Watch* (2014) (Hornby 2017; Jackson 2015), hybrid installations like Julian Charriere's *Towards No Earthly Pole* (2019) (Hannah 2021), speculative filmmaking like Juan Francisco Salazar's *Nightfall on Gaia* (2015), the work of painters and mixed media artists such as like Diane Burko (Garrard, Broude 2021) and Justin Brice Guariglia (Horn 2019), of designers such as Irene Stracuzzi,[3] or thematic exhibitions like *Vanishing Ice* (Matilsky 2013; Kothe, Maute, Brewer 2015), among many others, demonstrate the variety of forms and creative practices currently engaging with the endangered vitality of glacial landforms while operating within the cultural logic of the Anthropocene.[4]

The prominence and ubiquity of ice in climate communication and in the visual culture of the Anthropocene attest for the intrinsic narrative potential of glacial matter and of its sense-making agency. The polar regions of the planet, together with glaciers at every latitude, are connected by anthropocenic narratives of vulnerability and environmental violence, extinction, and forced mutation. The ice from glaciers and the polar landscapes can be read as examples of what material ecocriticism defines as *storied matter*:[5]

"a material mesh of meanings, properties, and processes, in which human and nonhuman players are interlocked in networks that produce undeniable signifying forces" (Iovino, Oppermann 2014: 1-2). Similarly to the other material and living subjects of the planet, ice manifests forms of eloquence as a specific type of storied matter:

> A non-linguistic performance inherent in every material formation from bodies to their atoms making them telling or storied. Whether it is a cell, a singing whale, a whispering wind, a pebble on the beach, an erupting volcano, a hurricane or a plastic bag, matter is encoded with meaningful narratives, or narrative agencies through which the world becomes eloquent (Oppermann 2018: 412).

Through the eloquence of ice, the Anthropocene sets the tone for its own narration, one made of impending apocalypse, planetary boundaries, and irreversible tipping points, while, at the same time, attesting for the "lively materiality" of ice, and of its past and present states (Salazar 2018: 32). Depending on its mediators, interpreters, and intended audiences the storied matter of ice enables different – at times divergent – narratives and historiographies, and contested political projects. Compared to the visuality of glacial geo-morphological subjects and to the narrative agency of ice, ice cores, specifically, occupy a unique role within the technical imagination of the Anthropocene, as they represent a readable, chronological inventory and a "reliable" testimony of the changes in the atmospheric composition of the planet: "when snow is transformed to ice, air bubbles are enclosed, providing actual snapshots of the atmosphere of the past and constituting a stand-alone feature of this natural archive (Bohleber et al. 2021). As material metonymies, ice cores are objects of interest for both scientists and visual practitioners, as their narrative agency is unlocked, interpreted, and expressed through advanced techniques of spectrometric analysis, and through the construction and maintenance of complex infrastructures of knowledge production and cryo technologies (Achermann 2020). Ice cores are not the only form of "natural archive" (Nowak 2022: 19) or climate testimony available to us, but, post-extraction, they transform "the dense, frozen water of glaciers into latent archives of the atmosphere, providing evidence of recent and significant spikes in greenhouse gases" (Salazar 2018: 36) proving that "climatic change did not happen only locally, but globally" (Achermann 2020: 21). They serve as "interscalar vehicles" (Hecht 2018) connecting deep time and human time, radically expanding "the 'sphere' of a given historical moment. Events and forces that we once thought had purview of only a relatively limited geographic area are suddenly legible at planetary scale" (Taylor 2014: 75). Moreover, in the brief moment in which they physically exist, during the ephemeral lapse of time between their extraction and their narrative expression, ice cores remind us of past states of the planetary climate that we, as humans, may experience never again. If the geological imagination of the Anthropocene implies the sedimentation of the human and its socio-political formations, in its glaciological version, humankind manifests as interruption, vanishing, melting and thawing.

In this essay, we will try to analyze and determine the narrative agency of ice cores within the contested terrain of the Anthropocene thesis. We do so by confronting and reading ice cores as techno-scientific instruments and as aesthetic objects that express their agency to a diverse audience of interpreters through various technological mediations, ultimately inscribing human history within the geological domain of the Earth as well as enabling planetary politics of nature. In order to give justice to the complexity of ice core knowledge, in this essay we present two recent art-science collaborative projects and we draw concepts developed in the environmental humanities, visual semiotics, design studies and science and technology studies: disciplines that are critically interrogating the far-reaching aesthetic, epistemological, and political consequences of the Anthropocene paradigm.

Vertical Time Machines

A timeline is a representation of time through space, where events, filed in an ordered and linear dimension, create a chronology. In a timeline, due to western alphabetic conventions, the graphical space is usually assumed as a continuum moving from left to right, in which every point occupies a position in a linear chronology that runs from earlier to more recent times.

Timeline was first used as a didactic tool for history by Joseph Priestley who, in 1765, depicted the lifespans of illustrious individuals in parallel horizontal lines along a timescale (Rosenberg, Grafton 2010:

122-126). This graphical representation of time as a horizontal line was established as a convention when William Playfair used it for his time series a couple of decades later, inscribing the variable 'time' on the x axis.[6] Only in the early decades of the nineteenth century did geologists develop their own visualization of time through space, rooting their dating techniques to stratigraphic superposition following a rule that sounds simple nowadays: other things being equal, newer rock beds lie on top of older rock beds and finds and fossils on the bottom are older than finds and fossils on the top.[7] This law also applies to archeological practice, where the past is always connected to depth, both in the language and in the time concepts used by archeologists (Carman 2006; Simonetti 2015). From a visual perspective, such configuration implies a 90° degree rotation of the timeline that, in this case, asks to be seen, out of convention, as a representation of an empirical reality: the different layers of time slowly accumulating on top of each other. Substantial and material human efforts of excavation, extraction and interpretation are required to detect, uncover, and identify the layers of time. This vertical visualization of chronology, based on the stratigraphic arrangement of soils drawn from geology and archeology, has competed with the horizontal sequence that usually paves the succession of historical events. However, the ordinary practice of 'scrolling' that is typical of our days has naturalized the vertical structure of the timeline, making it even more immediate than before for an observer to understand the easy equation "the deeper the older". Indeed, history and geology are based on different forms of representation of time which also act as influential conceptual frames: on one hand "the horizontal, linear, uniform, homogeneous time of historical progress" (Jordheim 2022: 23) – that is actually only one of the forms of visualization of historical time;[8] on the other hand "a multilayered, vertical oriented time from deep hidden pasts to superficial, visible and tangible presents" (ivi: 26). In facts, as Rheinart Koselleck (2018) claims, with the temporalization of natural history in the second half of the XVIII century (from Buffon on, mainly), not only did the idea of change and transformation enter the natural realm, until then considered unchanging, but also a stratigraphic and vertical conception of time was introduced in the historical discourse. Fernand Braudel (1972), with his theory of the *longue durée*, considered human event-based history as a superficial structure, rooted in a deeper structure of slow movement and change. Afterwards, Koselleck (2018) analyzed time as a sedimentary structure, in which each layer moves at different speeds and experiences moments of acceleration in which also events on the superficial layers affect the deeper ones in some capacity.

The physical conditions of production of the ice cores have necessary reflections on their signification structures, which respond to the same logic of vertical time visualizations. As long, linear samples of a stratigraphic structure in cylindrical shape, they are the outcome of a massive effort in extraction that is not extraneous to military enterprises.[9] If the practice of extraction, transportation, conservation, analysis and interpretation is executed correctly, ice cores, in their verticality, arrange the successive layers of snow fallen on earth in the last millennia from newest to oldest. By entrapping air bubbles, dust and sea salt brought by winds of the past, they are deep mirrored reflections of the changing skies under which they were lying for millennia. In comparison to geological strata, ice is more ductile than dust: the bottom layers of snow are thinner than the superficial ones, as they tend to stretch under the weight of the ice sheet above and to flow towards the coasts (Alley 2014: 31-39). This diverse composition causes a lack of regularity in the time scan. The intervals related to the deep past are indeed more closely spaced than those related to recent years.

However, the revolution of geology – and its effects on glaciology – does not lie only in having effectively rotated the timeline by 90°. In fact, the discovery of the concept of "deep time" has created a new time regime in which human time has been embedded in a much longer geological time, overlapping chronologies that belong to different scales.[10] On the one hand, the natural world has acquired a historical dimension; on the other, human history has been reduced to a small fragment of a long "geohistory" (Rudwick 2005). This, always in Helge Jordheim's words, has been seen as a further strike of the Freudian "outrage upon humanity's self-love", following the Copernican revolution, Darwin's evolution theories and Freud's psychoanalysis (Gould 1987), because it put into light man's insignificance and brief history in comparison to the long times of nature.

Nonetheless, it is still humans and their history to

be at the center of the ways in which scientific communities discuss ice cores and present them to the public. A common manner of "making ice cores meaningful" (Antonello, Carey 2017: 189) is to interpolate events from human history and prehistory into them: marking specific levels with reference to well-known human events serves as "a way of orienting public to scientific meaning and significance" (ivi: 189). As a matter of fact, dating ice cores through the grid of human events is not just a way to popularize science to a wider public. It is part of the scientific practice itself, in which scientists try to orient themselves and make sense of the depth of time through what they already know: a linear conception of history, composed of events and discontinuities. As noticed by Erik Isberg (2018), connecting historical facts with climatic events has been a narrative thread since the first articles written in the scientific field to document the analysis of ice cores (see for example Dansgaard et al. 1969). The captions on the timelines that illustrate Dansgaard et al. (1969) make reference to the interglacial period (between the 11th and the 14th centuries) in which Vikings were able to settle in Greenland, due to favorable climatic conditions. The system of dating also includes Lascaux cave paintings – thus implying a more favorable climate for the development of human civilization. The essay and the scientific images included in it acknowledge a certain causal relation between climate and human decisions. On the contrary, in his report of the GISP2 (Greenland Ice Sheet Project, 1993), the American geologist Richard Alley refers to the activity of dating ice cores as a way of "keeping track of the passing of history: this snow fell the year I was born, that snow when Lincoln spoke at Gettysburg, and so on" (Alley 2014: 54). People and climate are thus tied close together both by the imposition of a grid of events on the continuity of ice and by the extraction from this "time machine", as Richard Alley himself calls the ice-cores, of memorable stories – like the 1966 press conference in which officials from the Pentagon cooled their Coca-Colas with ice originating when Christ was born (Antonello, Carey 2017: 190). In any case, the practice of "synchronization" (Jordheim 2014) between human time, made of small individual events, and Earth's time, made of slow transformations, is key to scientific practice to face the vertiginous scale of nature's times. Only in this way, the two scales are brought to a condition of commensurability. In any case, the different shades of white of the ice cores are mostly imperceptible to the human eye and slight differences in the chemical composition need scientific analysis to be detected and explanatory apparatus to be communicated. There are then different forms of discontinuity in the reading of the ice cores: one is visible and inscribed in the matter itself. For example, a darker layer appearing in all evidence in the ice cores extracted in the Northern hemisphere can represent the dusty remains of the eruption of the Laki Peak volcano in Iceland that occurred in 1753 (Alley 2014: 54). The traces of the atomic experiments conducted since the 1950s – easily detectable through the analysis of radioactivity – belong to an evidentiary paradigm that is only visible through scientific devices. However, the organic trace of those events (natural and anthropogenic) becomes a time marker that is useful to date also the rest of the ice core. The other kind of discontinuity depends on the imposition from the outside of an extraneous grid, not founded on traces, with the objective to give an orientation and a recognizable background to the process of periodization and to give significance to something that is, in appearance, non-significant. At times, the discontinuities in the ice cores respond to discontinuities in human history (e.g. the rise and fall of the Greenlandic settlements) in an attempt to construct causal connections between environmental causes and human events. In other occasions, the correlation is instead totally arbitrary, as there is no climatic evidence for the existence of Jesus Christ or for Abraham Lincoln's speeches.

The emergence of the Anthropocene paradigm redirects the causal connection between environmental traces and human history: not only the reason for a human event (e.g. the disappearance of a civilization in a geographic area) can be found in the climatic data stored in ice; but it is the traces of mass industrialization that can now be found in the ice, and thus become the cause of an environmental change that has repercussions on human history itself. Paradoxically, the Anthropocene thesis has restored the centrality of the human agents in the history of earth, giving them the power of influencing what were once considered independent variables: "the metahistorical pregivens of the human *lebensraum*" (Koselleck 2018: 29). The Anthropocene thesis thus places "the long history of the planet and the short history of humans on the

same chart, not in order to stress the *insignificance* of humanity in the face of the Earth's vast history, as we used to do, but, on the contrary, in order to put the burden of unprecedented geological power abruptly on that same humanity's shoulders" (Latour 2017: 44).

The Anthropocene thesis has thus contributed in integrating the scale of human history with the slow times of geological transformation into a specific, unique form of visualization.

Autographic Visualizations

In scientific language, ice cores contain *data proxies*. They are empirical objects which are able to provide indirect measurements of past climate conditions. Although the information about the climate is indirect, they have the peculiarity of being made of material traces, thus giving direct access to that evidence that is the air encapsulated from the past. Through the chemical analysis and measurement of the quantities and weight of oxygen, hydrogen and carbon, scientists can reconstruct climatic data from the past and build narratives about the kind of air that past species and individuals have breathed. By enriching the evidential support of the ice cores with marks and annotations, they can tell stories of millennia-long climate and planetary change to the general public. The matter ice cores are made of has no relevance nor meaning until the researcher extracts them from a wide, indistinct continuum and looks at the lines, the spots and the slight changes of whiteness as material traces of seasonal cycles and abrupt events. As stratifications of traces, their semiotic existence depends on the presence of an interpreter: it is through the complex series of acts of recognition inherent in scientific practice that they reveal and produce environmental information.[11] Scientists are then to be considered *messengers* – the "spokespersons" in Bruno Latour's words (Latour 1987; 2004a) – who are able to give them a voice. Instruments encapsulating "mute entities (...) thus capable of speaking, writing, signifying within the artificial chamber of the laboratory" (Latour 1991: 29), the ice cores – as both scientific instruments and communication tools – can be considered as "speech prostheses that allow nonhumans to participate in the discussions of humans" (Latour 2004a: 67). On the one hand, then, ice cores belong to the world of facts: as records of past processes and events, they have an indexical and existential relation with 'what has been'; on the other, they belong to the realm of artifacts – they are the result of a massive and collective act of extraction, elaboration, codification and preservation. This is why Susan Schuppli calls them "double agents" (Schuppli 2020: 3): as "material witnesses", they have an evidential role and register external events; as scientific instruments, they also "expose the practices and procedures that enable such matter to bear witness" (ivi: 3). They are "Moebius-like concepts that continually twist between divulging *evidence of the event* and exposing the *event of evidence*" (Ibidem). We can add to this double role their function as communication devices, when they are exhibited in science museums with the purpose of assigning the environment the status of source and informant of its own transformations. In this respect, drawing from design theory, Dietmar Hoffenhuber sees ice cores as devices for collecting and displaying data through *autographic visualization*: "a set of techniques for revealing material phenomena as visible traces and guiding their interpretation. Designing an autographic display means setting the conditions that allow a trace to emerge" (Offenhuber 2020: 99). Avoiding ontological temptations that yet would seem consistent with the idea of "autography", Offenhuber considers ice cores not as mere supports bearing scars of past events, but as complexly designed communication machines whose goal is to make environmental information legible. The autographic act refers to "the self inscribing nature of material displays, in which the designer creates the apparatus that lets traces emerge rather than explicitly defining symbolic mappings" (ivi: 101). The semiotic act of recognition becomes an act of revelation: it allows nonhuman voices to emerge from the depths of time. Revealing memory encapsulated in ice is an act of 'connaissance' in its etymological sense of "co-birth": knowledge being born from the dialogue between the intelligence of things and that of human intermediaries, ice cores, as "mnemonic banks" (Serres 2003: 28) are there to show that Nature has a memory and that past is inscribed in it. Things, in Serres' words "set down codes" (198) that ask to be deciphered. Offenhuber's autographic visualizations can then be profitably associated with the concept of *gnomon*, a Greek word referring both to an object – the axis of a sundial – and to a concept – the knowing thing, which implies an attribution of cognitive agency to Nature. In Michel Serres' words, a

gnomon "functions automatically (...) without the intervention of intention, which is subjective and cognitive" (ivi: 37). Paul Ricoeur (1985), speculating about the form of the calendar, sees in the gnomon the place of the encounter between the universe of things and the schematizing habit of man: the only subject who is able to make the two systems – the system of things and the system of humans – commensurable.

As Susan Schuppli claims, if it is true that "ice cores are like a tape recorder of climatic history", then the role of the scientists is to "playback history" (Schuppli 2020: 284) as if it were a score to execute: the autographic act of environmental data self-inscribing in the ice strata can then be subdued to the possible multiple executions of the scientists reading them. As communicative devices, they give nature the active status of a subject who tells the slow history of atmospheric changes. So, the enunciation act becomes a collective effort in which the scientists expose the evidential proofs of climate change: in this construction, nature is allowed to occupy the position of enunciator and brings together the heterogeneous voices of humans and nonhumans.[12] It is humans though who have put nature in the position of speaking for itself and for them. Humans, whose impact on the earth is as accidental as a volcanic eruption, are the active directors of this collective act of communication.

Laboratories of Time

In this section, two recents artistic-research projects are presented: Susan Schuppli's *Ice Cores* (2019) [**Figg. 1-3**] and Giulia Bruno and Armin Linke's *Earth Indices. Processing the Anthropocene* (2022) [**Fig. 4**]. Making use of different media – documentary film-making, in the case of *Ice Cores*, and photography for *Earth Indices* –, these multi-year projects bring to light the network of actions, technologies, and processes required and enabled by ice coring within glacio-geological and climate change research. In their works, Schuppli, Bruno and Linke seem particularly interested in the scientific and archival practices and structures that emerge with the intent of producing knowledge on the planet's atmospheric, climatic, and geological history through the extraction, conservation, and interrogation of material samples from all over the world.[13] These artistic ventures explore the cultural and aesthetic significance of the ice core as a time capsule and as an eloquent material witness, but they also shed light on the network of intimate bonds between scientists and the objects of their study in the spaces of the field, the archive, and the laboratory.

Susan Schuppli is a multi-disciplinary artist-researcher whose work focuses on material evidence in the context of armed conflicts and environmental disasters. Through investigative processes that involve an engagement with scientific and technical modes of inquiry, she aims to open up new conceptual pathways into the material strata of our world.[14] *Ice Cores* (HD Film, 1:06:22, 2019) is part of Schuppli's multi-year research project *Learning from Ice*, which explores "the ways in which different knowledge practices engage with the situated material conditions of ice and the politics of cold".[15] In particular, *Ice Cores* documents activities in the Canadian Ice Core Archive and the Oregon State University's Ice Core and Quaternary Geochemistry Lab in the US as well as glacial retreat at the Athabasca Glacier in the Columbia Icefields and ice core drilling at Mount Oxford, Nunavut.[16] In the film, ice cores are shown in their multiple habitats: ice fields, laboratories, cryo-archives, refrigerated trucks, surrounded by complex technological and scientific apparatuses, and subjected to the acts of re-sizing and analysis by the researchers studying their chemical composition. Ice cores are extracted and then travel to institutions that are often on the other side of the planet, sometimes only to be shipped away again to other laboratories and research centers. Successful transportation, handling, and storage require a functioning infrastructure of artificial cold: without the development of cryo-technologies, ice coring could not be a viable enterprise. But the transportation can also go in a different direction, as the Unesco Ice Memory Project since 2017 is migrating ice cores from endangered glaciers in sub-Alpine and sub-Arctic regions to Antarctica, the ultimate repository of repositories: "a vast data set of vanishing information now stored in the material memories of ice".

Schuppli's film displays the relationship between researchers and ice cores, a relationship that is ultimately paradigmatic of humans and the geological past of the planet. In the film, the scientists extract, store, touch, sense, admire, brush, cut, crush, reshape, care for, and feed the ice cores into laboratory machines. The scientists are intermediaries and messengers in a larger, anthropocenic project of transmu-

Figg. 1-2 | Susan Schuppli, *Ice Cores* (2019)

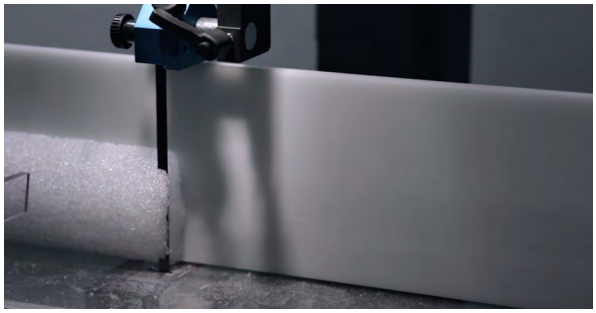
tation of matter: "the archive is a space of preservation where cores stand in purposeful wait; whereas the laboratory is the demesne of destruction, the site where ice is cut, crushed, and melted so that its internal lifeworlds can be released and studied".

The laboratory becomes a space where water, no more solid, neither liquid nor gaseous, transcends to a new non-physical state: "In the lab, ice retreats returning to granular and gaseous state, as samples move through various instruments and processes in their journey to becoming data". In this context, data is a phantasmatic exhalation of the storied materiality of ice that can be computed and stored as long as electronic supports and servers may function, potentially surviving both ice and humans' existence on Earth, to be read by machinic eyes and artificial intelligences. Schuppli's film reveals the bond between humans and the ice cores as an intimate one, veiled with a shade of proleptic nostalgia; seeing the scientists at work, with ice dust on their eyelashes and their hands sensing the textures of each ice core, we are made aware of the existential trepidation of facing a fragile and ephemeral embodiment of time.

Holding a diapositive photo, Schuppli reveals herself as a living witness: "As a teenager, I saw the snowy peak of the Kilimanjaro every day from our home in Lyamungo, Tanzania. But today, the mountain's glaciers have almost entirely disappeared, and will soon only exist within their distant sanctuary in the Antarctic". In the final sequence of the film, three researchers are shown engaging in ice coring operations in Greenland. Surprisingly choreographic, their processes and actions are accompanied by a rhythmic electronic soundtrack of distorted and looped laboratory sounds. If the laboratory is the space of destruction and transcendence into data, the field, in its white immensity, appears as the site of encounter between the scientists and the raw narrative potentiality of the storied materiality of ice.

Realized within the framework of *Evidence & Experiment* (2019-22), an initiative of Berlin's Haus der Kulturen der Welt in cooperation with the Max Planck Institute for the History of Science, Giulia Bruno and Armin Linke's project *Earth Indices: Processing the Anthropocene* (2022) is a multi-year artistic research project that focuses on the scientific processes involved in the search for the golden spike of the Anthropocene. For *Earth Indices*, Bruno and Linke closely followed the work of twelve laboratories of the Anthropocene Working Group[17] in their investigation for stratigraphic evidence of the Anthropocene epoch.[18] The artists gathered hundreds of photographs and images, which were later organized in an archive as index cards.

Every single one of these index cards is composed by three layers of meaning: a photograph depicting an object, a sketch, or some form of data visualization relevant for the stratigraphic investigation accompanied by its metadata (institutional data, technical data, coring and analysis data) and by an overlay of personal notes or commentary added by the scientists themselves. Bruno and Linke's idea was to re-create a graphic template reminiscent of the PDF format in order to convey the sense of the production and circulation of knowledge within the scientific world, while simultaneously inserting a quasi-poetic and self aware moment of reflection from the researchers in the form of commentary, instructions or caption. These notes



Figg. 3-4 | Susan Schuppli, *Ice Cores* (2019)

"unlock the technical and anecdotal knowledge hidden in the documents and reflect the praxis of the scientists' own work" (Klingan 2022: 6). The result is a vast visual repository of images and texts documenting and self-reflecting upon the collaborative and co-emergent nature of the scientific process itself. The images speak organically about the conditions of the scientific production to make the Anthropocene epoch readable: it is, according to Katrin Klingan, curator at HKW, a project informed by "the spirit of latourian laboratory studies", one aimed at making processes visible.[19]

The variety of subjects displayed in the index cards reveal the conjunction of time scales and geographical dimensions interrogated by the AWG project. Different types of high-end and low technology, macro and micro-scopic devices are mobilized in this investigation of time. Bruno and Linke wanted to express and replicate the idea of a methodology as a series of acts and processes to ultimately "transfer and translate the idea of a unit of time" and "to think about the verticality of stratigraphy". Only one ice core is studied in AWG's project (see Klingan 2022: 17), but it is the act itself of coring that is crucial for Bruno and Linke: coring contains the shape of the drilling technology, and it inscribes the human presence in the field, with various degrees of persistence in time according to the material composition of the extraction site. The stratigraphic search for the Anthropocene produces voids and pockets wherever the cores were extracted, similar to the bubbles of air encapsulated in the ice cores.

As in Schuppli's film, data is what remains at the end of the journey of the material witnesses collected in the AWG project. In *Earth Indices*, data is presented as metadata undetachable from the images they accompany. Scientists interpret the corporeal text of the cores and translate it in their language through a variety of technologies and visualization techniques: the laboratory is not too different from an artist studio, according to Bruno and Linke. Through scientist practice, as in the arts, researchers facilitate and become spokespersons of the storied matter composing the physical dimension of the planet, providing tales of precarious cohabitation, and of deep time entanglements.

Conclusions

The two case studies presented in this essay contribute to ice core knowledge in creative new directions, expanding and reconfiguring the relationship between humans and geological timescales. *Ice Cores* and *Earth Indices* inscribe the human within the vertical timelines of ice and geological stratigraphy, not as abstractions seized from Western history – the aforementioned examples of Lincoln and Jesus –, but rather

Fig. 5 | Giulia Bruno and Armin Linke, *Earth Indices* (2022). One of the index cards for the Palmer ice core.

as corporeal first-person eye-witnesses experiencing and interpreting the storied matter of ice, rocks, corals, or peat – the scientists, Schuppli herself, the AWG. They do so by using different media and registers, but converging on the idea that the acts of coring, the cores, and the empty spaces they produce are themselves acts of inscription of humans into nature that complexify and displace their relations to materiality and temporality. In contrast with the apocalyptic and extinction imaginaries mobilized by the Anthropocene paradigm, these practices and procedures introduce narratives of care and preservation. Rather than being "matters of fact" or "matters of concern" (following the distinction suggested by Latour, see 2004b), ice cores become a "matter of care", to use the definition of Maria Puig de la Bellacasa (2017). These scientific and artistic gestures appear in their gentleness and brutality, exposing care next to the inevitably harsh experience of human intervention. In their works, by focusing on ice core extraction, classification, and analysis and by documenting the search for a starting date of the 'age of man', Schuppli, Bruno and Linke subtly introduce us into the spaces and within the network of actions that produce the Anthropocene on an epistemological level. In the lab and in the ice repositories, before the air trapped in the ice cores can reveal their stories to human audiences, and before these stories can be transmuted into data, visualizations, and planetary politics, ice cores stand in "purposeful wait", handled, admired, protected by the scientists that will read and translate their final witness.

Notes

[1] For instance the *Welcome to the Anthropocene* website (https://www.anthropocene.info) developed in 2012 by Commonwealth Scientific and Industrial Research Organization (CSIRO), Globaïa, International Geosphere-Biosphere Programme (IGBP), International Human Dimensions Programme on Global Environmental Change (IHDB), Stockholm Resilience Centre and Stockholm Environment Institute. For critiques to the politics of data visualization in the Welcome to the *Anthropocene* website, see Demos 2017 and Barca 2020.

[2] See, for example, *Anthropocene* (Burtynsky, Baichwal, de Pencier 2018), the 2019 film *Breakpoint: A Counter History of Progress* (dir. Jean-Robert Viallet), or Subhankar Banerjee' Arctic photography (Demos 2016: 89-94).

[3] See, for instance, Stracuzzi's projects *The Legal Status of Ice* (2017-19) and *On Melting Ground* (2021).

[4] See also Buckland, MacGlip, Parkinson 2017; J. Reiss 2019. In particular, alpine glaciers are the focus of a very large and diverse body of works, for example: the 2007 activist performance organized by Spencer Tunick and Greenpeace on the Aletsch glacier (Wallis, Switzerland); Eddy Mottaz's glacier photography (Moiry and Rhonegletscher, 2019-2021); Olivier de Sépibus' *Mountain Undown* and *Hyper-mountain* series (2017-2018); the initiative "Project Pressure "(https://www.project-pressure.org/about).

[5] See also the process of semiotization of matter theorized by eco-semiotician Timo Maran (2014).

[6] Playfair may have been influenced by Priestley, as stated in Friendly (2006: 26). The practice of noting variation of a phenomenon in time through a horizontal line was also used in natural sciences, as Playfair himself tells us in his introduction to Adam Smith (1805, 3:xvi). That his connection to strategies of notations in natural sciences came from his relationship with his mathematician brother John is found in Berkowitz (2018: 253). As stated in Funkhouser (1937: 289), there is also a connection between financial graphs by Playfair and the visualization of meteorological data that was taking hold in the same years.

[7] The first geological maps and the definition of stratigraphy are attributed to William Smith in 1815 (see Palmer, Macfarlane 2020) while the first visualizations of cross-sections of the earth's layers as connected to time are by Cuvier and Brongniart (1822), as found in Sepkoski, Tamborini (2018). That earth is made up of layers, the oldest at the bottom, the newest on the top, was discovered as early as 1667 by Danish geologist Nicolaus Steno.

[8] See for example Krzysztof Pomian (1984) and the different forms of visualization of history (chronometry, chronology, chronography and chronosophy) that reflect the different approaches and instruments (quantitative or qualitative) for analyzing time.

[9] One of the first most successful drillings took place in 1966, the military outpost of Camp Century in Greenland. This camp was aimed to be a base of nuclear missiles and hosted a maze of under-ice tunnels. See Achermann 2020.

[10] Although the concept of time as a "dark abyss" is already present in Buffon, the best reference we can give to the concept of "deep time" is to the classics Toulmin & Goodfield 1965 and Gould 1987.

[11] Recognition is one of the modes of sign production indicated by Umberto Eco that has to do with imprints, traces and clues. In his words, "recognition occurs when a given object or event, produced by nature or human action (intentionally or unintentionally), and existing in a world of facts as a fact among facts, comes to be viewed by an addressee as the expression of a given content, either to a pre-existing and coded correlation or through the positing of a possible correlation by its addressee" (Eco 1976: 221).

[12] I am influenced here by the reflections on "impersonal enunciation" by Claudio Paolucci (2020) and his reinterpretation of the notion of "collective assemblage of enunciation" by Deleuze and Guattari (1980).

[13] These projects are not the only significant contributions on ice core knowledge stemming from visual and media arts. See, for instance, *Ice Core Modulations* (Wollensak, Goldman, Baird 2015) and Wayne Binitie's *Polar Zero* exhibition (2021).

[14] https://www.gold.ac.uk/visual-cultures/staff/schuppli-susan.

[15] https://learning-from-ice.org.

[16] https://susanschuppli.com/ICE-CORES-1.

[17] The AWG is a research subdivision of the Subcommission on Quaternary Stratigraphy, a constituent body of the International Commission on Stratigraphy. One of their main objectives is to date the beginning of the Anthropocene by finding a "golden spike" (formally known as Global Boundary Stratotype Section and Point), a demarcation in stratigraphy to mark the beginning or end of a geologic period http://quaternary.stratigraphy.org/working-groups/anthropocene.

[18] Each laboratory studied a different sample from a different location: Antarctic Peninsula, Antarctica (the only ice core of the project); Beppu Bay, Japan; Crawford Lake, Canada; East Gotland Basin, Baltic Sea; Ernesto Cave, Italy; Flinders Reef, Australia; Karlsplatz, Wien Museum, Vienna, Austria; San Francisco Estuary, USA; Searsville Reservoir, USA; Sihailongwan Lake, China; Śnieżka Peatland, the Sudetes, Poland; West Flower Garden Bank Reef, USA.

[19] According to Klingan "*Earth Indices* portrays both the natural landscapes from which anthropogenic sediments are laboriously extracted as well as the complexities of laboratory processes and the inscription devices they employ to transform the sediment into data that can be interpreted. The exhibition focuses on the spaces of social interaction in which this scientific research takes place, shedding light on the specific procedures and tasks involved in the production of geological evidence. In this way, a multilayered archive is created that relates the anthropogenic traces in the Earth system to the emerging body of knowledge of a new geological epoch" (Klingan 2022: 5).

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Le design de la “fusion”. Une anthropologie des corps excitables

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Abstract

La crise traversée par le secteur du tourisme de montagne est perçue par un certain nombre d’acteurs comme une aubaine économique. La crise a toujours représenté un champ d’opportunités pour la consolidation et l’extension des savoirs et des pratiques du marketing. En l’occurrence, la crise du tourisme de montagne a vu se renforcer les liens qui faisaient travailler ensemble “tourisme”, “marketing” et expériences de liens à la nature. Notre relation au(x) monde(s) fonctionne de plus en plus à l’image de la relation aux casinos et aux machines à sous qu’a décrit l’anthropologue Natasha D. Schüll dans *Addiction by Design*: médiée par une ingénierie et un management de l’attention, de l’extase et de l’oubli de soi. La fusion faisant à la fois figure de promesse et de moyen (*hooked*) pour accrocher les consommateurs/trices. Cet article entend présenter d’un point de vue critique l’émergence historique d’une forme de *design* de l’expérience de fusion à la nature.

Le psychologue Abraham Maslow a proposé dans un essai de 1964, *Religions, values, and peak experiences,* le concept de "*Peak experiences*" pour désigner des moments "rares, excitants, océaniques et régénérants" de bien-être et d'alignement au monde, des moments qui génèrent des formes altérées de perception de la réalité jusqu'à provoquer un sentiment de transcendance.[1] Dans cet essai, il suggérait que certains environnements, milieux et activités agissaient comme de puissants déclencheurs d'expériences qu'Hartmut Rosa qualifierait, près de cinquante ans plus tard, de "résonantes" pour la qualité d'être et de contact avec le monde dont elles seraient porteuses (2018). En plaidant pour une nouvelle alliance entre la science et la spiritualité, Maslow appelait de ses vœux un travail civilisationnel de mise en culture de la "résonance" et comptait sur le fait que la nature puisse en incarner une des sphères privilégiées au sein de notre Modernité.

C'était sans compter le fait que la relation au monde allait devenir une marchandise comme une autre. Au tournant des années 80, un nombre croissant d'expertises cherchèrent à étendre efficacement les prérogatives du marché aux "expériences de relations à la nature". Elles se mirent à réfléchir aux meilleures manières d'informer cette relation, d'en concevoir le *design* et, ainsi, offrir à l'industrie du tourisme récréatif de pleine nature, alors en pleine extension, une aubaine économique et un champ d'opportunités pour consolider et étendre son offre. Le cœur de ces démarches consista à tenter d'élucider une énigme, centrale pour cette industrie: comment *designer* l'expérience de la relation au monde intense et fusionnelle?

Nous proposons d'étudier ces expertises depuis le prisme d'un corpus d'articles produits par un réseau de revues internationales hébergées par des grandes business school qui, à la croisée de la géographie, du tourisme, du marketing, de l'ethnographie et de la psychologie expérimentale, ont construit un champ entièrement dédié à une industrie touristique tournée vers ces enjeux: la *Consumer Culture Theory (CCT)*. Depuis plus de trois décennies, une littérature grise abondante cherche, rend compte, calcule et, finalement, ordonne les moyens par lesquels les industries touristiques du capitalisme tardif prennent à leur charge la réanimation de nos expériences sensibles de nature. Plonger dans cette littérature permet de comprendre les rouages, c'est-à-dire les notions, les appareils, les médiations que se donnent ces industries pour s'auto-missionner dans la tâche de conceptualiser des expériences marchandes de contact à la nature qui soient intenses et fusionnelles.

Plutôt qu'à multiplier les prises de vue au cas par cas de tel ou tel opérateur, cet article prend pour terrain des articles scientifiques qui contribuent et façonnent des formes de marchandisation (Illiouz 2019), de touristification (Bourdeau 2003) ou encore de disneylandisation (Godin 2011) de notre rapport au monde et aux milieux naturels.

Depuis l'exploration de ce corpus, j'aimerais formuler les directions principales de cet article sur la base de trois propositions. La première voudrait que les opérateurs touristiques auraient tendance à substituer à un tourisme d'aventure (Curtin 2009) un tourisme de la fusion. Seconde proposition: ce tourisme de la fusion reposerait sur la promesse d'une expérience d'inséparation (Quessada 2013). Troisième proposition, pour qu'elle advienne, les acteurs du tourisme auraient besoin d'un opérateur commun pour "qualculer"[2] au mieux cette expérience. L'expérience touristique étant majoritairement pensée et souhaitée comme expérience "intense", c'est la notion d'"excitation" (*arousal*) qui jouerait le rôle d'opérateur principal et de mise en qualcul de l'expérience du tourisme de et du contact.

Cet article entend présenter l'émergence historique d'une forme de *design* de l'expérience de fusion à la nature. Et, dans le même temps, appuyé sur le travail de l'anthropologue Natasha Dow Schüll (2012) ou encore celui de l'historienne Michelle Murphy (2006), il se veut une tentative pour densifier et complexifier les histoires d'intrications et d'enchevêtrements qui se développent dans les SHS (Tsing 2015) et que l'on présente, en général, comme des formes moralement bonnes et politiquement souhaitables, en omettant qu'elles sont aussi le lieu du trouble (Haraway 2016).

"Recreation" et expérience intense

Le tourisme de crise engendre de nouveaux types de tourisme et, partant, de nouvelles pratiques récréatives de pleine nature (Micoud 2017). Le qualificatif "récréatif" est la reprise de la notion anglo-saxonne de *recreation,* laquelle accueille, articule et indiscerne les champs du loisir, du tourisme et du sport (Bourdeau 2003). Les pratiques en question ne sont

plus assignables à un univers de référence strict mais recomposent de nouveaux territoires d'activités et d'explorations. Parler de récréation en ce sens permet d'inclure dans l'horizon du secteur du tourisme, toute une gamme d'activités qui, jusqu'alors, n'avait que peu de place dans ce que l'on désignait par loisirs de pleine nature: peindre, chanter, herboriser, méditer… S'invitent dans les définitions, des aspects artistiques, mémoriels, spirituels et, pourquoi pas, politiques. Rapporté à cet univers de références, la "*recreation*" connote des formes de communion aux milieux, de sociabilité et d'épanouissement personnel (Arnould, Price 1993). Soit autant de valeurs "profondément frustrées", déplorent-ils, par les modes de vie occidentaux contemporains.

C'est en remontant au milieu des années quatre-vingt, dans la littérature anglo-saxonne, que l'on aura plus de chance de dater ce souci "récréatif". Par souci, j'entends son entrée en tant que domaine d'attention d'une expertise nouvelle. Si le rapport entre tourisme de pleine nature et capitalisme toxique s'est établi très tôt dans l'histoire de l'industrialisation sur la base d'une opposition entre la ville malsaine (lieu de travail et de production) et la nature (lieu de ressourcement et de soin), ce n'est que dans les années quatre-vingt qu'une ingénierie instrumentée, appuyée sur des concepts alors en plein essor (*peak experience, flow, extraordinary experience…,* nous y reviendrons), entreprend d'en formaliser les ressorts.

La *recreation* englobe alors l'univers de pratiques par lequel sont mises à distance les routines quotidiennes, les rythmes, les toxicités propres à la vie urbaine, aux univers professionnels. Elle est une réponse à une demande d'espaces compensatoires et réparateurs, qui se résume à une formule: "*getting away of it all*" (Arnould, Price 1993). Cette échappée hors d'un marasme jugé toxique est pensée comme un moyen pour réparer "son propre rapport à l'univers social" (Della Bernardina, 1996). Les milieux naturels vont être conceptualisés comme des environnements propices à cette réparation, ce que suggèrent Rachel et Steven Kaplan (1989) dans leur théorie de la restauration de l'attention très souvent mobilisée dans la littérature grise de la *CCT* et selon laquelle notre "attention directe" demanderait à être rafraîchie par une "attention indirecte" qui a la vertu de restaurer le cerveau dans ses aptitudes attentionnelles.

Par ailleurs, ce rapport compensatoire s'établit à la faveur de temps d'absorption de courtes durées qui se doivent, en conséquence, d'être intenses. La nature est cantonnée dans un rôle utilitaire de compensation et de réparation. Un "City break". Peu importe la durée de ces immersions, elles seront nécessairement toujours plus courtes que les immersions urbaines quotidiennes. Structurellement, sous-jacent à la demande de grand air pur et réparateur gît un impératif d'efficacité: on leur demande d'agir *efficacement* au sein d'un cadre temporel qui ne ménage et ne supporte que de rares échappées. Ce rapport "compensatoire" offre une prise à l'industrie du tourisme qui peut alors cibler comme produit des expériences extra-ordinaires au moyen d'un tourisme de rupture qui, paradoxalement se présente aussi comme un tourisme de contact: une offre de déconnexion, de dépaysement et de mise en rapport privilégiée avec des milieux naturels. De quoi marketer des offres calibrées qui allient rupture et déconnexion, sensation et dépaysement, intensité de la fusion et confortable sécurité.

Consumer Research

Dans les années 90 un courant se constitue, donc, sur la base d'une réflexion sur les innovations à mener dans un contexte concurrentiel intense et sur les stratégies à adopter pour suivre les évolutions de la figure du consommateur de pratiques récréatives. La montée en puissance d'une économie de l'expérience[3] et d'un marketing sensoriel qui, au consommateur rationnel et attaché aux qualités d'un bien, préfère désormais la figure d'un consomma(c)teur en recherche d'expériences plaisantes, intenses et hédonistes, crée le terreau d'une expertise nouvelle dans le montage de stratégies relationnelles visant à impliquer le client de manière personnelle et marquante, ainsi qu'à lui fournir une expérience sensorielle, d'autant plus forte qu'elle aura réussi à stimuler et concerner plusieurs sens.[4] De l'intérieur même des départements marketing des *business schools* américaines (Cochoy 2011: 73), une branche de la *CCT* va se démarquer par son tropisme pour les méthodes et démarches compréhensives utilisées par la sociologie et l'ethnographie (Arnould, Thompson 2005).[5] Cette branche déploie une approche culturelle de la consommation en s'attachant aux notions de plaisir et d'expérience. De nombreuses revues académiques diffusent ses recherches: *Interna-*

tional Journal of Tourism Research qui cherche à promouvoir de nouveaux territoires de recherches et de nouvelles approches en géographie sur les questions du tourisme, *Current Issues in Tourism, Foundation of Tourism Reseach,* ou encore le *Journal of Environmental Psychology* qui propose "une étude scientifique de la transaction et de l'interrelation entre les hommes et leurs milieux". Ces revues couvrent un programme scientifique très large qui s'étend de l'étude marketing d'une offre touristique singulière jusqu'à la mise à l'agenda scientifique et marketing des formes de relation au monde.

Ce recours aux méthodes des sciences sociales au sein de la *CCT* donne naissance à ce que Eric Arnould et Linda Price, tous deux membres du comité éditorial du *Journal of Consumer Research Institute,* professeur au Département de marketing et de management de la University of Southern Denmark pour le premier et professeure au département marketing de la University of Oregon pour la seconde, baptisent du nom d'ethnomarketing ou "ethnographie-orientée-marché". C'est ce mélange de tourisme et de géographie, de marketing et d'ethnographie, d'expérience et de consommation que ces chercheurs étudient et tentent d'élucider afin de mettre au jour les "déclencheurs émotionnels" à même d'optimiser l'expérience touristique (Frochot, Kreziak 2010).

On le voit, la notion d'"expérience" fascine ces cercles. Elle est le lieu de ce que, techniquement, ils nomment "point de contact" entre un produit et ses consommateurs. Loin du caractère ouvert et transactionnel que lui prête John Dewey (1934), l'expérience renvoie, ici, à des offres conçues et mises en scène par les entreprises: "les expériences adviennent dès lors qu'une entreprise, ou une organisation, les élaborent intentionnellement, dans le but de délivrer plus de valeur au consommateur. […] Une expérience n'est jamais aléatoire ou accidentelle, mais bien conçue et contrôlée par l'entreprise ou l'organisation" (Roederer, Filser 2015: 11). Plutôt qu'une ouverture à ce qui arrive, l'expérience prend la forme d'un produit programmé qui prend effet sous la forme des "sensations, sentiments et réponses cognitives et comportementales évoquées par des stimuli liés à tous les aspects d'une offre d'entreprise" (Richard 2013: 7). En somme, l'expérience est vue comme le fruit d'une mise en scène intentionnelle, s'adressant aux corps, à leur capacité à être affectés, elle est mise au service d'un accroissement de valeur (existentielle, morale) pour le consommateur et de valeur (profit) pour l'entreprise. La création de valeur repose sur la qualité, l'originalité et l'intensité de l'expérience qu'elle propose au consommateur.

Le *design* de l'expérience "extraordinaire"

Arnould et Price ont écrit un article séminal en 1993 dans le fameux *Journal of Consumer Research:* "River Magic: Extraordinary Experience and the Extended Service Encounter". Ils y étudient un séjour touristique de rafting de plusieurs jours sur la rivière Colorado et tentent de déterminer les éléments clés permettant à des opérateurs d'"offrir des expériences extraordinaires et prolongées dans le temps" (1993: 24). L'article prend pour objet le *design* de l'expérience extraordinaire entre des corps et des milieux naturels et destine ce *design* aux opérateurs du tourisme.

Outre les *peak experiences* de Maslow, les deux auteurs convoquent et combinent les concepts de *flow* (Csikszentmihalyi 1975 et 1979) et d'extraordinaire (Abrahams 1986) pour progressivement cerner les contours de leur propre concept. L'"expérience extraordinaire" renvoie au caractère à la fois inédit, positif et intense d'une situation ou d'un cours d'action, souvent partagé. Elle se distingue du "flow", en ce qu'elle est induite par des événements inusuels "qui se caractérisent par de hauts degrés d'intensité" (Arnould, Price 1993: 25, ma traduction) sans pour autant impliquer un niveau d'engagement physique élevé. L'intensité recherchée ici, à l'instar des "peak experiences", n'est pas une intensité d'effort mais de sentiment ou de contact. Elle se définit par un sentiment d'absorption et d'épanouissement personnel (à la fois moral et spirituel), un sentiment d'encapacitation (puissance, joie), un lâcher-prise et un renouvellement dans ses manières de percevoir le monde.

L'expérience extraordinaire est dépeinte comme une expérience positive, inédite et *intense*. Toute la question, dans le cadre d'une ethnographie-orientée-marché, est de se demander comment des opérateurs peuvent proposer ce type d'expériences sans devoir s'en remettre au hasard ou à la contingence quant à leur survenue. C'est en essayant de répondre à cette question que l'article tente de fournir des recommandations au marché auquel il s'adresse. Aussi Arnould et Price préconisent-ils une attention toute

spécifique à faire porter sur trois dimensions de l'expérience: *les affects, les récits et les rituels.*

"Nous spéculons sur le fait que l'ingénierie des affects (engineering affect) est centrale à la réussite de la prestation d'expériences extraordinaires" (ivi: 26, ma traduction). Ils s'inspirent, entre autres, de la littérature managériale des parcs à thème, notamment d'articles portant sur les stratégies que DisneyWorld a su mettre en place pour développer et rationaliser une "ingénierie des effets hédonistes" (*engineering of hedonic outcomes*) qui leur permet d'offrir une vision de premier plan enchantée qui occulte de l'attention du public l'ensemble des informations relatives à ses coulisses (Johnson 1981).

Mais l'intensité émotionnelle ne serait rien si, deuxièmement, elle ne s'insérait pas dans un schéma narratif qui se déploie sur un paradoxe: d'un côté, le caractère unique et rare de l'expérience extraordinaire, de l'autre son insertion dans un horizon d'attentes et de valeurs fantasmées. La satisfaction des clients serait ainsi liée et dépendante de *scripts* culturels sous-jacents auxquels les touristes auraient plus ou moins spontanément, et de manière plus ou moins consciente, adhérés. Arnould et Price en viennent, par exemple à scripter les "interactions interpersonnelles", notamment celles qui relèvent de la relation entre le guide et ses clients. "Le guide, écrivent-ils, est un impresario qui facilite la mise en scène de scénarios culturels vaguement familiers, aidant les participants à transformer des expériences en souvenirs d'épanouissement personnel, de dépassement de soi, de défis, de travail d'équipe et de persévérance" (Arnould, Price 1993: 24, ma traduction). Il est le médiateur principal d'une expérience centrale: vivre (avec) la "magie de la rivière". Outre son rôle attendu dans la "production de la communauté" (ivi: 34), le guide est attendu sur sa capacité "à fournir des clés" et à "orchestrer et faciliter des opportunités de communion avec la nature" (ivi: 33). Le voilà transformé en médiateur d'un type de rapport au monde, un opérateur de proximité, d'intensité et de fusion. Son but: intensifier le signal de l'expérience.

L'expérience extraordinaire prend, troisièmement, du fait de sa dimension émotionnelle et narrative, des allures de rites de passage, dans lesquels sont mis en jeu ce que les participants vont considérer et reconnaître comme relevant d'une expérience authentique, unique et extraordinaire. Le script de préférence doit donc être celui d'un rituel et, plus précisément encore d'un pèlerinage. En s'inspirant des analyses du folkloriste Van Gennep, Arnould et Price suggèrent que le séjour devra séquencer une série d'événements qui concourront à la survenue d'une expérience extraordinaire et au sentiment d'être pleinement vécue. Les clients sont ceux qui volontairement et temporairement font le choix de se mettre à l'écart de la société et de leurs vies courantes, et font de cette mise en retrait un "rite d'intensification". Intensification de la relation à soi, intensification de la relation aux autres, intensification de la relation aux éléments, à la nature. Les sciences sociales apparaissant une fois à titre de méthode (ethnographie) et une fois à titre de ressource (répertoire folklorique).

Affects, récits et rituels, Arnould et Price élaborent un *design et une ingénierie* de l'expérience extraordinaire. Ils formulent des préconisations afin d'organiser au mieux la possibilité d'un sentiment de connexion au milieu environnant. L'article en vient à thématiser l'importance de la question du *monitoring* de l'expérience en vue de stabiliser ces rites d'intensifications.[6] L'intensité de l'expérience ou plus encore l'intensification du rapport au monde n'est, dans ce cas, pas tant un événement qu'un récit pré-vendu et donc attendu.[7]

Tristan Garcia a proposé dans *La vie intense* (2016) un cadre d'analyse globale de la place qu'occupe la notion d'intensité dans notre Modernité, dont il relie l'essor, précisément, à la progressive déchéance de la promesse de transcendance. Le mouvement d'intensification généralisé de nos perceptions, désirs, sensations, argumente-t-il, servirait la cause de la forme de vie la plus enviable en l'absence de transcendance: une vie intense. Les sociétés modernes ne seraient plus en mesure de proposer et de promettre autre chose que la vie telle que nous la vivons. En l'absence de la possibilité de cet "autre chose", la promesse ne pourrait porter que sur un accroissement, un plus de cette même chose. Prise dans sa forme la plus générale, une telle promesse prendrait la forme majoritaire de plus de vie.

Les dispositifs expérimentaux qu'affectionne la CCT, prolongent, mais tout autant performent, ce type de rapport à l'intensité. Puisqu'ils ne saisissent de l'expérience que ce qui l'augmente et qui l'augmente du fait de l'excitation qu'elle procure à un corps, le design de l'expérience reste enfermé dans cette quête d'intensité, qu'il vise des expériences

"extraordinaires" ou "transcendantes".

En résumé, pour Arnould et Price, l'équation est à la fois complexe et simple. Simple, en ce que des participants s'engagent à vivre des expériences extraordinaires et s'en remettent, pour ce faire à une instance extérieure, un tour operator qui a à charge de scénariser la mise à l'épreuve souhaitée: rencontrer la rivière.[8] Complexe, en ceci que les déterminants de l'expérience doivent pouvoir être maîtrisés, convocables et produits par un *design* de l'expérience aussi discret que possible: "l'ingénierie des effets harmonieux hédoniques doit se faire en coulisses, sous la ligne de visibilité" (Arnould, Price 1993: 26, ma traduction).

En historicisant les conclusions et recommandations de cet article de 1993, on ne peut qu'être frappé par la manière dont elles viennent rencontrer certains champs très contemporains de contestation de la marchandification de nos expériences. La mise en avant des affects, des récits et des rituels fait partie de la montée en puissance en France, depuis une dizaine d'années, des perspectives convivialistes ou écoféministes, du fait notamment de la publication de l'ouvrage séminal de Starhawk *Rêver l'obscur* en 2015 et, l'année suivante, de *Reclaim,* premier recueil de textes écoféministes, dans la collection "Sorcières" des éditions Cambourakis.

Il ne s'agit pas d'arguer de l'inanité de ces tactiques de résistances mais de pointer le fait qu'elles ne sauraient, en elles-mêmes et de manière évidente, devenir telles. Une autre manière de le dire: affect, récit, rituels ne sont pas des mots innocents, des mots qui sauvent. Ils sont les représentants d'une zone contaminée et c'est à ce titre qu'ils peuvent être revendiqués (*reclaim*) de manière "non-innocente", faire l'objet de reprises qui mettent en leur cœur l'enjeu d'apprendre à en composer de nouvelles versions.[9]

Des expériences transcendantes

La scénarisation des affects, des récits et des rituels représente une première étape pour une industrie du tourisme désireuse d'accroître ses capacités de *monitoring* de l'expérience. Ce monitoring va très vite prendre une autre ampleur à la faveur d'un glissement conceptuel et d'un renouvellement des méthodes mises à disposition pour scénariser les expériences touristiques à la fin des années 90. En une décennie, la recherche de prises sur des expériences non plus seulement "extra-ordinaires" mais désormais "transcendantes" (Williams, Harvey 2001; Tsaur, Yen, Hsiao 2012) va organiser la transition des vertus de l'ethnographie-orientée-marché vers le laboratoire de psychologie expérimentale, lieu de référence pour toute opération de quantification et de mesure.

Ce glissement relève du dépassement de l'idéal arrimé au tourisme d'aventure au profit d'un tourisme du contact orienté vers des valeurs de références plus axées sur l'écologie, la spiritualité et, plus généralement, une éthique de la présence au monde (Corneloup 2011). Ce n'est pas que l'extraordinaire ait disparu, le qualificatif "transcendant" le dit suffisamment. Ni effort intense ni griserie, ni fun ni vertige, l'extraordinaire s'est déplacé, il procède de nouvelles intensités plus atmosphériques et éthérées.

La question reste la même: Comment se créer des prises sur ce genre d'expériences? S'il s'agit encore de se donner des outils de compréhension d'activités *in situ,* cela se fait en rêvant aux possibilités de les faire entrer au laboratoire et de les soumettre à la rigueur de l'expérimentation scientifique *in vitro*. Le laboratoire expérimental est le lieu où le monde peut être raréfié, mis en scène de telle sorte à pouvoir être reproduit dans ses manifestations (Stengers 1993). Il offre le cadre idéal à la stabilisation des conditions de possibilités d'une expérience.

En opérant un recentrage des sciences sociales vers les sciences cognitives et la psychologie expérimentale, de plus en plus d'études de la *CCT* vont, à partir des années 2000, concevoir des dispositifs expérimentaux censés offrir une saisie nouvelle du fait émotionnel en offrant notamment des mesures à un objet réputé jusqu'alors être instable et impur. Pour ce faire, je propose de m'arrêter sur l'article de Kim et Fesenmeier (2015) "Measuring Emotions in Real Time: Implications for Tourism Experience Design", pour leur inscription dans le courant de la *CCT*, leur renvoi appuyé à l'ethnographie-orientée-marché d'Arnould et Price, et en même temps la revendication d'une nouvelle expertise dans le "packaging" (Tsaur, Yen, Hsiao 2012) de l'expérience.

L'étude entend mesurer des émotions en enregistrant l'activité électrodermale chez deux étudiantes à qui on a demandé de se promener deux à trois heures par jour pendant une semaine dans des sites touristiques autour de Philadelphie. Elle enregistre le tracé

des phénomènes électriques qui se produisent sur la peau, collectés en temps réel et en situation, seconde après seconde. Plus qu'à une émotion, la mesure se rapporte, plus précisément, aux activations du système nerveux autonome et enregistre l'évolution de la conductivité de la peau. Elle quantifie un niveau d'excitation: "le niveau de conductance de la peau (SCL) et les réponses de conductivité de la peau (SCR) forment un indicateur fiable du niveau d'excitation (arousal) d'une personne" (ivi: 422).

Si le laboratoire peut désormais servir à quelque chose, c'est à partir en quête de la "pureté " de l'excitation physiologique, de laquelle est extrapolée un état émotionnel intense. Il ne serait plus seulement possible de récolter des récits sur l'expérience émotionnelle, mais de la capturer elle-même réellement, et donc de produire une quantification de ces phénomènes. Ce "durcissement" des données a de quoi intéresser: il permet de laisser derrière soi ce qui pouvait passer, quelques années auparavant, pour un bricolage qualitatif et d'établir scientifiquement les bases du management et du design de l'expérience touristique intense:

> Nous concluons que l'aptitude à mesurer les émotions des voyageurs en temps réel et en contexte naturel offre de nouvelles connaissances sur la relation entre leurs émotions et les environnements physiques et sociaux, ce qui, en retour, pourrait fournir une fondation utile au design et au management des expériences de tourisme (Kim, Fesenmeier 2015: 419).

L'appropriation des techniques expérimentales de la psychologie positive par la *CCT* s'inscrit dans une histoire déjà jalonnée d'étapes. La mesure de l'activité électrodermale forme, avec le sphymographe, le pneumographe et le cardiographe,[10] un appareillage de mesure qui émerge au XIX[e] siècle et qui liera la démarche expérimentale naissante à un champ d'applications en plein essor: la criminologie, science des comportements criminels, en pleine modernisation du fait des travaux alors jugés révolutionnaires de Cesare Lombroso. Ces équipements furent pensés pour enregistrer, compter et quantifier des événements corporels et les retranscrire sous la forme d'une physiographie et d'une physiométrie (Balmer 2013). Ils ont contribué au projet général, si caractéristique du XIX[e] siècle, de conquête scientifique du corps émotionnel.

Le polygraphe de Lombroso et le laboratoire à ciel ouvert que mettent en place Kim et Fesenmeier se recoupent dans l'anthropologie implicite que leurs deux dispositifs engagent. Il y aurait, sous des effets de surface, socialement construits et psychologiquement sculpté, un soi profond *en nature,* saisissable en son essence et fondamentalement incapable de mensonge ou non encombré par le "bruit" de son expression.

Insistons sur un point aveugle de ce genre d'étude: "l'expérience émotionnelle" en tant que telle n'existe pas. Il n'y a rien qui corresponde à cet énoncé de manière évidente ou spontanée (Lutz 1988). Pour qu'il y ait mesure et quantification, il faut que ce que l'on compte mesurer soit d'abord perçu comme quantifiable (Pharabod, Nikolski, Granjon 2013). Cela passe rarement par une équivalence de fait mais suppose de minutieuses opérations de traductions. La pureté présumée du laboratoire expérimental n'est pas sans effet, elle oblige à un travail de mise en formes pour construire, dans le cas qui nous concerne, une équivalence entre excitation et émotion. Kim et Fesenmeier ne cessant pas d'aller et venir entre l'"émotion" et l'"excitation", ils oublient au final tout le travail par lequel ils ont d'abord présupposé puis construit cette équivalence. À l'instar de nombres autres tentatives, la version que construit le laboratoire de Kim et Fesenmeier, est une version très pauvre de l'émotion à force de l'avoir *designée* de telle sorte à pouvoir rentrer au laboratoire (Danzinger 1990, Damian 2014). Et cette version sert un laboratoire d'une nature essentiellement extractiviste et réductionniste (Rasmi, Perazzo 2022): on extraie d'une expérience, d'un milieu, une dose d'excitabilité, en croyant expliquer la première par la dernière. On cherchait des expériences transcendantes et on ne se donne les moyens que de traquer des "excitations". On visait des formes complexes d'enchevêtrement au monde et on ne capture que des réactions physiologiques. Ce qui est *designé*, scripté, scénarisé: une excitabilité et des voies d'intensification.

Cette pauvreté, les auteurs ne s'en cachent même pas. La mesure physiologique, censée combler les manques du récit introspectif en première personne, s'avère *in fine* insuffisante et nécessite que l'on revienne à ce récit: "il est difficile d'identifier les raisons spécifiques de l'augmentation de l'excitation et du niveau de réponse différentielle. Toutefois, encore une

fois, les données autodéclar*ées* (self-report data) ont fourni des pistes importantes" (Kim, Fesenmeier 2015: 421). Les données physiologiques récoltées n'enregistrent rien de la valence ou du type d'émotion ressentie.

Enfin, l'étude commet une erreur d'importance: elle rapporte la question de la transcendance à une affaire purement humaine dans laquelle le milieu naturel environnant serait réduit à n'être qu'un décor. Contrairement aux ambitions affichées de réfléchir sur l'*agency* du milieu dans le vécu de telles expériences, ces études reterritorialisent l'expérience au seul périmètre de la personne humaine.

Une opération de qualcul

Les recherches d'Arnould et Price et de Kim et Fesenmeier puisent dans les sciences sociales et dans le laboratoire expérimental des sources d'inspiration méthodologiques, confiantes dans leur capacité à épurer l'expérience, la *designer,* la scénariser et la remettre entre les mains d'une industrie touristique. Une telle industrie fonctionne en standardisant des gabarits préconçus et scénarisés. Elle casse le primat de la singularité de l'expérience tout en, paradoxalement, multipliant les paramètres d'une personnalisation qui n'est plus le fond de l'expérience mais l'enveloppe qui la rend confortable et désirable. Elle est en demande des bons indicateurs pour que ces expériences puissent ne pas valoir par et pour leur singularité mais par l'ensemble des variables commensurables qu'elle parviendra à dériver de l'expérience. La traduction de l'expérience en une échelle d'intensité ou d'excitabilité validée par un laboratoire scientifique offre un avantage commode. Elle permet d'optimiser un panel d'offres à partir de la comparaison rendue possible d'expériences intenses qui, à défaut d'être du même ordre, auront bénéficié du même type de mesure.

En ce sens, le design de l'expérience intense est le design d'un rapport à une nature fantasmée comme entièrement paramétrable, *qualculable* (Callon 2017) et *scalable* (Tsing 2015: 38). L'industrie du tourisme est dépendante d'une logique et d'une recherche effrénée de *scalabilité,* soit de modes de gestion indépendants et sans égards pour les circonstances particulières, les histoires singulières, grâce auxquelles un bien est produit.

La relation au monde fonctionne, dans les articles de la *CCT,* de plus en plus à l'image de la relation au casino et aux machines à sous que décrit Natasha Dow Schüll dans *Addiction by Design* (2014). Un casino est une tentative sophistiquée et aboutie de création d'une dimension de l'espace qui procède par retournement des valeurs: un espace marchand, public, peuplé, surabondant en termes de stimuli et de hameçonnages attentionnels devient le lieu d'une retraite privée, douce et quasi spirituelle, le lieu d'une expérience extatique où l'on s'autorise à s'oublier soi-même et à apaiser un temps son commerce avec le monde. Tout est pensé et façonné, programmé, marketé de telle sorte à satisfaire la principale demande des clients: une demande d'évasion. Et ainsi produire des espaces dédiés à l'oubli, à la dissolution du soi, qui passent pour les lieux même d'une mise en contact avec soi et avec le monde. Les expériences que *designent* les tenants de la CCT produisent des subjectivités finalement assez indifférentes à la spécificité des milieux et confondues à des corps dont le cycle sensori-moteur est fermé sur lui-même. Elles ne fonctionnent, n'apaisent, ne dépaysent ou ne gratifient qu'à la seule condition que tout le reste ait été absentéifié ou chosifié. La relation au monde est devenue une marchandise (*commodities*) comme une autre. Son design: celui d'une fusion intense.

Alors il nous faut conclure sur ce point. Dans ses deux ouvrages *Résonances* (2018) et *Rendre le monde indisponible* (2020), Hartmut Rosa a dépeint la Modernité comme une promesse d'extension de notre rapport au monde. Cet accès n'est rendu possible qu'à la seule condition que le monde soit réductible à un ensemble de paramètres connaissables et compatibles avec les scripts d'un utilitarisme hédoniste qui rêve de pouvoir mettre en scène un monde intégralement *atteignable* et *disponible*.

Lorsque la *CCT* cherche à *designer* la fusion, lorsqu'elle s'appuie et détourne des notions telles que "point de contact", elle ne cherche pas autre chose que cette "mise en disponibilité". Elle transforme les possibilités d'expérimentation qui gisent dans les "zones de contact" (Haraway 2008) en des points d'agression (Rosa 2018: 13). Les ressorts de cette agression tiennent dans le type d'anthropologie qu'implicitement la *CCT* véhicule et performe dans ses textes: une anthropologie du corps excité et excitable. Cette agression se répand depuis la con-

fusion de deux sortes d'intensités: l'une liée à l'intensification de la sensation, l'autre relevant davantage d'une mise en culture de plaisirs somatiques qui se déploieraient à l'écart des formes prescrites et injonctives de l'expérience intense telle que l'entend et la pense l'industrie du tourisme. Autrement dit, l'intensification du plaisir est confondue avec (et réduite à) l'intensification de la sensation (Shusterman 2007). Les opérateurs touristiques connaissent mieux le marché que la culture somatique. Les règles de fonctionnement du second ne peuvent être déduites du premier.

Qu'en serait-il de médiations qui nourrissent non ce point d'agression, mais au contraire serve le caractère inappropriable de ce qui sculpte des formes de rapport au monde qui le laisse à son indisponibilité?

Notes

[1] Pour une présentation détaillée, se reporter à Privette (1983); McDonald, Wearing, Ponting (2009).

[2] Michel Callon nomme "qualcul hétéronome" la situation où sa propre évaluation n'est en fait que "la poursuite d'un calcul commencé et cadré par des professionnels de la qualification" (Callon 2017: 198).

[3] "définir et améliorer l'expérience client sont une priorité croissante pour le marketing, car l'expérience représente le nouveau champ de bataille pour le marché" (Richard 2013).

[4] Les tenants de cette forme de marketing savent que la multisensorialité de l'expérience renforce son impact chez celui ou celle qui la vit (Hultén 2011), et qu'elle sera de surcroît redoublée si le modèle industriel parvient à viser la part émotionnelle des consommateurs et consommatrices (Schmitt 1999).

[5] Il y aurait une histoire à écrire des usages des savoirs produits par les enquêtes et méthodes en sciences sociales au profit de ce genre de théorie. Cela est particulièrement sensible pour les États-Unis. Pour s'en convaincre, on consultera Bernays (1928); Stiegler (2005). Parmi les auteurs les plus fréquemment rencontrées dans les travaux de la *Consumer Research Theory*, on trouve, par exemple, Baudrillard, Maffesoli, De Certeau.

[6] Rapporté à un tel domaine de référence, le terme d'"ingénierie" n'est pas anodin et renvoie à l'essor du champ de la "public relation", ancêtre du marketing moderne, initié par Edward Bernays (1891-1995), par ailleurs double neveu de Freud, et devenu expert dans ce qu'il nommait "manufacture de l'opinion". Le "design de l'expérience" peut être vu comme une émanation et une continuation de ce champ d'expertise, prétendument mis au service de la démocratie dans la première moitié du XXIe siècle.

[7] Si un récit est "une machine de capture de nos désirs et de nos croyances" (Citton 2010: 7), un tel récit, pour être efficace, doit avoir fait l'objet d'une scénarisation. Le terme même de scénario ne se rencontre pas seulement dans les films, il "s'emploie également parfois pour évoquer des projections de situations futures qu'on essaie d'anticiper" (ivi: 84).

[8] Voir sur ce point l'analyse d'Annabelle Charbonnier (2017) sur la vitalité de l'oxymore du "tourisme d'aventure organisé".

[9] Sur la "non-innocence" et les puissances de la reprise, cf. Despret 2010.

[10] Le *sphygmographe* est un dispositif mécanique utilisé dès seconde moitié du XIXe siècle pour mesurer la pression artérielle de manière non-intrusive. Développé originairement en 1854 par le physiologiste allemand Karl von Vierordt (1818-1884), le système fût amélioré et allégé par Etienne-Jules Marey (1830-1904), de telle sorte à pouvoir être portatif et à pouvoir enregistrer et retranscrire sur papier la pulsation artérielle. Le *pneumographe*: enregistre les amplitudes de la respiration en traçant le mouvement des courbes de l'abdomen.

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Les ruines comme médias virtuels. Visualiser et contre-visualiser l'anthropocène

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Abstract

Au sein de la culture visuelle de ces dernières décennies, une profonde nostalgie de l'obsolète s'est emparée de l'image de l'homme. Elle est habitée par une fascination singulière pour la ruine contrebalançant l'obsession du neuf. Alors que les médias nous ont permis d'assister à plusieurs reprises à la destruction de sites entiers du patrimoine archéologique – des bouddhas emblématiques de Bamiyan, victimes de l'iconoclasme taliban, à l'occupation de Palmyre par les forces de Daech –, c'est le délabrement urbain dans les zones post-industrielles du monde qui fait l'objet d'un véritable tourisme photographique sur le thème *ruin porn*. L'essai se propose d'analyser les ruines en tant que média, c'est-à-dire en tant que dispositif capable de nous mettre en contact avec une dimension temporelle qui, dans la crise environnementale actuelle, semble radicalement niée: le futur.

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Ruines du futur

En regardant la série de photographies *No More Stars* (2010) [**Figg. 1**] de Rä di Martino, on entre dans la peau d'un archéologue qui, dans un futur imaginaire, découvrirait les restes de l'industrie cinématographique contemporaine (Barikin 2014; Bertola 2012). Il s'agit des décors abandonnés du premier film de *Star Wars*, tourné en 1977, que l'artiste a photographiés dans les plaines salines de Chott el-Jérid en Tunisie.[1]

Les débris d'une structure industrielle circulaire s'effondrent, partiellement submergés par les dunes mouvantes. La coupole d'une habitation en terre, balayée par le sable, se détache sur le fond du désert. Les colonnes métalliques de mystérieuses machines s'élèvent vers le ciel nuageux. Un historien de l'avenir pourrait-il deviner que ces bizarres ruines sont en réalité les restes d'une technologie de l'imaginaire et précisément d'un imaginaire du futur? En fait, déjà au sein de l'univers fictionnel de *Star Wars* les moyens modestes du village de Tatooine apparaissaient obsolètes et contrastaient fortement avec les intérieurs high-tech de l'Étoile de la Mort de l'Empire.

Les vestiges de cet étrange site archéologique condensent une dimension temporelle complexe et plissée. Ces reliques de science-fiction de la fin du XX^{e} siècle incarnent la décadence d'imaginations passées, le prospect d'un temps à venir. Toutefois, le temps du récit des trilogies de Lucas nous révèle, depuis son origine, que l'intrigue, se situant *dans une galaxie lointaine, très lointaine*, avait eu lieu dans un passé tout aussi lointain. Le présent de l'histoire est donc le lointain passé d'une époque future.

Les décorations scénographiques abandonnées dans le désert tunisien nous rejoignent comme un témoignage du processus d'accumulation des résidus de l'activité humaine à l'époque du consumérisme, et, d'autre part, elles apparaissent comme un improbable monument non officiel à l'imaginaire hollywoodien, tant à son passé glorieux qu'à son impalpable précarité.

Les ruines – comme morceaux de passé incrustés dans le présent – impliquent en tant que telles un emboitement de temporalités. Mais, dans le cas des ruines précoces de *Star Wars*, le court-circuit temporel se double d'une dimension ultérieure, puisque ces édifices et accessoires étaient destinés à un monde

Figg. 1 | Rä di Martino, *No More Stars* (2010)

fictionnel: de ce fait, leur matérialité physique et décadente renvoie en même temps au passé historique qui les a vu naître en tant que décors et à l'avenir – quoique fictionnel – qu'ils projetaient dans le futur. Dès lors, ces ruines cinématographiques relèvent d'un anachronisme étrange, car elles nous projettent dans l'avenir, mais un avenir qui – par définition – ne pourra jamais s'actualiser – car il relève de mondes fictionnels. Un futur antérieur, un temps qui "aura été".

Ce site produit un télescopage de temps. En regardant ces ruines du futur, nous nous situons dans une posture paradoxale: ces bâtiments et structures futuristes – qu'on contemple cependant comme s'ils appartenaient désormais au passé – font simultanément signe vers des extases temporelles inconciliables et

pourtant coexistantes. Alors qu'il ne s'agit pas simplement d'objets du passé, car le récit de science-fiction les projetait dans l'avenir, ils ne sont pas non plus des objets du futur, car en tant que tels ils sont déjà obsolètes et on les observe désormais dans leur état de ruine.

La réalité photographique de ces clichés ajoute une dimension temporelle ultérieure (au sens du *ça a été* de Barthes dans *La chambre claire*) à l'entrelacs qu'on cherche à cerner: ce que nous contemplons est, de fait, inactuel, ces ruines auraient pu disparaître entre-temps, se trouvant dans un irrémédiable décalage par rapport à leur apparitions photographiques. Et ce, non seulement parce que, suite au moment où le cliché a été réalisé, l'érosion aura poursuivi son action, mais qu'après la publication de ces images, un groupe de fans de *Star Wars*, consternés par l'état délabré de la maison de Luke Skywalker, a organisé une campagne pour restaurer l'édifice, ce qui lui a donné une apparence neuve, clairement absente du film original.[2] La série de photographies constitue donc en même temps une archive, témoignant d'un état désormais inactuel de ce site.

En un sens, ici, l'élément indexical du photographique finit par détourner l'origine fictionnelle de ces bâtiments, au profit de leur existence physique de restes. En même temps, leur matérialité pose problème, même d'un point de vue écologique, car ces constructions à l'état d'abandon sont aussi des déchets, des résidus d'accessoires provisoires, qui auraient dû être éliminés suite au tournage – comme on tendrait à le faire aujourd'hui selon une éthique du *leave no trace*.[3] Cependant, entre-temps, ils sont devenus des reliques, en cela qu'ils sont des signes tangibles de l'événement *Star Wars* et de l'univers transmédia qu'il a engendré. Ils sont désormais des monuments, faisant partie du patrimoine culturel de la Tunisie, le site de Chott el-Jérid étant exploité comme destination touristique et signalé dans tout guide de voyage.

Enfin, façonnés par le temps et les agents atmosphériques, ces décors emblématiques fusionnent avec le milieu environnant. Engloutis par le paysage, ces édifices se transforment en œuvre involontaire de *Land Art* et deviennent partie intégrante de l'environnement du désert. Et, enfin, ces ruines du futur nous projettent dans une temporalité géologique, dans un temps de la Terre qui est différent du – ou bien *indifférent* au – temps humain.

Nous interrogeant à ces différents niveaux, la série de photographies de Rä di Martino révèle quelque chose de notre époque présente, où non seulement le passé mais davantage l'avenir semblent être *en ruine*. En effet, face aux prémices d'une crise environnementale globale, l'humanité tardo-capitaliste baigne dans une atmosphère d'inévitabilité (Fisher 2009: 24), où le futur est devenu une dimension radicalement inaccessible (Berardi 2011 et 2017). En vertu de la trajectoire dessinée par la civilisation industrielle, la civilisation tout court semblerait se trouver au seuil de son effondrement, de son *collapse* imminent (Servigne, Stevens 2015). Ainsi, dans l'atmosphère qui caractérise notre manière d'être du point de vue temporel et affectif, on a appris à considérer peu à peu la dystopie – technologique, politique, sociale – comme une dimension familière et actuelle, l'étoffe même de notre quotidien.

Les ruines deviennent une métaphore puissante et toujours plus présente dans le discours contemporain, et ce, à plusieurs niveaux, car elles interrogent notre manière de nous situer par rapport à l'avenir ainsi qu'au passé qui nous porte. Du fait qu'elles se situent au point d'intersection entre espace anthropisé et nature, entre technique et environnement, les ruines constituent un point de départ pour penser aujourd'hui ce que Gilbert Simondon a défini comme "milieu associé", à savoir l'espace géographique et symbolique qui résulte de l'interaction entre les objets techniques et l'environnement naturel.[4] En d'autres termes, elles jouent un rôle d'intermédiaires, en connectant le naturel et l'artificiel, l'actuel et le virtuel, l'imaginaire et le réel. Pourrait-on dire qu'aujourd'hui les ruines sont aussi des médias virtuels, en cela qu'elles fonctionnent comme des dispositifs qui médiatisent notre expérience, nos pensées et nos désirs?

En effet, les ruines médient un désir impossible, celui de voyager dans le temps, et même d'habiter plusieurs dimensions temporelles à la fois. Nous projetant dans un avenir qui dépasse nos existences, la ruine subvertit l'échelle temporelle humaine, elle nous met en contact avec un temps en dehors de l'histoire, un temps géologique (Parikka 2015) qui nous excède, en tant qu'individus et même en tant qu'espèce. On pourrait, alors, comprendre les ruines comme des "médias imaginaires", selon la définition d'Eric Kluitenberg (2006 et 2011), à savoir des dispositifs qui ne perfor-

ment pas une fonctionnalité ordinaire, mais injectent plutôt du virtuel dans l'actuel, l'imaginaire au sein même du réel.

Telles des machines célibataires (Carrouges 1976), dépourvues d'une productivité concrète, les ruines engendrent un mouvement pyrotechnique de dépense (Bataille 1933). Mais pourraient-elles, en vertu de l'anachronisme qui leur est inhérent, constituer un antidote à même de remettre en jeu la dimension virtuelle du futur? Avant de développer cette hypothèse, il faudra d'abord éclaircir en quel sens on peut affirmer qu'à l'époque présente le futur est devenu une dimension inaccessible (§ 2). On pourra ainsi adresser la question des ruines et de l'attrait singulier pour la ruine en tant qu'objet esthétique omniprésent dans la réflexion contemporaine (§ 3) ainsi que dans l'art et dans la culture visuelle du XXI^e^ siècle et telle qu'elle habite les pratiques discursives contemporaines des sciences humaines et hante notamment la conceptualisation de la notion d'anthropocène (§ 4). À partir de ces prémisses, on cherchera donc à développer la perspective d'une heuristique de l'anachronisme que les ruines peuvent engendrer (§ 5). En allant à l'envers de l'esthétique postapocalyptique, qui prend appui sur l'image de la ruine seulement pour étaler le sentiment de sa précarité, l'hypothèse qu'on essayera d'avancer est que l'expérience esthétique des ruines désamorce la tendance contemporaine à nier l'avenir et est à même de rouvrir la dimension virtuelle du futur au sein de notre présent, en opérant une sorte de parallaxe, à savoir en déplaçant notre prise sur le présent par un changement d'incidence de notre point observation.

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Le temps présent est caractérisé par un écroulement de l'avenir. Comme le suggère le philosophe Franco 'Bifo' Berardi, on a assisté à un *lent effacement du futur* (Berardi 2011: 18): non seulement, après la fin des *grands récits* on ne peut plus croire au mythe du progrès, soit-il scientifique, technologique ou humaniste, mais on s'habitue à penser l'avenir sous la forme de la dystopie. Dans l'imaginaire collectif le futur a été supprimé, nié au sens psychanalytique. Le futur n'est plus pensable comme un ensemble d'avenirs possibles et ouverts, comme une dimension dans laquelle on peut agir, modifiant le cours de l'histoire. On en voit un reflet dans le sentiment d'inévitabilité et d'épuisement qui informe à présent la conduite et le système de valeurs qui est élaboré, du moins en Europe, par la génération Z, ayant grandie en aval de la crise économique de 2008, bientôt devenue permacrise, et à l'ombre d'une catastrophe climatique qu'on envisage désormais comme irréversible, se trouvant en même temps à vivre et à penser dans la précarité instituée par l'horizon temporel de la pandémie, puis par la proximité – symbolique encore plus que géographique – de la guerre en Ukraine.

La complexité d'un univers globalisé renforce la sensation de ne pouvoir rien faire pour éviter la crise, sur le plan individuel ou collectif. Un tel sentiment d'inévitabilité, qui rend le futur ultimement inaccessible, est la tonalité émotionnelle qui caractérise ce que Mark Fisher a défini comme le "réalisme capitaliste": il y a une dimension d'inéluctabilité qui est inhérente à l'état du capitalisme tardif en tant que système économique qui se propose comme la seule voie possible: il est plus facile d'imaginer la fin du monde que la fin du capitalisme – une croyance qu'on peut condenser dans le slogan de la propagande économique de Margaret Thatcher "il n'y a pas d'alternative [*There Is No Alternative*]" (Jameson 2005; Fisher 2009).

Et pour autant, le sentiment d'irréversibilité ou inévitabilité a son pendant dans le spectre de l'effondrement qui hante l'imaginaire de notre présent, comme en témoignent le mouvement de la collapsologie (Servigne, Stevens 2015) et plus en général la rhétorique effondriste, classant le changement climatique comme ce qui fait désormais partie de l'horizon historique, au cours duquel les civilisations se sont trouvées à maintes reprises face à des phases de décadence, voire de destruction (Diamond 2005). En dépit de la pression urgentiste qui le porte, ce discours finit par situer les êtres humains dans une position d'extériorité vis-à-vis de leur environnement, qu'il faudrait plutôt réapprendre à habiter, devenant des "collapsonautes" (Citton, Rasmi 2020; Rasmi 2020), plutôt que de simples victimes de la catastrophe annoncée. Dans les pages qui suivent, on cherchera à nouer une lecture de notre destin de "collapsonautes" avec les puissances subversives et virtuelles des ruines, à même de nous transformer non seulement en *navigateurs* de l'effondrement, mais aussi en voyageurs dans le temps.

Mais, quelle est la stratégie de la logique effondriste? Comment agit-elle au sein de nos sociétés mé-

diatisées? La *Stimmung*, l'atmosphère d'inéluctabilité du XXI[e] siècle s'accompagne de la mise en place d'une prédiction constante qui concerne notamment les formes de la médialité contemporaine: une attitude de prévision couvre désormais tous les aspects de l'existence individuelle et collective et contribue à réaliser la lente érosion de l'avenir. De ce fait, lorsque le futur nous rejoint, il a déjà été pré-vu ou pré-venu.

S'il est vrai que depuis l'antiquité les êtres humains ont toujours tenté de prévoir l'avenir, au moyen de diverses formes de divination, façonnées par les différentes cultures à travers le monde, la vision des machines (*machine vision*) qui soutient la gouvernementalité algorithmique constitue la forme de divination de la quatrième révolution industrielle. Ces formes de prévision probabiliste qu'on confie aux intelligences artificielles et auxquelles on a tendance à attribuer une valeur objective de vérité, fonctionnent comme ce qu'on appelle des prophéties auto-réalisatrices, à savoir des prédictions qui se réalisent en raison du fait qu'elles ont été posées, dans la mesure où les croyances qui en découlent orientent le comportement des individus concernés.

Dès lors, comme l'affirme le théoricien des médias Richard Grusin, la tonalité affective qui caractérise la médialité contemporaine est celle d'une "affectivité d'anticipation" (Grusin 2010, chap. V), en cela qu'elle réalise une prévision continue vis-à-vis du futur ainsi que du présent dans lequel on vit. Selon Grusin, une telle attitude des médias a pris forme comme réaction à la couverture médiatique planétaire de l'événement du 11 septembre 2001,[5] qui a fait irruption à travers les moyens de communication de masse de l'époque, de manière d'autant plus choquante qu'elle a investi simultanément les individus à l'échelle mondiale.

Si les médias de la fin du XX[e] siècle étaient caractérisés par un désir très fort d'immédiateté (Bolter, Grusin 1999), c'est-à-dire par une obsession pour un présent qui puisse être saisi en direct, "*live*", l'événement du 11 septembre, en tant que premier événement médiatique mondial vécu *en temps réel* par les spectateurs du monde entier, a réalisé le désir d'immédiateté mais sous la forme exacerbée du trauma.

Sous l'effet du choc du 11 septembre, l'attitude de la médialité s'est donc réorientée: les médias cessent de tendre à un contact *simultané* avec le réel et essayent dorénavant de le prévenir, d'empêcher que l'immédiateté de la catastrophe puisse se reproduire sans que le public ait été préparé à sa réception.[6] Un désir de *prémédier* le futur prend ainsi forme: désir de prédisposer le public aux événements à venir, avant que ceux-ci ne déferlent dans le présent, autrement dit avant que le futur n'émerge dans l'actuel, de manière immédiate ou immédiée (Grusin 2010: 12).[7]

Non pas en prévoyant, mais en anticipant tous les scénarios possibles, la prémédiation veut faire du futur un lieu suffisamment familier et connu pour qu'il soit acceptable, afin que le futur ne se présente jamais sinon, pourrait-on dire, sous la forme d'un *déjà-vu.* Les médias numériques, et notamment les réseaux sociaux, ont donné vie à un système d'interfaces qui canalisent les comportements des utilisateurs, en favorisant une atmosphère d'alarme et d'anxiété permanente, faite de notifications, d'alertes et de mises à jour, de manière à mettre en place un véritable *training sensoriel* des spectateurs et usagers.[8] Un tel *désir de prémédier le futur avant qu'il n'arrive* vise à faire en sorte qu'aucun événement ne se *présente* jamais sinon sous une forme *déjà* prémédiée: étrange désir que *le futur n'arrive jamais* (Grusin 2010: 58). De manière paradoxale, le futur semble reculer et nous projeter dans un retard irrémédiable par rapport à tout événement: le présent *nous dé-passe avant même de pouvoir se faire événement.*

On peut observer qu'une stratégie médiatique similaire est mise en place aussi dans la gouvernementalité de catastrophes et désastres collectifs, tels que le désastre nucléaire de la centrale de Fukushima en 2011, dans lequel la politique de la résilience (Ribault 2019 et 2021), en tant qu'adaptation constante des sujets aux circonstances survenues prenant la place des mécanismes de résistance, se combine avec la logique de la préparation (*preparedness*) (Pellizzoni 2020).

Dans le cadre d'une telle prémédiation, préemption ou préparation constante, "le futur n'existe pas", comme l'affirme Elie During avec Alain Bublex, dans le livre qu'ils consacrent au *rétro-futurisme*, déjà présent en tant que courant artistique dans les années 1970-1980 et devenu véritable chiffre temporel du présent (Bublex, During 2014). La seule forme dans laquelle le futur serait accessible est donc celle d'un *futur passé*: on vit dans le sentiment obscur que notre présent devient un morceau d'histoire, de ce fait on le traite déjà comme du passé, comme un futur désormais en ruine. Alors, si pour Marcel Proust le temps que l'on croyait

perdu était le passé, un passé qu'il fallait ressusciter dans le présent, pour le XXIe siècle le temps perdu semble être plutôt le futur, vers lequel on doit faire retour, comme le suggérait le film *Retour vers le futur* de Robert Zemeckis (1985).

Vivons-nous dans un futur déjà en ruine, déjà dans l'acte de s'effondrer (Sofia 2003)? Le temps à venir semble reculer dans le passé: paradoxalement, ce n'est pas le passé, mais l'avenir qu'on laisse en arrière, il ne s'est pas réellement passé, il nous a plutôt dé-passés et ses images empiètent désormais sans cesse sur le présent. Avant même de se présentifier, le futur est déjà compromis par des prophéties auto-réalisatrices, déjà ébranlé par l'imminence de la catastrophe, confisqué par un mouvement d'anticipation constant qui le dégrade précocement, qui en prescrit l'obsolescence, une obsolescence, comme on dit, "programmée". Tel nous paraît être le chiffre de la logique dominante et de la tonalité affective de notre technoculture contemporaine: elle tend à regarder le futur à partir du présent comme s'il était déjà du passé en puissance et donc comme un temps déjà oblitéré.

C'est peut-être à cause d'un tel effondrement du futur que notre époque connait un goût particulier pour la ruine, une fascination pour le *derelict*, un désir pour l'inactuel, l'obsolescent (Bredekamp 1996). On assiste aujourd'hui à une prolifération de la notion de ruine dans le discours contemporain des sciences humaines et sociales, ainsi qu'au sein de phénomènes culturels émergeants. Comment interpréter cette obsession pour les ruines? Sont-elles des nouvelles *vanitas*, ou bien les signes romantiques d'un deuil pour une époque dans laquelle l'humanité se croyait prospérer, ou encore la nostalgie pour tous les futurs possibles qui ne se sont jamais réalisés?

Ruinophilie contemporaine

Il y a une identification profonde de notre époque avec les forces que la ruine convoque et avec l'atmosphère affective qui distingue cette expérience esthétique. Comme l'affirme Giuliana Bruno (2007: 82), nous vivons dans une époque qui n'accepte pas l'idée de *ruination*,[9] qui relance perpétuellement le régime temporel du présent, étant caractérisé comme on l'a vu par un mouvement d'anticipation anxiogène. Et pourtant le XXIe siècle manifeste une étrange "ruinophilie" (Boym 2007: 44; Huyssen 2006; cf. aussi Augé 2003; Hell, Schönle 2010; Jouannais 2012; Hyppolite 2017; Bégout 2022), une profonde nostalgie de l'obsolète qui est venue contrebalancer la tendance au présentisme (Hartog 2003) et l'obsession du neuf.

Aujourd'hui la fascination pour les ruines se traduit dans des pratiques à l'allure glauque, suscitant un sentiment d'inquiétante étrangeté, tels que le *ruin porn* (Lyons 2018; Whitehouse 2018),[10] l'*urbex*[11] ou sa version japonaise l'*haikyo*. Mais le goût pour les ruines n'est pas inédit dans l'histoire de l'Occident, prenant forme déjà à partir de la modernité. C'est en particulier le XVIIIe siècle qui a été marqué par un enthousiasme vis-à-vis des ruines, qui a animé presque tous les aspects de la création artistique, de la poésie à la peinture, à la critique d'art, en passant par l'architecture de jardins. La ruine devint le catalyseur d'une nouvelle forme de plaisir esthétique: pour la première fois dans l'histoire, on fabriquait des ruines artificielles et on décorait les jardins à la nouvelle manière anglaise avec des temples, des colonnes ou des chapiteaux délibérément délabrés. On fantasmait également sur des ruines à venir, lorsque les artistes dessinaient des paysages réels en état de ruine [**Fig. 2**].[12]

Le sentiment que le XVIIIe siècle éprouve vis-à-vis des ruines est exprimé de manière emblématique par Diderot, spectateur des tableaux de ruines romaines d'Hubert Robert:

> De quelque part que je jette les yeux, les objets qui m'entourent m'annoncent une fin, et me résignent à celle qui m'attend. Qu'est-ce que mon existence éphémère, en comparaison de celle de ce rocher qui s'affaisse, de ce vallon qui se creuse, de cette forêt qui chancelle, de ces masses suspendues au-dessus de ma tête, et qui s'ébranlent? (Diderot 1767: 229).

Pour le fondateur de l'*Encyclopédie*, la ruine suscite une méditation sur la vanité de ce monde, mais ce *memento mori* est biface, car, si d'un côté les ruines font signe vers la finitude de l'existence humaine, de l'autre, elles étayent la conscience de la grandeur du projet culturel et politique porté par les Lumières. Ainsi les ruines et surtout leurs fantômes, à savoir les ruines imaginaires plus que les ruines réelles, plongent les esthètes dans le vertige sublime du spectateur du naufrage.

Or, les sentiments esthétiques provoqués par les ruines classiques – telle la mélancolie ou le sublime

Fig. 2 | Joseph Michael Gandy, Soane's Bank of *England as a ruin* (1830)

– ne sont plus valides aujourd'hui. Si le goût pour la ruine qui prend forme à partir du XVIII[e] siècle jaillit du projet de la modernité et se poursuit dans le mythe du progrès des Lumières, dans notre époque la fascination pour les ruines résonne plutôt avec la décadence des aspirations de notre passé récent. Nous sommes entourés par les ruines de l'époque industrielle (Edensor 2005) et post-industrielle et assistons même à un étrange phénomène: celui de bâtiments qui commencent à tomber en ruine avant même de vieillir (Broggini 2009; Somhegyi 2014). Nous sommes devenus familiers des ruines, elles constituent le paysage de nos villes et de nos périphéries.

Les ruines contemporaines sont des ruines à l'envers, des ruines inversées, comme les a définies Robert Smithson dans son tour des banlieues de Passaic, New Jersey: "*ruins in reverse*" (Smithson 1967). L'esthétique des édifices contemporains précocement en ruine se confond avec celle des bâtiments encore en construction à moitié réalisés, toujours sur le point de rester suspendus et ainsi déjà promis à un état de ruine: "This is the opposite of the 'romantic ruin' because the buildings don't *fall* into ruin *after* they are built but rather *rise* as ruins before they are built" (ivi: 50).

C'est le paradoxe de l'époque présente sur lequel se penche la réflexion que Bruce Bégout consacre à l'obsolescence des ruines (Bégout 2022): en inversant les lois de l'architecture, qui selon Vitruve vise la solidité et la durée, nous construisons désormais des bâtiments qui auront une vie plus éphémère que les individus qui les habitent. Les constructions contemporaines se dégradent avant même de vieillir, leur précarité constitutive leur empêche d'acquérir de la valeur à travers le temps. C'est pourquoi, pour le philosophe français le délabrement des bâtiments contemporains ne produit pas de *vraies ruines*: "seul ce qui a force de persistance mérite le nom de ruine" (ivi: 29). Pour Bégout, qui en cela fait écho à la réflexion de Marc Augé (2003), on doit donc évaluer la ruine à partir du rapport au temps: nous vivons dans un monde violent dans lequel les débris ne sauraient pas devenir des ruines, ils n'en ont pas le temps. De manière paradoxale, si nous vivons dans un futur déjà en ruine, l'avenir ne conservera pas beaucoup de ruines de notre époque présente. Les ruines sont inexorablement "vouées à une disparition rapide et totale" (ivi: 28), notre société de consommation à temps limité produit seulement un amas de décombres.

Nous assistons à une prolifération de ruines récentes. Si l'on se promenait il y a quelques années par les rues de Détroit, l'on pouvait visiter des quartiers entiers désertés et à l'état d'abandon. Même aujourd'hui, lorsque la ville est lentement en train de se réanimer et repeupler, une grande partie de son extension délivre un spectacle post-apocalyptique et troublant: non seulement les maisons en bois et matériaux préfabriqués, mais les usines, les gares et les gratte-ciels demeurent vides et délabrés. Souvent ces constructions, déjà en un état très précaire, deviennent l'objet de vandalisme, de telle sorte que la destruction de ces sites est accélérée par une dévastation délibérée. Devenue épicentre de l'industrie automobile dans les années 1960, Détroit avait atteint deux millions d'habitants, mais, suite aux émeutes de 1967 et à la fermeture de nombreuses usines, la Motor Town est tombée dans une profonde dépression, déterminant l'exode de sa population. Par ses atmosphères *derelict*, consacrées par les séquences poétiques d'*Only Lovers Left Alive* de Jim Jarmusch (2013), la ville américaine est en train de devenir la nouvelle Rome de la décadence urbaine, célébrée par les amateurs de ruines et par les pratiquants de l'*urbex* [**Figg. 3, 4, 5**].

Mais, ces ruines contemporaines sont-elles comparables aux monuments qui témoignent de civilisations disparues depuis des siècles ou des millénaires? L'enthousiasme qu'elles suscitent est à mi-chemin entre le *dark tourism* et la consécration de ce que Rem Koolhaas a défini comme le *junkspace* (Koolhaas 2011).[13] On peut cependant se demander, pourquoi, au juste, l'on devrait nier à ces objets le statut de ruine? Dans son étude sur le *ruin porn*, Tania Whitehouse pro-

pose d'élaborer une définition plus élargie, telle à inclure ces manifestations hyper-contemporaines dans la valeur esthétique de la ruine (Whitehouse 2018). Ce n'est pas nécessaire qu'un bâtiment perdure depuis des millénaires pour qu'il engendre la perception de son inactualité, de son intempestivité. Car ce qui est spécifique à la ruine récente est que l'anachronisme qu'elle produit – on y reviendra – active non seulement l'imagination de ce qui n'est plus – en même temps que de la grandeur et de la nature éphémère du temps passé –, mais aussi la dimension virtuelle de ce qui *aurait été* et de ce qui n'a *pas* été, ou n'a *pas pu* être.

Dès lors, si aujourd'hui les ruines sont venues empiéter nos espaces d'existence, elles injectent aussi dans notre monde la dimension temporelle de la tragédie grecque, celle d'un conditionnel décliné au passé – pendant du futur antérieur qu'on évoquait plus haut –, faisant signe vers la nostalgie pour un passé dans lequel les possibilités virtuelles du futur ne s'étaient pas encore fermées.

Visualiser l'anthropocène

Or, qu'est-ce que nous révèle l'attraction contemporaine pour les ruines, qu'est-ce qui rend pour nous cette décadence "irrésistible" (Roth, Lyons, Merewether 1997)? Pour comprendre la valeur de la ruine pour la théorisation actuelle, il faut d'abord reprendre l'essai incontournable que Georg Simmel a consacré à cet objet esthétique (Simmel 1998). Les ruines se situent à la lisière entre l'action humaine et ce que l'Occident appelle "nature". Si dans l'architecture les tensions entre la nature (la matière inerte) et l'esprit (la volonté humaine) parviennent à un point d'équilibre, la ruine est le point où un tel rapport penche du côté de la nature, à savoir où les éléments naturels prennent la relève sur l'œuvre de la main humaine.[14] Dans le délabrement de l'œuvre architecturale, la nature se venge de la violence qui lui a été infligée par l'esprit, en se réappropriant ce qui dans le produit humain était tout de même resté "nature", c'est-à-dire la matière qui avait été aliénée dans l'art. Mais, ce faisant, elle parvient à atteindre une totalité nouvelle (Simmel 1988: 50), car elle s'offre tout de même à l'œil humain en tant que spectacle esthétique. Voici, alors, ce qui nous obsède dans les ruines, même dans les ruines industrielles et récentes: on y voit à l'œuvre l'émergence d'un nouveau type de compromis entre ces forces, la recherche d'un

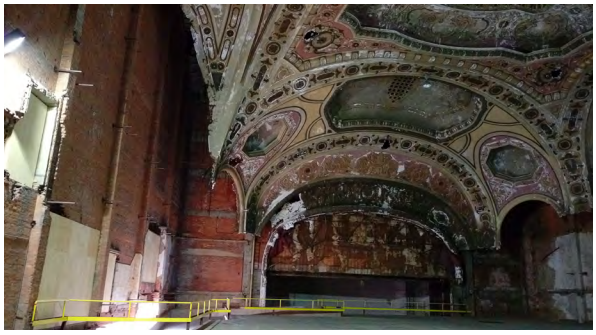
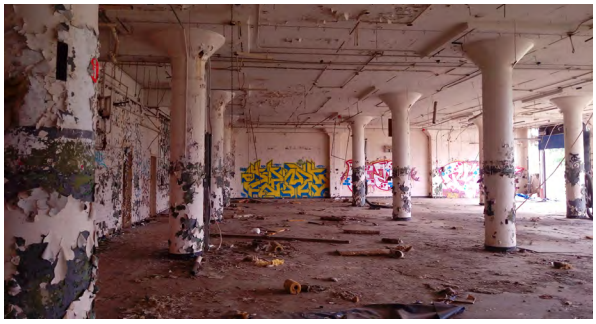
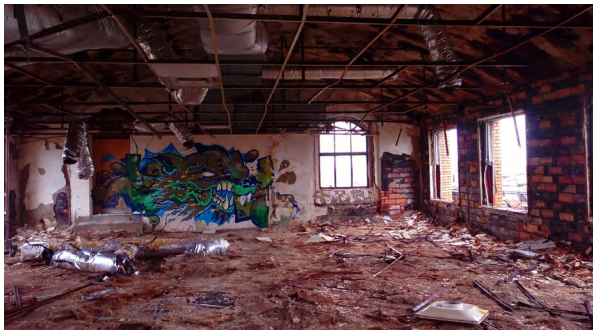


Fig. 3 | Garage dans le Michigan Theater, Détroit





Figg. 4-5 | Packard Plant, Détroit

"tiers paysage", pour reprendre le manifeste de Gilles Clément sur les lieux abandonnés (Clément 2004), ou, pourrait-on dire, la négociation d'une nouvelle forme de *milieu associé* (Simondon 1958).

La ruine s'infiltre dans notre image de la pensée: elle est en train de devenir la synecdoque visuelle de notre époque. Ayant nourri à plusieurs reprises la théorisation moderne (Forero-Mendoza 2002; Schnapp 2020) et post-moderne (Krauss 1974; Barthes

2003; Derrida 1990), ainsi que la création artistique et littéraire (Robbe-Grillet 1994; Sebald 1999; Kiefer 2011; Egaña, Schefer 2015), la ruine est partout dans les métaphores des pratiques discursives contemporaines et elle s'entremêle surtout avec la théorisation autour de la crise environnementale, telle qu'elle est reçue et élaborée par l'Occident globalisé à l'époque du capitalisme tardif, notamment à l'aune du concept d'anthropocène.

Les efforts intellectuels et l'auto-conscience collective du XXIe siècle sont marqués par la tentative de faire sens du phénomène planétaire qu'on a défini comme l'"l'Ere de l'humain". On cherche à penser de manière *anthropocénique*, et non anthropocentrique (Mirzoeff 2014: 215). Que l'on situe le début de l'anthropocène à la fin du XVIIIe siècle avec la révolution industrielle et l'usage massif de combustibles fossiles, ou que l'on établisse son commencement avec la diffusion de l'agriculture comme première modification de la surface de la planète, on constate que les êtres humains affectent de manière irréversible la transformation de l'équilibre planétaire. Comme le suggère Benjamin Bratton dans son manifeste programmatique, on ne peut plus se limiter à une écologie qui soit une simple conservation visant à arrêter ou à minimiser l'impact de l'espèce humaine sur la planète. En d'autres termes, on ne peut plus songer à un *retour* à la nature, mais faire l'état de notre implication dans le processus de *terraformation* (Bratton 2019). Si normalement on se réfère par ce mot à la transformation d'écosystèmes d'autres planètes pour les rendre capables d'accueillir une vie terrestre, on doit désormais inclure dans ce processus la Terre elle-même, dont l'habitabilité est menacée par les transformations écologiques imminentes et déjà en acte.

Comme le souligne Nicolas Mirzoeff, l'événement continu de la crise climatique – accompagnée par les multiples crises systémiques – est souvent appréhendé dans le cadre de la maladie auto-immune (Mirzoeff 2014: 215),[15] dans la mesure où les êtres humains par leur action sur les écosystèmes sont inconsciemment amenés à mettre en danger l'avenir de leur propre espèce. Or, on peut remarquer qu'une telle narration, ne faisant que rejouer les mythes transculturels de la palingenèse et notamment le récit biblique du déluge, situe l'être humain dans une culpabilité irrémédiable vis-à-vis de la nature, et, de ce fait, l'absout d'une prise de position réelle, en le rassurant dans sa passivité, confirmant l'inutilité et l'inefficacité de son action face à un événement disproportionné et fatal, tel à convoquer l'intervention de forces surnaturelles.

La théorisation de la nouvelle ère géologique nous concerne, à la fois intimement et globalement, à tel point qu'elle demeure inobjectivable, étant, selon l'expression de Timothy Morton, un *hyperobjet* (2013). Comme le suggère Mirzoeff, on ne saurait pas *voir* l'anthropocène, mais on peut tout de même essayer de le *visualiser* (Mirzoeff 2014: 213), d'individuer une esthétique de l'anthropocène ayant dominé la révolution industrielle,[16] et ainsi tracer des formes de contre-visualisation (Mirzoeff 2011), afin de créer un espace mental pour l'action, ou on pourrait dire un différent "pouvoir de scénarisation" (Citton 2010), à même de relier le régime du visible et celui du dicible.

Alors, en termes de culture visuelle, on pourrait dire que la ruine fonctionne et peut être comprise en tant que forme de *visualisation* de l'anthropocène.[17] Malgré leurs différences, les lectures qu'on donne de la nouvelle époque géologique qui se caractérise par l'avènement des êtres humains en tant que principale force de changement sur la Terre concordent dans leur manière de concevoir l'environnement comme en train de s'effondrer. C'est ici que se situe le *kairòs* de la ruine: une prise de conscience de l'anthropocène coïncide avec une prise de conscience du monde comme étant en ruine, en tant que ruine. Comme le suggère Anna Lowenhaupt Tsing, dans son anthropologie du champignon Matsu-také devenue célèbre, il nous faut apprendre à vivre "dans les ruines du capitalisme" (Tsing 2015). Si l'auteure sino-américaine comprend ce génitif de manière ambivalente, il faut surtout le saisir de manière subjective pour comprendre en quel sens la ruine fonctionne à présent en tant que forme de visualisation de l'anthropocène. Normalement, lorsqu'on se réfère aux ruines on entend par là les restes de civilisations passées, la ruine est de l'artificiel arraché au monde humain par la nature, qui s'approprie à nouveau la matière. Dans le scénario de Tsing, au contraire, c'est la nature même qui est pensée comme en état de ruine, sa force corrosive et destructrice étant le régime économique du capital, à son tour impliqué dans le mouvement de cette décadence. Telle est la véritable ruine *a contrario*, ruine à l'envers: la ruine ne décrit plus, comme le voulait Simmel, le jaillissement de forces naturelles inconscientes dépassant la téléologie humaine. L'équilibre entre es-

prit et nature est brisé, mais c'est la matière naturelle qui est irrémédiablement perturbée et délabrée par l'action anthropique. Bref, c'est la Terre elle-même qui, de manière paradoxale, devient une ruine, se trouvant menacée par l'un de ses êtres.

La métaphore de la ruine habite notamment l'esthétique des réalisations contemporaines en réalité virtuelle. Une œuvre récente visant à sensibiliser le public sur l'impact de notre mode de vie condense de manière essentielle le storytelling et la mythocratie qui modèle à présent notre compréhension de la crise environnementale. *The Miracle Basket* d'Abner Preis tisse le récit mythique, raconté par un grand-père à son petit-fils, d'un paisible village dans la forêt, qui est détruit suite à l'arrivée d'un mystérieux navire chargé de marchandises et des symboles iconiques de l'Occident, laissant en peu de temps un désert de maisons brûlées et de plantes flétries, inhabitable pour tout être vivant. L'expérience interactive se termine avec la découverte d'un panier miraculeux plein de graines, caché sous les décombres, que l'usager pourra planter, en aidant les habitants du village à reconstruire la nature perdue. Le récit se conclut en esquissant un nouveau monde dans lequel les technologies sont au service d'une relation durable entre anthropisation et nature. Puisant dans l'imaginaire *solarpunk*, ce storytelling véhicule une interprétation de la crise actuelle comme perte de la capacité à vivre en harmonie avec la nature, engendrée par le capitalisme colonialiste, et envisage un dépassement dialectique de cette rupture à même de désamorcer la parabole de la *ruination* ayant investi le milieu naturel, dont les êtres humains font partie [**Fig. 6**].

Or, si on déploie la trajectoire de pensée qui sous-tend cette mythocratie, l'esthétique de la ruine fonctionnerait comme point critique à même de solliciter dans l'humanité contemporaine le sentiment de sa précarité, de sa fragilité longtemps niée, dans l'espoir qu'une telle prise de conscience puisse engendrer les prémices d'une conversion.[18] C'est précisément une telle compréhension de la ruine dans le discours contemporain que l'on vise à renverser. Car, ce faisant, ne risquerait-on pas de se limiter à voir dans l'attrait des ruines une simple mise à jour post-moderne du *memento mori*, une méditation plus ou moins baroque sur la vanité de notre monde? Il s'agit d'une tentation théorique très forte et aussi fascinante sous différents regards, mais qui risque de renouveler encore une fois une position esthétique de détachement, pour pouvoir se creuser un dernier interstice résiduel en tant que spectateurs de notre propre naufrage et exorciser ainsi la fin de l'Histoire. Il faut donc pouvoir aller au-delà du *memento mori* (qui, rappelons-le, comprend le présent comme un passé potentiel), afin de saisir la charge subversive et virtuelle dont la ruine est porteuse.

Anachronisme méthodologique

La ruine opère un chiasme de temps, elle produit de l'anachronisme, comme on l'a vu dans l'exemple de la série de photographies de Rä di Martino dont on est parti. En tant qu'objet esthétique elle incorpore une contradiction interne, qui en fait ce que Walter Benjamin appelait une "image dialectique".[19] Mais, alors, si la ruine nous fournit une forme de visualisation de l'anthropocène, elle doit contenir également les indices de sa propre *contre-visualisation*. Ce que la ruine médiatise en tant que médium imaginaire (Kluitenberg 2006), ce qu'elle peut nous apprendre par sa force esthétique, est une heuristique de l'anachronisme: afin de s'orienter dans une époque marquée par l'écroulement de l'avenir, l'anachronisme – véritable tournant épistémologique débuté au XX^{e} siècle[20] – devient une méthodologie décisive, afin de retrouver le temps perdu qu'est pour nous le futur.

Le télescopage des temps que la ruine engendre nous permet d'opérer une "parallaxe historique", selon l'expression d'Anne Friedberg (2006: 243), produisant un déplacement de notre perception du présent. Du grec *parallaxis* ("devenir autre", "changer de direction"), la parallaxe désigne, en termes d'optique, un déplacement apparent d'un objet quand on l'observe depuis deux points de vue différents. Plus précisément, elle indique l'impact d'un changement d'incidence sur l'observation d'un objet.[21] La parallaxe historique nomme alors le changement de perspective que la familiarité avec d'autres époques nous offre en opérant un recadrage du présent; cela revient donc à produire une négociation entre "le présent et l'avenir, le proche et le lointain de la technologie, réfractée à travers la longueur focale raccourcie du présent" (Friedberg 2006: 243).

Mais en quel sens notre familiarité avec les ruines devrait-elle produire un tel mouvement de pensée? L'état de décomposition de la ruine révèle aussi l'in-

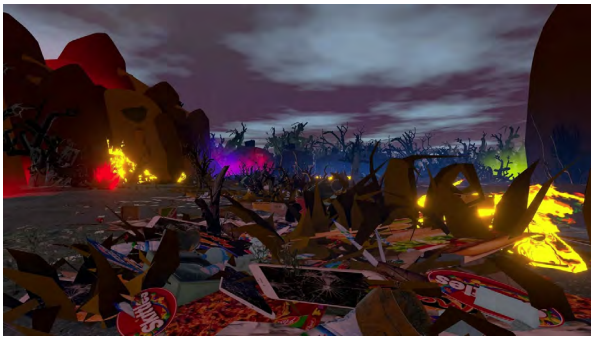


Fig. 6 | Abner Preis, *The Miracle Basket* (2021)

tervention formatrice du regard qui la contemple, qui est appelé à une contemplation non statique, à une perception dynamisée par l'imagination. Il s'agit d'une perception processuelle qu'on pourrait définir comme techno-esthétique pour reprendre la catégorie simondonienne (Simondon 2014: 379-396).[22] Lorsque Simondon forge ce terme, il vise d'abord à décrire la beauté intrinsèquement technique d'œuvres qui parviennent à nouer réciproquement art et avant-garde technologique, donnant lieu à des réalisations esthétiques *parce que* techniques, techniques *parce qu'*esthétiques (ivi: 382). Mais Simondon emploie le terme aussi pour décrire la réponse que suscitent certaines œuvres d'art qui, en vertu de leur agencement interne, donnent lieu à une expérience esthétique de nature processuelle. Ainsi, par exemple, la *Joconde* de Léonard de Vinci peut être comprise à la lumière d'une analyse technique, en cela que le plaisir esthétique que cette célèbre peinture suscite tient à ce qu'elle est "plurale en son fond", qu'"elle existe comme une surimpression par rapport à elle-même", dans la mesure où elle réunit sur la toile "un début de sourire et une fin de sourire" (ivi: 386). Le spectateur fait l'expérience de manière inchoative de la dynamisation de figure sur fond, c'est-à-dire comme un processus dans lequel nous sommes en présence de la superposition de deux techniques.

En ce sens, la ruine serait à comprendre en tant que dispositif techno-esthétique: tout d'abord en cela qu'elle se configure en tant que point d'intersection mobile entre environnement et technique, entre espace anthropisé et "nature". En deuxième lieu, c'est le type de réception dynamique et processuelle, la performativité qu'elle implique remettant en jeu ce rapport entre humain et environnement naturel en tant que métastable, qui dans la ruine émerge notamment dans le plan des temporalités.

Mais, pour que l'anachronisme devienne *méthodologique* il faut pratiquer deux mouvements complémentaires: le premier mouvement consiste à concevoir le présent à partir de sa ruine (future), c'est-à-dire en ce qu'elle hante déjà notre présent – bref, c'est le *memento mori* pris au sérieux. Telle est la démarche qu'avait entrepris Albert Speer, architecte du III[e] Reich et théoricien de la "valeur des ruines [*Ruinenwert*]" (Speer 1969), visant à intégrer la ruine au processus même de construction comme puissance qui anime l'architecture de l'intérieur. Speer avait remarqué que les moyens de construction du XX[e] siècle entraînaient une détérioration prématurée des bâtiments. Dans de telles conditions, les bâtiments qui étaient censés représenter la grandeur du régime nazi risquaient de ne pas se conserver dans les siècles à venir. L'architecte visait donc à construire des édifices conçus de telle sorte que, lorsqu'ils s'effondreraient, ils laisseraient des ruines aussi grandioses et magnifiques, destinées à résister au temps et, par-là, à assurer la mémoire impérissable du III[e] Reich.[23] En dépit des raisons politiques qui l'animaient, avec sa *théorie de la valeur des ruines*, Speer en venait à inscrire la ruine au sein même du design architectural, voire à concevoir la ruine comme le véritable achèvement du processus de construction. Destruction et création se nouent depuis le début. Tel est le premier moment de l'anachronisme méthodologique, accueillir la ruine comme forme latente dans notre présent contemporain.

Mais, ce premier moment – comprendre la ruine en ce qu'elle hante déjà notre présent – doit être accompagné d'un deuxième mouvement complémentaire qui est rendu possible par la ruine: regarder le présent depuis le passé (comme s'il était du futur virtuel). Mais comment?

L'imagination techno-esthétique que les ruines engendrent nous met en contact avec les traces survivantes du passé et produit de l'anachronisme; leur action de médiation met en communication et fait coexister différentes extases temporelles. Par-là, les ruines désamorcent la tendance contemporaine à nier le futur, c'est-à-dire, comme on l'a vu, à regarder le futur à partir du présent comme s'il était déjà du passé potentiel, en cela qu'elles nous permettent au contraire de regarder notre présent tel qu'il devrait

apparaître à d'autres époques historiques, comme ce qui était à venir. De ce fait, elles nous permettent de rouvrir la dimension virtuelle de l'avenir. En tant que médias, les ruines en viennent à restaurer en nous une forme de communication avec l'avenir, une qui ne soit pas prémédiée dans la forme de l'anticipation continue. C'est ainsi, à savoir par ce détour par le passé opérant une parallaxe temporelle, qu'elles nous permettent de revenir au futur.

Il y a une ironie de la ruine, dont le *memento mori* – la conscience que nous venons de la poussière et que nous retournerons à la poussière – est seulement le niveau le plus superficiel, le premier degré. Les ruines, et notamment les ruines récentes, nous rappellent que les lieux que nous habitons sont ainsi surtout parce qu'ils sont animés et soignés par notre présence, et que, si nous les abandonnions, ils seraient bientôt enveloppés par les forces naturelles. C'est la dimension du soin que nous donnons si souvent pour acquise: à entendre à la fois en tant que soin des ruines elles-mêmes et comme soin des manières inédites – des stratégies inattendues et subversives – par lesquelles la nature se réapproprie les lieux anthropisés, en donnant vie à des *tiers paysages* (Clément 2004). Seulement en tant que voyageurs dans le temps, en tant qu'opérateurs des médias virtuels que sont les ruines, en tant que spectateurs de plusieurs temporalités, humaines et non humaines, on pourrait – comme les vampires habitant Détroit dans *Only Lovers Left Alive* – regarder le monde historique *sub specie aeternitatis* et apprendre à prendre soin de cette imbrication intempestive entre *anthropos* et environnement.

Notes

[1] Ce site était le lieu de tournage des séquences qui, dans l'*Épisode IV : Un nouvel espoir* se déroulent sur la planète Tatooine, à la ferme d'humidité où Luke Skywalker grandit lorsqu'il est confié à son oncle et à sa tante Owen et Beru Lars, sous la surveillance d'Obi-Wan.

[2] Pour une documentation concernant la restauration: https://www.cnet.com/pictures/saving-lukes-star-wars-home-in-tatooine-pictures/10.

[3] *Leave No Trace* ("sans laisser de trace") est un ensemble de politiques et de principes d'éthique recommandés, s'adressant aux pratiques individuelles et collectives, par l'association *Leave No Trace Center of Outdoor Ethics* pour promouvoir la conservation de l'environnement.

[4] En réélaborant la notion de "milieu technique" forgée par Leroi-Gourhan, mais également en reprenant la référence au concept de milieu que l'on trouve déjà chez von Uexküll, Goldstein ou Canguilhem, Simondon parle de milieu technique associé ou milieu associé pour désigner la structure de l'individuation technique (Simondon 1958).

[5] Sur l'événement du 11 septembre et de la temporalité propre de ses images cf. aussi Carbone 2013.

[6] En ce sens, le 11 septembre constitue pour l'univers médiatique une véritable ligne de partage à partir de laquelle les médias modifient leur régime de référence : ils ne seront plus concernés par la représentation d'un présent im-médié, mais plutôt par celle d'un futur *pré-médié*. Cf. Grusin 2010: 13.

[7] À partir de ce moment, les médias, au lieu de *médier* les événements commencent à les *prémédier*, parvenant ainsi à opérer une désensibilisation vis-à-vis de tout événement possible en tant que potentiellement choquant et traumatique. Comme Grusin le fait remarquer, une telle tendance trouve son exemple paradigmatique dans la guerre en Irak, et dans l'idée même d'une guerre *préventive* ayant servi la doctrine de l'administration Bush-Cheney, dont la prémédiation serait le pendant médiatique, cf. Grusin 2010: 38-61. À ce propos voir également la réflexion de Brian Massumi 2007 et 2015.

[8] Chez Grusin, le concept de prémédiation trouve sa source dans la réflexion que Benjamin consacre au choc de la modernité. Cf. Grusin 2020: 17, 103-105, 110.

[9] Bruno l'affirme pour suggérer ensuite que les images en mouvement seront les ruines de l'époque contemporaine.

[10] Terme qui naît pour condamner en tant que voyeurisme la pratique de safaris photographiques des lieux marginaux et abandonnés, né notamment à Détroit au début des années 2010.

[11] Par ce terme on indique l'exploration, issue de la culture underground, de lieux urbains abandonnés et en ruine, dont l'accès est normalement interdit au public.

[12] Ce motif marque par exemple certaines des œuvres de Giovanni Battista Piranesi, Nicolas Poussin, Joseph Gandy, Hubert Robert, Martin Engelbrecht, William Turner, parmi d'autres.

[13] Commenté par Bégout 2022: chap. IV "L'environnement poubelle".

[14] En ce sens, il faut préciser que pour Simmel il est essentiel qu'on parle de ruines seulement en présence de l'intervention de l'action naturelle, et non pas d'un acte de destruction délibérée.

[15] À ce sujet on peut remarquer comment la crise issue de la pandémie peut fonctionner comme une forme de visualisation de cette métaphore.

[16] Dans cet article Mirzoeff se concentre notamment sur la manière dont la peinture est devenue une forme de visualisation de la pollution et de l'émission de gaz à effet de serre.

[17] Dans la vaste littérature au sujet de la notion d'anthropocène, on rappelle l'essai germinal de Dipesh Chakrabarty 2009 et 2021.

[18] Dans une telle démarche s'inscrit notamment la réflexion de Judith Butler autour d'une éthique fondée sur le partage du sensible, en cela que la reconnaissance de la précarité radicale des vies humaines va de pair avec la nécessité de leur protection contre la violence de pouvoirs arbitraires (cf. Butler 2005 et 2010), mais la reconnaissance de la précarité d'une vie est aussi centrale dans les écrits de Giorgio Agamben (cf. 2014).

[19] Cette notion polyphonique parcourt l'œuvre de Benjamin cf. notamment la définition qu'on trouve dans *Le livre des passages* comme "*ce en quoi l'Autrefois rencontre le Maintenant dans un éclair pour former une constellation*" (Benjamin 1989: 479).

[20] Différentes formes d'anachronisme ont été articulées, notamment par l'histoire de l'art, au cours du XX^{e} siècle, cherchant à briser la chronologie linéaire de l'histoire et de la pensée occidentales. Si l'empiétement des temporalités avait toujours été considéré par les historiens comme une erreur et une menace à la rigueur scientifique, l'anachronisme a été réévalué, démontrant que l'histoire est un réseau continu de latences, de références et de suppressions. Au XX^{e} siècle, on en vient au contraire à admettre l'apparition d'éléments appartenant à une époque donnée dans une autre époque comme ouvrant des possibilités épistémiques et esthétiques: survivances, ressemblances déplacées, etc., révèlent que l'histoire de l'art n'est qu'un processus continu d'appropriations et *reenactment*.

[21] En astronomie par exemple, la parallaxe indique l'impact d'un changement d'incidence d'observation sur l'observation d'un objet et donc le déplacement apparent d'un astre au cours de l'année solaire, dû au fait que celui-ci change de position à cause du mouvement de révolution de la Terre autour du Soleil.

[22] Mais le terme de techno-esthétique ne se limite pas à une définition fonctionnelle, elle assume aussi une signification plus radicale, celle d'une "fusion intercatégorielle" entre technique et esthétique: "Le sentiment techno-esthétique semble être une catégorie plus primitive que le sentiment esthétique seul ou l'aspect technique considéré sous l'angle de la seule fonctionnalité, qui est appauvrissant" (Simondon 2014: 391-392).

[23] De telles observations amenaient l'architecte d'Hitler à imaginer la décadence du national-socialisme et même à illustrer le devenir ruine des bâtiments nazis, une perspective qui avait été reçue comme une provocation irrévérente par l'entourage d'Hitler. En revanche, le projet de Speer fut apprécié et soutenu par le *Führer* et devint le principe fondateur et "loi" de l'architecture nazie.

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Topologie dal network planetario. Note sulle "mostre di pensiero" di Peter Weibel e Bruno Latour

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Parole chiave

Arte contemporanea
Nuovi media
Antropocene
Cartografia
Gaia

Abstract

Quattro mostre, nell'arco di un ventennio, presso lo ZKM - Zentrum für Kunst und Medientechnologie di Karlsruhe hanno segnato la storia di una suggestiva collaborazione tra il curatore e teorico dei media Peter Weibel e il sociologo Bruno Latour, per quelle che sono state definite le loro Gedankenausstellungen ("mostre di pensiero"): *Iconoclash* (2002), *Making Things Public* (2005), *Reset Modernity!* (2016) e *Critical Zones* (2020). La scelta delle opere costituisce strumento di analisi, partecipando – nell'ottica dei curatori – a quel contesto ontologico di convivenza antigerarchica di entità di natura completamente differente, che siano esseri umani, animali, enti inanimati, elementi chimici, geologici, costrutti sociali o, appunto, esposizioni; ma anche a un più largo ordine di pensiero che in anni recenti ha tentato di descrivere la complessità delle "nuove politiche terrestri" trovando volentieri fianco nella rappresentazione artistica.

Zone di ipotesi

Iconoclash (2002), *Making Things Public* (2005), *Reset Modernity!* (2016) e *Critical Zones* (2020) sono le quattro mostre che hanno segnato la collaborazione tra Peter Weibel, artista e direttore dello ZKM (Zentrum für Kunst und Medientechnologie) di Karlsruhe – che le ospiterà – e il sociologo Bruno Latour. Per definirle, i due scelgono un termine ben preciso, *Gedankenausstellungen* ("mostre di pensiero"), e pertanto di situarsi in un orizzonte interdisciplinare che apparenti la cultura visiva al metodo sperimentale del *Gedankenexperiment*, tipico delle scienze dure. Se in tale pratica si applicano le leggi della fisica su modelli impossibili da ricostruire in laboratorio per provarne la tenuta concettuale – come nel celebre dibattito tra Einstein e Bohr sulla meccanica quantistica (cfr. Dorato 2009) –, Latour e Weibel tentano di applicare all'ambito della curatela una simile "occasione di verificare idee impossibili da testare in scala" (Latour 2020b: 16). Prima di concentrarci sull'ultima della serie, in cui matura una precisa attenzione ecologica, vedremo come l'impianto teorico dell'intera operazione abbia sfruttato quella tipica "sospensione del tempo, dello spazio, del realismo" (Latour, Weibel 2006) prodotta dall'istituto espositivo per farne un metacampo di sperimentazione museologica.

Per prima cosa, la strategia di Weibel e Latour abbandona l'urgenza del "cosa esporre" preferendo sviluppare una sorta di scientificizzazione dell'ipotesi di mostra, sottolineando la natura dell'esperimento mentale come collaudo. La possibilità del suo fallimento è compresa quindi nel processo (al contrario dell'idea classica di mostra d'arte, il cui insuccesso coincide quasi sempre con la mortificazione) attraverso una larga concertazione disciplinare che permette di distribuire i punti di pressione sui vari aspetti della teoria iniziale. Per chiarire:

> Le mostre possono essere sfruttate come assemblaggi di elementi totalmente improbabili per sollevare ipotesi che possono dimostrarsi giuste o sbagliate. Il successo di tali esperimenti espositivi dipende da un'attenta pianificazione e dal *debriefing* (ibidem).[1]

I passi di metodo sono essenzialmente rispettati: la formulazione dell'ipotesi (giocando velatamente col concetto di abduzione, in una convergenza tra "il primo passo del ragionamento scientifico", nei termini in cui lo intende Charles Sanders Peirce, e l'impatto sociale dell'opera d'arte nella definizione di Alfred Gell – 1998: 14), la verifica, la raccolta, addirittura la pubblicazione dei risultati nelle forme del catalogo di mostra. E dunque il ribadimento di un'alterità rispetto all'esposizione tradizionale, dominio invece del gusto, della coerenza e della messa in mostra di ricerche "già avvenute". Anche nell'ottica di un rapporto con chi espone, la collaborazione è piuttosto espressa nei termini – azzardando un termine dal vocabolario operaista – di una "conricerca", tanto che i due si rivolgono agli artisti coinvolti come "sperimentatori".[2] D'altra parte, la definizione dell'artista in quanto tale non è mai macchina celibe ma connessa – come ricorda Henk Borgdorff (2012: 133) – via via a diverse costituenti: al propriamente detto sistema dell'arte nel caso si segua la lezione di Arthur Danto o Howard Becker, alla produzione culturale secondo Pierre Bourdieu, ai network dell'attore-rete per Latour. Proprio nel campo della curatela, l'ipotesi di quest'ultimo prevede un preciso incontro-scontro tra le discipline (in cui la storia dell'arte non gode di privilegio) e un approccio produttivo alle scienze, le quali possono essere comprese solamente per mezzo di quelle reti composite che collegano in maniera equivalente entità, singoli, comunità, oggetti, tecnologie, composti chimici, organismi animali o vegetali (Latour 2005b). La vocazione "antidualista" della Actor-Network Theory (ANT) latouriana non ammette alcuna origine esterna al network: umani (attanti sociali) e non-umani (attanti tecnici o naturali) saranno classificabili solo a posteriori (eventualmente chiarificati dal processo scientifico stesso), dal momento che la costruzione viene attribuita esclusivamente ad assemblaggi non gerarchici – definiti da John Law "ingegneria eterogenea" (1987) –, a cui l'autore si riferisce componendo "la vicenda dell'emergenza, costituzione e stabilizzazione di oggetti teorici in quanto attori reticolari" (Mattozzi 2006: 10).

All'inizio del millennio, quando le mostre di pensiero prendono avvio, la ANT è un criterio metodologico molto popolare. È largamente usato nei campi più disparati e sta vivendo una fase di (talvolta controversi) tentativi di superamento (cfr. Law, Hassard 1999). La riaffermazione di Latour e Weibel "nel campo dell'eteronomia"[3] documenta da una parte un'alternativa applicazione della ANT messa in atto da uno dei suoi fondatori, dall'altra un approccio costruttivista all'e-

sibizione dell'eterogeneo, in cui si cerca di rispondere a domande specifiche della mediazione curatoriale (il rapporto col pubblico è un design connettivo? La derubricazione dell'artista ad attante è funzionale?). Le mostre dello ZKM vanno intese innanzitutto come la traduzione di tali reti in un processo sfidante come quello della propria esposizione e dei luoghi che la accolgono. Se in questo senso si volesse darne rappresentazione, il paragone più prossimo non sarebbe tanto quello – spesso abusato – del laboratorio, quanto probabilmente quello del "teatro anatomico", nato in seno alla scienza rinascimentale come luogo dedicato alla dissezione dei corpi e alle necessità di esibizione della ricerca, nei modi funzionalmente meglio fruibili per gli studenti di medicina (o per il pubblico nel nostro caso). In sostanza, allo ZKM si dissezionano spettacolarmente ipotesi, e la "sociologia della traduzione" che la ANT rappresenta è uno dei modelli posti sul tavolo.

Se i metodi giocano con teoria, lo sfondo museografico è tutt'altro che astratto, in continuità con quella specifica tipologia di esposizione d'arte curata da filosofi o scienziati che, in un rinnovato *curatorial turn* del pensiero radicale – come lo definisce Hans Ulrich Obrist (2014) –, propongono forme di ricerca speculativa non didattica: *Les Immatériaux* (1985) di Jean-François Lyotard, ospitata dal Centre Pompidou, è stata la prima di questa varietà, seguita da altre in cui è noto almeno lo sforzo del Louvre per *Mémoires d'aveugle: l'autoportrait et autres ruines* (1990) di Jacques Derrida e *Visions capitales* (1998) di Julia Kristeva. Per l'ingresso di Bruno Latour nella categoria il volano sarà proprio Obrist, che nel 1999 chiama il francese a partecipare a una grande mostra al Provinciaal Fotografie Museum di Anversa dal titolo *Laboratorium*. Curata assieme a Barbara Vanderlinden, la teorica sovrapposizione tra lo studio dell'artista e il laboratorio dello scienziato si apriva al "tessuto e alla realtà topografica" per mezzo del coinvolgimento di cittadini, artisti, danzatori, scrittori e, appunto, scienziati, i quali potevano sperimentare liberamente oltre i canoni della consueta "curatela estetica". Accanto ad artisti di varia estrazione come Carsten Höller, Matt Mullican, Jan Fabre o Marko Peljhan, Latour partecipa in prima persona con una curiosa forma di rappresentazione tra performance e rievocazione storica dettata dal contesto ibrido, proponendo un *reenactment* della conferenza-esperimento di Louis Pasteur del 1864 sulla confutazione della generazione spontanea a favore della biogenesi, dove lo scienziato dimostrava la contaminazione con microrganismi dei matracci del rivale Félix-Archimède Pouchet.[4] Il peso simbolico dei microbi appariva funzionale in più di una direzione: nel decentralizzare l'attore umano[5] e nella proposizione di una *laboratory life* esteticamente connotata (Latour, Woolgar 1979).

La ANT aveva già dimostrato di funzionare per le mostre di tipo scientifico, relazionando l'addomesticamento dell'oggetto con l'educazione alla materia (Waller 2016), ma non nel mondo dell'arte, che necessitava di un prospetto differente. Le mostre di pensiero cercano di dare una risposta a questa traduzione, presentandosi come un modulo di connessione tra due estremi: da una parte l'impossibilità naturalistica dell'apparato su cui dimostrare empiricamente l'ipotesi espositiva (che attiva la condizione teorica del *Gedanke*), dall'altra gli effettivi limiti – spaziali, sociali, istituzionali – della galleria come luogo dell'esperimento. Ognuna delle quattro mostre si produce dunque così, tra la possibilità dell'ipotesi e l'impossibilità di razionalizzazione espositiva, che tuttavia serve a operare uno sfondamento in territori più larghi, tipici dell'arte.[6]

> Questo approccio, che mette in discussione il modo in cui la ricerca esprime se stessa e come è valutata da un pubblico di non addetti ai lavori, le consente di impegnarsi in diversi tipi di ragionamento e di porsi domande che andrebbero altrimenti persi nella pratica scientifica più convenzionale. Quello che spesso viene considerato il problema intrinseco delle mostre d'arte – e cioè che siano interpretate dal pubblico in modi sempre diversi rispetto alle intenzioni dei curatori, e che si esprimano attraverso mezzi meno precisi del semplice testo – può essere trasformato in un elemento costruttivo in grado di far entrare in questo tipo di esposizioni nuove prospettive e idee (Bjerregaard 2019: 7).

La problematizzazione è ovunque simile. Nella prima *Iconoclash*, il tema è quello dello scontro di rappresentazione tra i fondamenti dell'iconoclastia e dell'iconofilia nei campi larghi della scienza, dell'arte e della religione; lo statuto di un'immagine "che muove passioni" e che attraversa le necessità storiche dell'umanità (Latour 2009). In questo caso l'ipotesi di studio è: "esiste un modo per sospendere temporaneamente il gesto iconoclasta, in modo da indagarlo?" (Latour, Weibel 2006: 95-96), a cui segue la messa in opera del *display*, dove l'irreale spazio museale si popola di reali immagini, sommate come in un'arena-rete di confron-

to, tra *readymade* di Duchamp e quadri suprematisti di Malevič, documenti scientifici e idoli religiosi (Latour, Weibel 2002). Sulla scelta:

> Non c'è laboratorio migliore dell'arte contemporanea per far emergere e per testare la "resistenza" di qualsiasi oggetto che comprenda il culto dell'immagine, della bellezza, dei media, del genio. Da nessun'altra parte si sono ottenuti così tanti effetti paradossali sul pubblico con lo scopo di rendere più complessa la sua reazione alle immagini. Da nessun'altra parte sono stati elaborati tanti tentativi di rallentare, modificare, turbare o eliminare lo sguardo ingenuo e il "regime scopico" dell'*amateur d'art* [...]. Più l'arte è diventata sinonimo di distruzione dell'arte e più ne è stata prodotta, valutata, discussa, comprata, venduta e, sì, venerata. Si sono prodotte nuove immagini così potenti che è diventato difficile comperarle, toccarle, bruciarle, ripararle e addirittura trasportarle, generando in questo modo persino dei nuovi casi di *iconoclash*. Un tipo di "distruzione creativa" che Schumpeter non aveva considerato (Latour 2009: 298-299).

Nella più ambiziosa *Making Things Public: Atmospheres of Democracy* si scivola dalla questione visiva della rappresentazione a quella politica della rappresentanza. La congettura avvia stavolta dal concetto di *dingpolitik*, una politica degli oggetti dai tratti heideggeriani – compresa delle sue forme assembleari – in cui si forzano le esistenze di una *things democracy* e di affascinanti enti teorici come il "Parlamento delle cose" (Latour 2005a).[7] Il *Gedankenexperiment* su cui si fonda la mostra seguente sarà altrettanto radicale: "resettare la modernità". Secondo Latour infatti, il "progetto modernista" necessita di essere riavviato, come una bussola digitale impazzita o un computer la cui memoria sia appesantita da un *overload* di processi, una ricalibrazione che permetterebbe ai cosiddetti "moderni" di difendersi dalla propria materia (Latour, Leclercq 2016). In *Reset Modernity!* le mappature, le carte topografiche, sono elementi privilegiati nel rendere quel senso di misura che continuamente si rilancia tra "modi di esistenza" (Latour 2013) e uno spazio espositivo chiuso che tenta di affermare il suo esatto contrario: il rapporto tra locale e globale riferisce infatti argomentazioni sul territorio, su spazi contesi e confini permeabillizzati dagli effetti del cambiamento climatico, annunciando il tema della mostra successiva. L'installazione *Nymphéas Transplant* di Pierre Huyghe esemplifica l'avvicendamento, esponendo sotto una teca di vetro "intelligente" che simula una turnazione meteorologica, un pezzo del primo strato del suolo sottostante lo stagno di Giverny, il luogo dei celebri dipinti impressionisti di Claude Monet, concentrandosi su quel sottile segmento di membrana terrestre dove la vita organica si è sviluppata, e che gli scienziati chiamano "zona critica" (Houser, Giardino 2015).[8]

Esporre Gaia

In *Critical Zones: The Science and Politics of Landing on Earth* (Latour, Weibel 2020), la centralità del verbo "atterrare" (*to land*) gioca una sfida multiprospettica. Il planare su terre incognite è certamente un'immagine di allargamento esplorativo, ma funge qui soprattutto come richiamo a rimanere all'interno dell'habitat terrestre, definito in limiti che evidentemente non sono stati attenzionati a sufficienza. Per Latour, i destinatari principali di questo messaggio sono innanzitutto quelle forze moderne e secolari che più di chiunque altro si sono definite "coi piedi per terra" (*down to earth*), che hanno partecipato alle età delle grandi scoperte, alle spedizioni di mappatura del globo, chiamandosi via via razionali, oggettive o realiste. La corresponsabilità davanti alla sorpresa di una Terra in crisi (ecologica, climatica, esistenziale) reclama dunque un nuovo definitivo atterraggio, se non una terraformazione dall'interno:

> Sembra che il globo che si aspettavano di catalogare, registrare, localizzare, contenere e divorare non fosse altro che una resa molto provvisoria di ciò che resta da scoprire; che il mondo che sostengono di attraversare con tanta disinvoltura non sia altro che la visione superficiale di una totalità che deve ancora essere assemblata; che persino il materialismo che promuovevano con tanto entusiasmo potesse essere in realtà una versione troppo idealizzata di ciò che la materialità realmente implica. All'inizio del XXI secolo, la Terra appare ancora una volta – per lo stupore della parte più illuminata della razza umana – come una terra sconosciuta (Latour 2020b: 11).

Il sapore anti-escapista si collega alla volontà di Weibel e Latour di sperimentare proprio con le strette pareti dello spazio espositivo, richiamando alla consapevolezza di un'inevitabile coesistenza tra reti di organismi. Il confinamento è ricercato funzionalmente nel raffronto tra il *claustrum* espositivo del *white cube* e quello del pianeta come l'unico habitat che ci è con-

cesso, così come alle opere la loro misurata spettatorialità.[9] L'ipotesi gira ancora attorno al vulnus della modernità, avvicinando sostanzialmente attuale e virtuale di un "divenire terrestre" che i curatori spiegano nel *fieldbook* con un'analogia medica: "Quando un malato entra in terapia intensiva, la prima cosa che il personale fa è attaccare al corpo una serie di strumenti in modo da avere una buona lettura dei valori e di quelle variabili che possono aiutare a monitorare lo stato di salute" (Latour, Weibel 2020). L'impossibilità del traslato è dunque sperimentata mediante laboratori interdisciplinari come i Critical Zone Observatories (CZO), di cui uno situato proprio fuori Karlsruhe, che costantemente monitorano, "contano i battiti" del dominio critico, e da una serie di moduli dove coesistono strumenti tecnici di controllo come gravimetri, rocce minerali dai musei di storia naturale, piattaforme di discussione e opere d'arte contemporanea: il *Timekeeper* di Sarah Sze, dove la frammentarietà biomeccanica del tempo globalizzato rimanda fino agli urobori autodistruttivi di Tinguely, l'impatto climatico sulle foreste di conifere alpine nella VR immersiva di Rasa Smite e Raitis Smits (*Atmospheric Forest*), i conflitti tra le comunità locali del sud della Groenlandia e le neoeconomie estrattive in Lise Autogena e Joshua Portway (*Kuannersuit/Kvanefjeld*), che fanno da contraltare al realismo perturbante di Courbet (il daino e le rocce dipinti in *Chevreuils à la source*), o all'altrettanto sgomento prodotto delle forze naturali in Friedrich (la scogliera della Staatliche Kunsthalle datata 1825). La materia testuale entra pure nell'esposizione: i testi di fine Settanta a opera di James Lovelock e Lynn Margulis sull'ipotesi Gaia delineano il pianeta come "entità finalista" in costante stato di autoregolazione (Lovelock 1981; Margulis 1998).

Scrive Jussi Parikka recensendo la mostra:

> Seppur Gaia non sia mai fuori dal discorso, la parte più interessante del progetto non è la terminologia, bensì l'attenzione a uno specifico strato della superficie terrestre come zona dinamica, e le sue diverse manifestazioni (Parikka 2021).

In effetti, ciò che interessa le *earthly politics* non è tanto definire cosa sia Gaia, quanto il suo apparato rappresentativo. Continua Parikka:

> La mostra argomenta la zona critica come spazio prospettico (e persino struttura materiale) epistemologicamente significativo. Viene presentata come un modo per abbattere "la visione cartografica del pianeta Terra", ma anche per interrompere "l'unità giuridica e politica di qualsiasi visione globale" (Ibidem).

Ciò è particolarmente evidente in tutta una serie di riflessioni che Latour imposta già negli anni precedenti, parlando non semplicemente di Gaia ma di "Gaiagrafie" (Arènes et al. 2018). La raffigurazione planimetrica tra assi latitudinali e longitudinali manifesterebbe la stasi di un pianeta morto "come Marte o Venere", mentre il dinamismo della zona critica parla di un principio di proiezione opposto, fatto di cicli geochimici che denotano tutt'altro che inerzia (Latour 2020a). Dunque, se il tema della percezione visiva diventa centrale, è facilmente intuibile come il *display* museografico possa essere utilizzato da campo di sperimentazione. Inoltre, il luogo specifico dell'arte permette un commercio privilegiato con l'immaginazione, supporto per la stessa materia scientifica: le Gaiagrafie sarebbero esercizi di immagini (Arènes et al. 2018: 3) paralleli a come, ad esempio, la rappresentazione artistica ha aiutato la rivoluzione copernicana costruendo visivamente una sorta di *fiction* delle misure cosmografiche (Aït-Touati 2011), rendendo comprensibili co-dipendenze altrimenti assai complesse (cfr. Maniglier 2016). Un rapporto biunivoco – che chiarisce anche l'avvio delle mostre di pensiero con *Iconoclash* –, tra immagini che producono una collettivizzazione della scienza, e la scienza che si autoproduce in immaginari, così come è successo con la prima fotografia della Terra dallo spazio, il "pianeta blu" (Solnick 2020) che ha messo in prospettiva l'urgenza di un adattamento e di un monitoraggio.

Del resto, la singolarità dell'approccio latouriano all'ecologia sta proprio nell'essersi legato fin dal principio allo statuto dell'arte, riconoscendogli la capacità di negoziare concetti pubblici tra rappresentazione e politica. Lo conferma intervistato nel pieno dei lavori della mostra:

> Ho iniziato a interessarmi di Gaia studiando Lovelock, e scrivendo *Facing Gaia* mi sono immediatamente relazionato con il lavoro degli artisti. Il caso richiedeva una certa concertazione tra scienza e arte [...]. Mi sono reso conto che la mia idea iniziale, cioè forzare l'ecologia nella teoria politica, era completamente sbagliata: servivano altre forme di sensibilità. Questo mi ha portato a pensare *Reset Modernity!*, che in un certo senso era una prima elaborazione di questa nuova mostra sulla zona critica [...]. Ci sto lavorando perché il tema è

estremamente urgente, e ha continuato a crescere mentre la percezione delle persone non l'ha seguito. A questo serve una mostra: per modificare il vocabolario con cui si diventa consapevoli di tale urgenza (Suzuki 2018).

Non è un caso che le emanazioni del contatto tra Latour e la zona critica siano contenute non tanto in pubblicazioni, come è d'uso nella sociologia e nell'antropologia della scienza, quanto in altre mostre, e dunque in altre immagini e in altri prodotti artistici: nel 2014, appena dopo il ciclo di lezioni all'Università di Edimburgo che aprirà la stagione dell'interesse per Gaia (*Facing Gaia: A New Enquiry into Natural Religion*), inaugura la mostra *Anthropocène Monument* a Tolosa con un "simposio performativo" sulla definizione tecnica di Antropocene e le sue controversie, incrociando un gruppo di artisti che lo seguiranno fino a *Critical Zones*, tra cui Armin Linke, Lise Autogena e Joshua Portway, e avviando un sostanzioso rapporto dialogico con l'opera di Tomás Saraceno. Nel 2020 dei lockdown globali, mentre la mostra allo ZKM è già avviata, Latour cura assieme a Martin Guinard la direzione artistica della Biennale di Taipei, quell'anno intitolata *You and I Don't Live on the Same Planet*, sottolineando la volontà di stare in una continuità tematica. Una certa naturalezza ormai acquisita nella gestione di materiali artistici si riscontra nella complessità della struttura, costruita a partire da un "planetario finzionale" – già teorizzato in una lezione del 2018 ad Harvard intitolata *A Tale of Seven Planets: An Exercise in Gaiapolitics* (Latour 2019) – dove la figurazione di un sistema solare alternativo racchiude i moduli-pianeti espositivi, ognuno dei quali approfondisce un diverso aspetto critico (la globalizzazione, la sicurezza, la fuga, la condizione terrestre, la gravità alternativa).[10]

Impossibile che a questo punto *Critical Zones* sfugga al dibattito su una possibile "arte dell'Antropocene" (in realtà, un fatto sostanzialmente già risolto in forme che hanno senza troppo affanno convinto i grandi enti internazionali, poggiandosi spesso sulle solide spalle della Land art, dell'arte povera e relazionale – si veda Davis, Turpin 2015), scegliendo tuttavia, ancora una volta, la strada dell'analisi strutturale. Un termine di grande fortuna, da almeno due decenni usato per definire l'attuale era geologica post-olocenica caratterizzata dall'alterazione umana (Crutzen, Stoermer 2000), e altrettanto discusso, specie alla luce della presenza ingombrante di quell'*anthropos* che ne determina un connotato di centralizzazione e astrazione, e perciò rigettato da parte della critica, come in Donna Haraway, Anna Tsing o T. J. Demos (cfr. 2017). In Latour la parola Antropocene campeggia senza remore ma esclusivamente per quella stessa ragione di ricerca per cui nascono le mostre di pensiero: intesa come una problematizzazione del materialismo storico, e dunque di un istituto che, anche proprio grazie alle dispute, aiuta a far luce sul mestiere degli scienziati. Tecniche, dati, parole, immagini; sono tutti elementi relazionali che partecipano alla strutturazione di assemblaggi, concreti (la zona critica) o meno (gli strumenti del linguaggio che servono per identificarla).

> Non sono quindi arrivato all'ecologia politica, come invece è capitato a molti miei amici, perché fossi un naturalista, o perché amassi la natura, o perché collezionassi farfalle, ecc. – ci sono arrivato dalla sociologia delle scienze, attraverso le controversie. [...] Queste questioni si traducono, se si proviene dal mondo naturalista (naturalista nel senso della "storia naturale"), in problemi di "difesa", "protezione", "conservazione", ecc., mentre la questione ecologica per come la vedevo io, provenendo dalle scienze sociali, era una questione di sociologia delle scienze, di comprensione dell'attività degli scienziati. [...] Quando il comunismo e il socialismo, o meglio, i comunismi e i socialismi hanno cominciato a insistere sulla questione sociale, essi non ne hanno fatto unicamente una questione sociologica: ne hanno fatto una questione di filosofia della storia, una questione artistica estremamente importante, una questione giuridica e, chiaramente, una questione politica (Manghi 2018).

La consapevolezza – ma anche la sottile scaltrezza – con cui Latour utilizza il termine Antropocene chiarisce un orizzonte che non è di "sensibilizzazione" verso un ente astratto e supermorale, ma quello di un costrutto interno alla storia, esattamente come lo è il luogo espositivo, fatto di professionalità, giurisdizioni e linguaggi. E lo stesso accade con la definizione di Gaia, cosciente delle problematicità dell'ipotesi di Lovelock (Bondì 2006), eppure grandemente sostenuta dalle *taglines* di *Critical Zones*, evidentemente ritenuta necessaria per spiegare il meccanismo di analisi delle scienze umane. Certamente Gaia non è più la divinità mitologica che personifica la Terra ("non è il Globo, né la Madre Terra; non è una dea pagana e neppure la Natura così come l'abbiamo immaginata finora" Latour 2020a) ma il solo fatto di usarne la denominazione costringe il lettore a porsi il dubbio della rappresentazione, sfruttando il pubblico dello ZKM come dato-vettore di un esperimento. Esistono solo questioni contingenti, tanto più che nell'idea latouriana di Natura non troviamo niente di salvifico, né tantomeno tracce di pacificazione tra umani davanti all'emergenza: restano semmai le rotte di relazione tra i suoi nodi interni, monitorati dalle macchine e riprodotti da scienze in conflitto – tra cui l'arte e la museologia.[11]

Note

[1] Dove non altrimenti specificato, tutte le traduzioni all'italiano di citazioni da testi in lingua sono del sottoscritto.

[2] Una modulazione che non è tuttavia una novità nell'ambito della curatela d'arte. Enrico Crispolti, ad esempio, nei suoi presupposti di *Ambiente come sociale* culminati alla Biennale veneziana del 1976, identificava gli artisti come "operatori estetici", sottolineandone i caratteri di autogestione – soprattutto terminologica, in uscita dalle consuetudini del "chi definisce artista" – e di efficacia sul "territorio in quanto tessuto sociale e non soltanto [...] realtà topografica" (Crispolti 1977: 27).

[3] "Nel processo di esposizione sperimentale tutti si sottomettono ai rischi e agli interessi dell'eteronomia" (Latour, Weibel 2006: 95).

[4] Il format fu ideato dallo stesso Latour con il nome di *theatre of proof*, un ciclo di rievocazioni storiche sull'idea di "esperimento". All'interno del progetto Latour iniziò a confrontarsi anche con il *Gedankenexperiment* nel contesto delle mostre d'arte, principalmente da due angolazioni che torneranno nell'elaborazione delle mostre di pensiero: la difficoltà nel reperire materiali utili alla ricostruzione e la traduzione pubblica di un ambiente laboratoriale (Obrist 2014).

[5] La connessione tra la figura di Pasteur e i microbi era già stata utilizzata da Latour negli anni Ottanta in *I microbi: trattato scientifico-politico*, dove il "prodotto epistemologico" di tali microrganismi, seguendo il sistema dei quasi-oggetti, era da considerarsi tanto naturale quanto culturale: inesistenti prima degli esperimenti di Pasteur, artefatto collettivo da lì in poi (Latour 1991).

[6] Anche i rispettivi cataloghi, spesso mastodontici (*Making Things Public* supera le mille pagine), sono pensati come ulteriori *Gedankenexperiment*, dove le modularità espositive sono sostituite dai differenti mezzi della scrittura, della tipografia, delle immagini stampate. La redazione di un catalogo come macchina a sè stante è anch'essa – o almeno in parte – un retaggio tipico di mostre come *Les Immatériaux* o *Laboratorium* dove la pubblicazione segue prospettive comuni all'esposizione ma non sovrapponibili. Sul caso specifico, e a proposito di una "artisticità" della critica letteraria in Latour si veda Matei 2021.

[7] Anche qui l'ipotesi concettuale è sostenuta da una quantità imponente di opere e documenti, a cui si tenta di dare relazione. Ad esempio, le rotte extraurbane della politica territoriale de *Il buono e cattivo governo* di Ambrogio Lorenzetti (1338-1339) si troveranno a dialogare con altre di differente fattura ma simile logica, come quelle mostrate nell'installazione *MILKproject* (2004-2005) di Esther Polak e Ieva Auzina, in cui si seguono i tracciati economici prodotti dal movimento caseario dalle campagne lettoni ai mercati iper-regolamentati dell'Europa centrale.

[8] Seppure con un'impostazione teorica più tradizionale, Latour inizia a interessarsi alla questione ecologica a partire dalla metà degli anni Novanta con *Politiche della natura. Per una democrazia delle scienze* (2000), giungendo successivamente alla convinzione di dover affidare al tema una "capacità rivoluzionaria" che trascendesse la struttura del ragionamento politico in senso stretto. Da qui la rielaborazione di una serie di conferenze tenute attorno al 2013 e il recupero dell'idea secolare di Gaia (Latour 2020a).

[9] "Vogliamo comprimere i visitatori all'interno del museo, per far loro sperimentare la zona critica, senza possibilità di fuga e senza facilitare il loro rapporto con gli altri esseri" (Latour 2020b: 12), richiama a un certo atto di realismo, usando il gancio sulla coesistenza tra esseri offerto dal saggio-lettera di Donna Haraway presente nello stesso catalogo di mostra (Haraway 2020), dedicato a sua volta al racconto di Ursula K. Le Guin *Sempre la valle* (1986) come modello fanta-etnografico e contestualmente atto d'accusa alle rigidità della civiltà contemporanea, descritta dall'antropologo che documenta le abitudini della popolazione post-apocalittica dei Kesh, come "la malattia dell'uomo", causa di un collasso di cui ormai non se ne ricordano neanche i contorni.

[10] Molti elementi di *Critical Zones* e della mostra taiwanese si sovrappongono, specie nella sezione-pianeta dedicata ai "terrestri", dove si parla proprio di zona critica e Gaia, mostrando la documentazione di Lovelock sui sistemi di *feedback loops* di omeostasi planetaria, di ispirazione cibernetica. Sul tema specifico si veda anche Schrape 2014.

[11] I tumulti delle politiche terrestri evidenziano proprio l'assenza di una conciliazione rispetto all'ecologia, che è tale a causa di una precisa formulazione storica. La stessa definizione di zona critica è usata da Latour per l'aggettivo che rimanda al campo semantico della pericolosità e della contesa. O ancora più chiaramente: "In quanto progenitrice di ciò che esiste, Gaia è inequivocabilmente attiva e pericolosa. James Lovelock ha infatti resuscitato il concetto di Gaia per raffigurare, contrariamente al mito originario, non un organismo gigantesco o una divinità compassionevole, ma piuttosto un sistema autoregolante composto da una molteplicità di elementi indivisibili che si evolvono per via di una manipolazione reciproca. La Terra, trasformata dalla mente umana, come ha sottolineato Paul Valéry, non è certo un'incubatrice passiva per le fantasie tecnologiche dell'intelletto umano, anzi "ci ripaga in natura'. Ci consegna una catastrofe" (Leksanich 2017).

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Intensificare il non-umano. Pratiche inclusive nel lavoro di Anicka Yi, Tomás Saraceno e Philippe Parreno

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Parole chiave

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Abstract

Negli ultimi due decenni, diversi artisti hanno iniziato a esplorare il rapporto tra tecnologie mediali, soggettività ed ecosistemi viventi. Seguendo metodi e obiettivi spesso differenti, hanno messo in luce un intreccio radicale tra i linguaggi dell'arte e le problematiche connesse alla crisi ambientale. Questi artisti si sono mossi in direzione di un'estetica "inclusiva", così come l'ha recentemente definita Nicolas Bourriaud, poiché hanno proposto uno sguardo decentrato capace di problematizzare le principali opposizioni che caratterizzano l'*habitus* dell'antropocentrismo. Il saggio mira ad analizzare tre installazioni artistiche in cui l'intensificazione dell'*agency* non-umana ha contribuito a creare dei veri e propri ambienti mediali in cui gli spettatori sono stati invitati a riconsiderare il proprio rapporto con l'alterità. I progetti presi in esame sono *Biologizing the Machine (terra incognita)* (2019) di Anicka Yi; *Sounding The Air* (2018) e *Webs of At-tent(s)ion* (2018) di Tomás Saraceno e la mostra *ANYWHEN* (2016) di Philippe Parreno allestita alla Tate Modern di Londra. La tesi che si intende sostenere in questo saggio è che una delle principali strategie adottate da questi artisti sia stata quella di intensificare, e quindi rendere pienamente visibile, l'*agency* delle entità non-umane – come quella degli elementi vegetali e dei microorganismi – mediante la coazione con le tecnologie dell'automazione e dell'intelligenza artificiale.

Nell'autunno del 2021, entrando negli spazi post-industriali della Turbine Hall della Tate Modern di Londra ci si poteva imbattere in una serie di robot volanti, simili a polipi e a meduse. Questi "aerobi", così come li aveva chiamati l'artista coreana-americana Anicka Yi, erano alimentati da un software di intelligenza artificiale e fluttuavano nell'ambiente espositivo interagendo con il pubblico. Attratti dal calore corporeo, gli aerobi reagivano a ogni cambiamento di temperatura e si raggruppavano sopra le teste dei visitatori quando questi formavano dei piccoli assembramenti. Nello stesso spazio l'artista aveva creato un vero e proprio paesaggio olfattivo, disseminando dei dispositivi che emettevano diversi odori associati a periodi specifici della storia del Bankside – l'area di Londra in cui è collocata la Tate Modern. In particolare, si poteva sentire il profumo di alcune spezie ritenute in grado di combattere la peste nera nel XIV secolo o l'odore del carbone usato per azionare le macchine dalla Turbine Hall agli inizi del Novecento.

Significativamente l'intera installazione si intitolava *In Love with the World* (2021) ed era stata concepita come una sorta di "acquario" (Yi 2021: 47) al cui interno le macchine e gli esseri umani coesistevano nel medesimo spazio: "Volevo che i visitatori avessero la sensazione di condividere l'aria con gli aerobi – ha affermato Yi – e, trasformando l'aria in soggetto, volevo esaminare le questioni correlate all'ingiustizia atmosferica e alla biopolitica dei sensi" (ivi: 51).[1]

Negli ultimi due decenni diversi artisti hanno esplorato il rapporto tra tecnologie, soggettività ed ecosistemi viventi. Seguendo metodi e obiettivi spesso differenti, hanno messo in luce un intreccio radicale tra i linguaggi dell'arte e le problematiche connesse alla crisi ambientale. Questi autori si sono mossi in direzione di un'estetica "inclusiva", così come l'ha recentemente definita Nicolas Bourriaud (2020), poiché hanno saputo proporre uno sguardo *decentrato* – finalmente aperto a sistemi e forme di vita non-umane – capace di problematizzare le principali opposizioni che caratterizzano l'*habitus* dell'antropocentrismo.

La crisi della scala umana resa evidente da quelli che Timothy Morton ha definito "iperoggetti" (2018a: 168) – entità non misurabili né controllabili e "incomparabilmente più vaste e potenti di noi", come il riscaldamento globale, le scorie radioattive e lo stesso virus SARS-CoV-2 – ci sta infatti obbligando a una rinegoziazione dei termini che definiscono la nostra presenza nel mondo. Siamo chiamati a congedarci da quelle strutture di pensiero che hanno sostenuto la presunta predominanza dell'uomo sugli altri enti, per abbracciare una prospettiva non antropocentrica, che concepisca l'essere umano in costante relazione con l'alterità vivente e/o macchinica.

L'obiettivo di questo saggio è approfondire un aspetto preciso della pratica di tre artisti contemporanei: Anicka Yi, Tomás Saraceno e Philippe Parreno. La principale ipotesi che si intende sostenere è che l'intensificazione dell'agency non-umana promossa dalle opere di questi artisti favorisca un autentico processo di "antropodecentramento" (Marchesini 2014: 34), ovvero un'azione di avvicinamento alle entità non-umane che incoraggia l'assunzione di una "posizionalità meno parziale e più critica" (Ibidem), consapevole dell'essenziale interdipendenza tra le specie viventi.

Alla luce del dibattito su quella che è stata definita la "svolta postumana" (Bignall, Braidotti 2019),[2] verranno analizzate tre installazioni in cui la coazione tra intelligenza artificiale, tecnologie dell'automazione e microorganismi ha prodotto veri e propri ambienti mediali (talvolta connotati anche a livello olfattivo e sonoro) in cui gli spettatori sono stati invitati a riconsiderare il proprio rapporto con l'alterità.

Anicka Yi: biologizzare la macchina

La pratica artistica di Anicka Yi si è spesso attestata in una zona di confine tra umano e animale, naturale e artificiale, sintetico e organico. Le sue installazioni sono quasi sempre caratterizzate dalla presenza di materiali non convenzionali, come microbi, batteri, alghe, lieviti e persino virus, talvolta assemblati a prodotti industriali (lamette, lenti a contatto, gel per capelli). L'artista adotta un approccio apertamente interdisciplinare – collabora con scienziati, programmatori, profumieri, chimici, neurobiologi – e dà vita a opere che enfatizzano l'aspetto ciclico, metabolico e impermanente dei materiali utilizzati.

Uno dei lavori che permette di analizzare in maniera puntuale la tensione ecologista che informa gran parte delle sue opere, è senza dubbio *Biologizing the Machine (terra incognita)*. Presentato per la prima volta nell'ambito della 58ª edizione dell'Esposizione Internazionale d'Arte della Biennale di Venezia nel 2019 e, successivamente ampliato in occasione della mostra *Metaspore* allestita al Pirelli HangarBicocca di Milano

nel febbraio del 2022, questo ciclo di opere è formato da una serie di composizioni colorate che l'artista installa al soffitto, ad altezze diverse, all'interno di vetrine trasparenti. Da lontano, questi lavori assomigliano a dipinti astratti, ma quando ci si avvicina rivelano un piccolo ecosistema che sembra mutare senza soluzione di continuità. Yi ha infatti utilizzato del fango prelevato nei dintorni del sito espositivo e lo ha successivamente mischiato a carbonato di calcio, gusci d'uovo e cellulosa, secondo il principio della colonna di Vinogradskij – un dispositivo microbico artificiale che, esposto alla luce del sole, permette la crescita di una moltitudine di microorganismi (Whitefield 2021: 37). Col passare del tempo, la coltura ha continuato ad evolversi creando strati di colori diversi, sfumature e motivi geometrici a seconda della presenza di batteri aerobi e anaerobi (i primi si trovano in alto poiché necessitano di ossigeno, i secondi, invece, nella parte inferiore, perché non richiedono ossigeno).

L'artista ha inoltre dotato ogni vetrina di un dispositivo di intelligenza artificiale che monitora l'attività dell'ecosistema microbico e che rileva la crescita e il decadimento – o "il battito cardiaco", come lo definisce Yi (2022) – dell'intera colonia. Le informazioni ottenute vengono quindi tradotte in pattern luminosi visibili dai circuiti stampati installati al centro di ogni composizione.

Oltre ad essere un'opera *site-specific* – sia perché il terreno della coltura è prelevato nelle immediate vicinanze del luogo in cui è esposto, sia perché la crescita dei microorganismi dipende dalla luce, dalla temperatura e dall'umidità dell'ambiente circostante – *Biologizing the Machine* è una sorta di "biofiction" (Jones 2016: 90), ovvero una forma di scrittura biografica *allargata* che, facendo reagire la biologia alle speculazioni del postumanesimo, evidenzia una "relazione perennemente intrecciata" (ivi: 92) tra la dimensione teorica e quella materiale.[3] Al contempo, l'opera di Yi intensifica e rende immediatamente visibile l'incessante attività di una moltitudine di entità non-umane, esalta le qualità *involontariamente* estetiche di un universo secondario e nascosto eppure costantemente in azione.

"Catturando i flussi sapidi del suolo e trasformandoli in colori dello spettro visibile", come ha opportunamente scritto Rachel Lee, l'artista "[…] ci ricorda di non osservare strettamente ciò che è sotto di noi come un passato inanimato – semplici detriti di morti ed estinti – ma di campionare, inspirare e assaporare la vitalità della terra, tutti i suoi vapori e tutto il nostro divenire" (Lee 2022: 216). D'altronde, lo stesso microbiologo ucraino dal quale Yi riprende la tecnica della coltura considerava la terra che calpestiamo come "un'entità che respira, un ambiente vivente […] un collettivo […] che possiede […] le funzioni caratteristiche di un organismo vivente" (Dworkin, Gutnick 2012: 371).

Questo "adattamento della tela pittorica alla nicchia ecologica" (Lee 2022: 215) si fa inoltre testimone di quella fondamentale "variazione aleatoria" che, come ha sostenuto Jean-Jacques Kupiec (2021: 15-22), rappresenta la proprietà primaria del vivente: un fenomeno intrinsecamente stocastico che non contiene semplicemente delle "fluttuazioni", ma è esso stesso determinato da qualità aleatorie. Ogni livello, ogni trama, ogni sfumatura delle composizioni di Yi è il risultato di una concatenazione di eventi imprevedibili, non pienamente controllabili, che si verificano in uno stato di metamorfosi costante.

In occasione della Biennale veneziana, assieme a *Biologizing the Machine (Terra incognita)*, Yi ha presentato un'ulteriore installazione, intitolata *Biologizing the Machine (Tentacular Trouble)* (2019), che consiste in sei enormi bozzoli luminosi che, simili a lanterne giapponesi, pendono dal soffitto dello spazio espositivo in corrispondenza di piccoli crateri colmi d'acqua. All'interno di questi involucri – precedentemente trattati con l'alga laminaria kelp – l'artista ha collocato degli insetti animatronici che svolazzano continuamente creando un gioco di luci e ombre. Il terreno sottostante sembra evocare una palude e gli stessi canali della città di Venezia mentre le sculture sospese sembrano rimandare a crisalidi o a organi umani e richiamano l'attenzione sugli usi potenziali delle alghe: organismi mutaforma che compongono la più grande biomassa del pianeta (Griccioli, Todolì 2022: 242).

Se nell'opera analizzata in precedenza, l'atto di "biologizzazione della macchina" è dato dalla creazione di un canale di comunicazione tra l'intelligenza artificiale e le forme organiche, in questo caso è reso dalla presenza degli animali animatronici all'interno delle lanterne di kelp, che sembrano realmente appartenere a quella realtà biologica. "Volevo concentrarmi sugli elementi di *Biologizing the Machine*, considerando la parte sensoriale della macchina e la sua suscettibilità all'infiltrazione biologica e all'ibridazione" (Yi 2019), ha dichiarato l'artista durante una conferenza al Royal

College of Art di Londra. La stessa Yi, ha successivamente aggiunto:

> Più in generale quest'opera riguarda la trasformazione evolutiva dell'essere umano e delle sue specie compagne in relazione al radicale cambiamento ambientale e tecnologico. Queste sono le nuove realtà con cui ha a che fare la nostra civiltà ed è per questo che il mio lavoro analizza i modi in cui la biologia sintetica, l'intelligenza artificiale e il rapido cambiamento climatico interferiscono con le nozioni umane convenzionali di autonomia, individualità e persino di sopravvivenza elementare (Ibidem).

Biologizing the Machine (Tentacular Trouble) è in fondo una sorta di paesaggio originario, uno scenario primordiale dove l'acqua rappresenta l'elemento generativo primario e il bozzolo il paradigma dell'essere-nel-mondo. Come ha scritto Emanuele Coccia (2022: 83), infatti, il bozzolo "è la forma trascendentale di ciascun vivente [...] è la prova che la nostra vita non può limitarsi a un solo ambiente, a una sola nicchia, a un solo mondo". Ed è proprio insistendo su questa profonda interconnessione, generando e mostrando le "parentele" (Haraway 2019: 143-149) che esistono tra domini apparentemente differenti, che Yi ribadisce la sua critica all'eccezionalismo umano.[4] Le sue opere definiscono una concezione dell'alterità radicalmente rinnovata, ci riposizionano all'interno di una rete di rapporti in cui non siamo più l'unità metrica principale. Essere contrari all'antropocentrismo, d'altronde, "non significa che detestiamo l'umanità e che vogliamo estinguerci, significa capire come noi umani siamo inseriti nella biosfera in quanto esseri tra gli altri" (Morton 2018b: 57).

Tomás Saraceno: per un'estetica dell'Aerocene

Se Anicka Yi si concentra su un elemento naturale come la terra e sulla commistione tra realtà biologiche e meccaniche, Tomás Saraceno pone l'accento su un'entità altrettanto fondamentale, eppure troppo spesso sottovalutata: l'aria. L'artista argentino ha dedicato gran parte della sua carriera allo studio di quest'elemento, grazie anche al supporto di scienziati e climatologi. A partire dal 2007 ha dato avvio alle attività di *Aerocene*: una comunità artistica interdisciplinare che promuove e organizza azioni di attivismo ambientale, elaborando nuove forme di mobilità e sperimentando pratiche collaborative che mirano a superare l'approccio estrattivo nei confronti dell'ecosistema e delle specie non-umane. "Vogliamo immaginare una nuova epoca, quella che potrebbe lasciarsi alle spalle l'assoggettamento dell'Antropocene", ha dichiarato Saraceno durante un'intervista condotta da Hans Ulrich Obrist, "l'abbiamo chiamata *Aerocene*: un periodo di consapevolezza ecologica, in cui impariamo a galleggiare insieme, a vivere nell'aria e a raggiungere un impegno etico per l'atmosfera e la terra" (Saraceno 2017: 5).

Da "medium elementale" – dotato di un proprio peso specifico nell'articolazione del nostro rapporto sensibile con il mondo (Durham Peters 2015) – nell'opera di Saraceno l'aria diventa medium artistico e "sociale", poiché se da una parte rappresenta la componente essenziale di molte delle sue installazioni, dall'altra è presa in considerazione come autentico strumento di conoscenza: non più predicato esclusivo della natura, ma anche della cultura.[5] Le opere e gli ambienti dell'artista, come ha sottolineato Eva Horn (2017: 21), "esplorano proprio questa zona di passaggio, cruciale ma sfocata, tra un approccio scientifico alla natura e una visione ibrida, sperimentale e fenomenologicamente più aperta agli elementi della vita, come il sole, l'aria, la terra, gli spazi in cui viviamo".

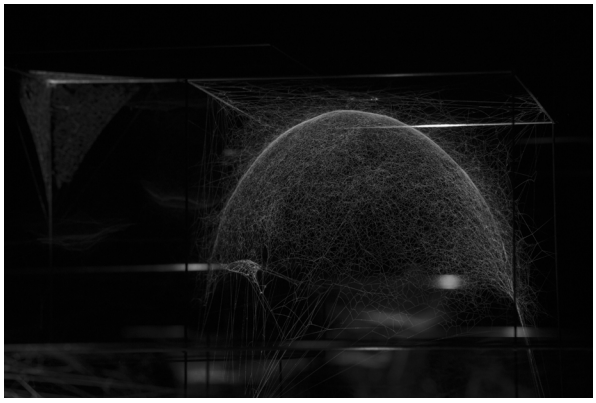
In occasione dell'antologica *On Air*, allestita al Palais de Tokyo di Parigi nell'autunno del 2018, Saraceno ha presentato un'installazione intitolata *Sounding The Air* (2018) [**Fig. 1**] che esemplifica in maniera estremamente chiara la sua metodologia di lavoro. Si tratta di un'opera per la quale l'artista ha letteralmente "collaborato" con l'aria, innescando un complesso meccanismo co-autoriale che ha portato quest'elemento a rivelare un'intrinseca forza espressiva. *Sounding The Air*, infatti, è un vero e proprio strumento eolico composto da cinque fili di seta di ragno lunghi sei metri che, oscillando in continuazione sia grazie al calore delle lampade che li illuminano dal basso sia a quello dei corpi dei visitatori, alle folate e agli spostamenti d'aria generati dai loro movimenti, emettono una serie di suoni che invadono lo spazio espositivo. Un video registrato in tempo reale cattura le oscillazioni dei fili mentre un dispositivo elettronico trasforma le vibrazioni in frequenze e modelli sonici (Saraceno 2020: 75) secondo un principio molto simile a quello che attiva i pattern luminosi nell'opera *Biologizing the Machine (terra incognita)* di Anicka Yi.

Fig. 1 | Tomás Saraceno, Sounding the Air (2018), veduta della mostra On Air. Carte Blanche a Tomás Saraceno, Palais de Tokyo, Parigi, 2018. Courtesy l'artista. Fotografia di Andrea Rossetti © Tomás Saraceno

In questo ambiente immersivo, ogni gesto, ogni singolo movimento, anche il più lieve e impercettibile fruscio, altera l'intera macchina sonora di Saraceno. Una macchina che è influenzata anche dalle numerose interazioni tra i diversi particolati dell'aria, dalla polvere e dalle forze elettrostatiche. Per questo motivo, l'artista ha parlato del suo lavoro al Palais de Tokyo come di una "jam session" (Saraceno 2018: 10) interpretata da corpi umani e non-umani che, immersi nel medesimo medium, inventano collettivamente una partitura ogni volta diversa, ogni volta unica, irripetibile.[6]

Sounding The Air è ispirata al fenomeno del *ballooning*, ovvero una tecnica tipica di alcune specie di ragni che, dopo aver fatto roteare diverse strisce di seta, sfruttano i campi elettrici o elettromagnetici e riescono a librarsi nell'aria percorrendo distanze relativamente lunghe. Secondo l'artista, la particolarità di questa tecnica – per molto tempo vero e proprio mistero per gli stessi ricercatori[7] – "ci permette di immaginare la possibilità di un volo aereo collettivo, dell'armonizzazione tra le specie e della collaborazione con le forze dell'atmosfera" (Saraceno 2020: 75).

Sin dal 2007, parallelamente al progetto *Aerocene*, Saraceno porta avanti una ricerca incentrata sulle capacità e l'intelligenza dei ragni e sul potenziale estetico del loro comportamento. Affascinato dalla metafora dell'universo come ragnatela cosmica (Engelmann 2016: 2),[8] ha ideato – in collaborazione con gli ingegneri dell'Università di Darmstadt – un'originale tecnica di scannerizzazione che gli permette di modellare digitalmente le tele di ragno e di riscostruirle nello spazio



Figg. 2-3 | Tomás Saraceno, Webs of At-tent(s)ion (2018), veduta della mostra On Air. Carte Blanche a Tomás Saraceno, Palais de Tokyo, Parigi, 2018. Courtesy l'artista. Fotografia Studio Tomás Saraceno © Tomás Saraceno

espositivo. Per l'opera *14 Billions (Working Title)* (2010), presentata alla Bonniers Konsthall di Stoccolma e al Baltic Center for Contemporary Art di Gateshead, l'artista ha scansionato la ragnatela di una vedova nera (*Latrodectus mactans*) e l'ha riprodotta in scala 16,7:1 utilizzando un filo di nylon lungo circa 8000 metri, collegato da oltre 23.000 nodi, per un'estensione complessiva di 400 metri cubi.

In occasione della mostra al Palais de Tokyo, invece, Saraceno ha esposto *Webs of At-tent(s)ion* (2018): un'installazione di grandi dimensioni composta da 76 ragnatele "ibride" – realizzate da specie di ragni differenti – amplificate con speciali microfoni che permettono di ascoltare il ritmo delle loro vibrazioni [**Figg. 2-3**]. Sospese ad altezza uomo all'interno di vetrine trasparenti che ricordano quelle di un museo di storia

naturale, le sculture sono illuminate da numerosi faretti che ne esaltano gli elaborati dettagli.

Per quest'opera, l'artista ha inserito una colonia di "aracnidi sociali" in una struttura di carbonio nella quale i ragni hanno stabilito il proprio habitat. Gli animali hanno quindi iniziato a tessere in maniera collettiva un'unica ragnatela che Saraceno, assieme ai membri del suo studio, ha continuato a modellare e a riorientare prima di scansionarla e ricostruirla in vista dell'esposizione (Enderby 2022: 23). Sul suo sito web, nella pagina dedicata alla documentazione dell'opera, è stata inserita la lista di tutti ragni che hanno contributo alla creazione dell'installazione, significativamente rinomati "collaboratori" dell'artista.[9]

Frutto di "un'autorialità multipla" (Groys 2012: 108) alla quale partecipano umani e non-umani, in *Webs of At-tent(s)ion* assistiamo a una "collaborazione interspecifica" (Saraceno et al. 2019: 485) – sia tra specie di ragni diverse, che tra queste ultime e l'artista – che rende molto più fragile anche i confini tra il mondo della scienza e quello dell'arte. Proprio in quanto "mediazioni tra la conoscenza tecnica e l'espressione artistica", le sculture che compongono l'installazione "ricoprono il doppio ruolo di oggetti estetici e agenti epistemici" (Parikka 2020: 311). L'artista le concepisce come dispositivi capaci di promuovere "nuove relazione simbiotiche con i corpi non umani" (Saraceno 2022: 128), corpi con i quali condividiamo il destino del nostro pianeta e dai quali potremmo apprendere nuove modalità d'esistenza.

Come ha sostenuto Jussi Parikka (2020: 309-332), infatti, i lavori scultorei di Saraceno possono essere definiti degli "oggetti di lavoro", ovvero oggetti che non rappresentano semplicemente delle illustrazioni di concetti preesistenti, "che non cristallizzano una teoria, ma che invece la precedono, la regolano, la abilitano, la attuano e la canalizzano" (ivi: 326). O ancora, per usare le parole degli studiosi Lorraine Dastone e Peter Galison (1992: 85) dai quali Parikka riprende il termine, "materiali da cui si formano i concetti e ai quali questi vengono applicati". L'idea dell'artista, infatti, è che il suo assemblaggio polifonico possa permettere di percepire nuovi "fili di connettività" (Saraceno 2022: 31), inedite reti di relazioni che spostino la nostra attenzione verso ambienti e forme di vita diverse dalla nostra. Del resto, la maggior parte dei suoi lavori, come egli stesso ha dichiarato, "mirano a rendere visibile e tangibile ciò che è latente, che si tratti di una ragnatela o delle correnti a getto nella stratosfera" (Saraceno 2017: 13).

Philippe Parreno: la mostra come organismo vivente

Allo stesso modo delle installazioni di Saraceno, le mostre recenti di Philippe Parreno sono tutte caratterizzate da un dialogo costante con le entità non-umane. A differenza di Saraceno, tuttavia, Parreno estende la sua pratica alla totalità dell'ambiente espositivo. Per l'artista francese, infatti, la mostra non rappresenta soltanto un'occasione "dimostrativa" in cui esporre opere da osservare in successione, piuttosto, è un "atto creativo" (Parreno 2013a: 198), un momento in cui in cui "rinegoziare la modalità d'apparizione di lavori prodotti in precedenza, testarne le possibilità narrative e rimetterli in gioco all'interno di scenari differenti" (Di Rosa 2019: 82).

Sin dai primi anni Novanta, Parreno ha iniziato a ripensare radicalmente il concetto di esposizione, lavorando a una vera e propria "coreografizzazione dell'attenzione del pubblico" (Parreno 2013b: 91). Le sue mostre, soprattutto quelle personali, sono degli autentici *scripted space*, ovvero degli spazi progettati per dar vita a uno percorso esperienziale, "da attraversare come narrazioni, in cui il pubblico è il personaggio principale" (Klein 1997: 151).[10]

Dal 2002, l'artista ha elaborato un particolare protocollo curatoriale che gli permette di "automatizzare" le sue esposizioni, facendole evolvere in maniera autonoma, sia spazialmente che temporalmente. Il punto di arrivo di questa sperimentazione è la *large scale* organizzata negli spazi della Turbine Hall alla Tate Modern di Londra nell'autunno del 2016: un progetto espositivo nel quale Parreno affida il controllo complessivo della mostra a forme e processi organizzativi non-umani (microorganismi, elementi vegetali, algoritmi).

Intitolata *ANYWHEN*, l'esposizione è animata da un bioreattore che ospita una colonia di lieviti e batteri. Quest'apparecchiatura è connessa a una stazione metereologica posta all'esterno del museo londinese che, in base ai dati ricevuti dall'ambiente (vento, temperatura, luminosità), trasmette *input* al dispositivo che controlla il processo di alimentazione dei batteri stessi (Saba 2018: 196). La reazione dei microorganismi al processo di alimentazione attiva il software che governa la sequenza di luci, suoni e proiezioni all'interno della mostra (Stilpass 2020: 57).[11] Questa com-

plessa catena di relazioni, quindi, innesca l'elaborata drammaturgia di Parreno e funziona come una sorta di "cervello della mostra" (Oberender 2018: 52), poiché determina ogni evento che si verifica negli spazi della Turbine Hall [Figg. 4-5].

L'attività del bioreattore, per esempio, gestisce l'accensione e lo spegnimento delle luci delle *Marquee* (2016) installate nello spazio superiore della Turbine Hall; controlla l'attivazione del film *Anywhen in a Time Colored Space* (2016), una pellicola in cui la ventriloqua Nina Conti introduce i primi piani di alcuni cefalopodi dell'oceano Pacifico che cambiano colore in relazione all'ambiente in cui si trovano. L'intera sequenza espositiva può durare dalle otto alle dodici ore e può cambiare in maniera imprevista in base alla reazione dei microorganismi (Searle 2016). Il bioreattore funge quindi da "centro di comando vivente" (Nathan 2016), giacché il funzionamento complessivo della mostra è integralmente determinato dalle reazioni dei microbi e dei batteri coltivati al suo interno, che incidono in maniera sostanziale anche sull'esperienza spettatoriale. Da questo punto di vista *ANYWHEN* sembra un vero e proprio "automa" (Stilpass 2020: 55), un organismo vivente, pulsante, che ospita una concatenazione di eventi in cui i lavori artistici appaiono e scompaiono, si alternano o si sovrappongono, in assoluto dialogo con lo spazio espositivo. Allo stesso tempo, è un ecosistema mediale che dipende intimamente dalle variazioni dell'ambiente circostante, che influenzano il funzionamento del bioreattore e di conseguenza anche la drammaturgia visiva e sonora concepita dall'artista (Saba 2020: 165-168).

ANYWHEN potrebbe essere definita come un sistema "simpoietico", ovvero un apparato dinamico, reattivo, situato, che non possiede confini spaziali e temporali predeterminati e che, al contrario dei sistemi "autopoietici" (autonomi, indipendenti, con un'unità di controllo centralizzata), opera e produce in maniera "collettiva" grazie a un articolato meccanismo di relazioni e interdipendenze (Haraway 2019: 89-92). Il controllo di un sistema simpoietico, infatti, è distribuito tra tutti i componenti del sistema stesso che sono legati a doppio filo tra loro cosicché risulta persino difficile comprendere dove finisca la sfera d'azione dell'uno e inizi quella dell'altro.

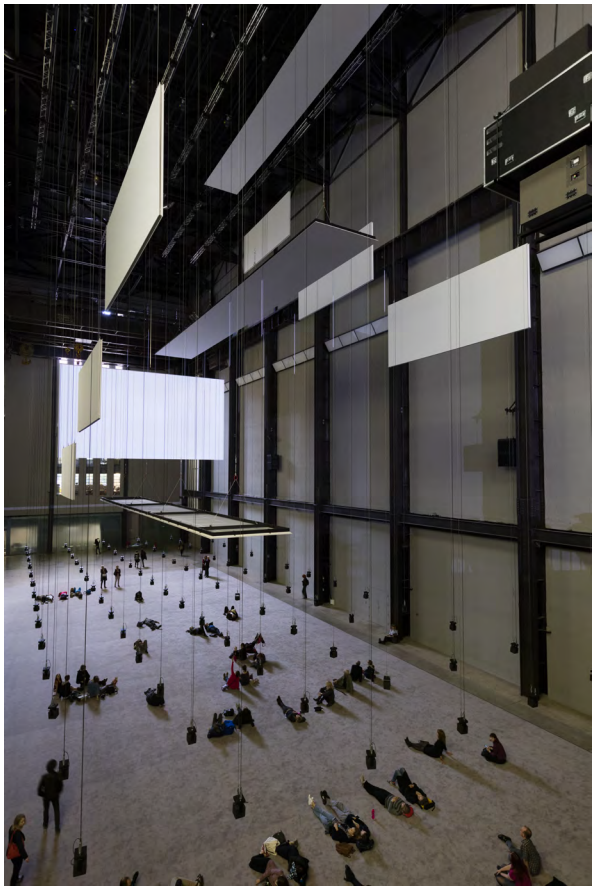
Coniata dalla studiosa canadese M. Beth Dempster (2000), la nozione di "simpoiesi" è stata recentemente ripresa da Donna Haraway (2019) che l'ha descritta come uno dei concetti essenziali per ripensare la nostra posizione nell'era dello "Chthulucene".[12] Secondo la filosofa statunitense, infatti, per "restare costantemente in contatto con il problema" e per recuperare un rapporto simmetrico con le entità non-umane è necessario spostare l'accento su una responsabilità diffusa, su un "con-fare", dal momento che ogni organismo vivente non è altro che il risultato di un processo dialogico con l'alterità (Haraway 2019: 89).

> Le creature si penetrano a vicenda, si riavvolgono l'una attorno all'altra e l'una attraverso l'altra, si mangiano, fanno indigestione, si digeriscono in parte e in parte si assimilano a vicenda, e così definiscono degli ordini simpoietici altrimenti noti come cellule, organismi e assemblaggi ecologici (Ibidem).

La mostra di Parreno sembra mettere in scena proprio questo complesso insieme di relazioni: è una costellazione mobile dove ogni cosa è *compromessa* con l'altra, un reticolo di connessioni dove la componente tecnologica estende e *intensifica* l'attività di elementi che fino ad allora apparivano secondari. Lo spettatore si trova immerso in un organismo vivente che si trasforma e si evolve in maniera non prevedibile, seguendo il ritmo di un cervello "ibrido", fatto di vento, pioggia, lieviti, batteri e algoritmi.

Una svolta molecolare

Pur nella diversità delle loro pratiche, Anicka Yi, Tomás Saraceno e Philippe Parreno si fanno testimoni della "svolta molecolare" (Bourriaud 2020: 141) che, almeno a partire dagli anni Dieci del Duemila, ha investito in maniera decisiva la produzione artistica contemporanea. Consapevoli del ruolo che il "minuscolo" può ricopre all'interno degli ecosistemi, questi artisti ci spingono a riconsiderare l'importanza di elementi microscopici, quasi invisibili, eppure capaci di influenzare profondamente le nostre economie e le nostre culture. "Anziché focalizzarsi su degli oggetti, delle cose o dei prodotti, osservano la struttura molecolare delle realtà sociali, le relazioni atomiche che compongono l'illusoria stabilità del mondo" (ivi: 142). Prendono in considerazione l'azione di alghe e batteri (Yi), la forza dell'aria e il comportamento dei ragni (Saraceno), l'attività dei lieviti e degli agenti atmosferici (Parreno), e gli attribuiscono un valore singolare e concreto. In questo senso, portano avanti una pratica "inclusiva", che se da



Figg. 4-5 | Philippe Parreno, Anywhen (2016-2017), veduta della mostra, Hyundai Commission, Tate Modern, Turbine Hall. Courtesy l'artista; Gladstone Gallery, New York; Pilar Corrias, Londra ed Esther Schipper, Berlino. Fotografia di Andrea Rossetti

una parte comprende l'agency di entità non-umane, dall'altra implica la connessione tra "mondi" apparentemente distanti.

Le loro opere d'arte diventano allora dei dispositivi di conoscenza che, grazie all'apporto di strumenti tecnologici differenti, riescono a captare e a mostrare i segni, le vibrazioni e le trasformazioni dei materiali che le compongono. Allo stesso tempo, sono opere che danno voce a un "reale simbiotico" (Morton 2022: 11) in cui l'elemento antropico ha perso ogni pretesa di centralità e di autonomia[13]. Nel "moto di molecolarizzazione" che caratterizza il lavoro di questi artisti, la figura umana "è come disciolta in una soluzione (in senso chimico), esiste ormai solo tramite delle connessioni" (Bourriaud 2020: 149). Essa è ripensata e rimessa in gioco in quanto entità sostanzialmente relazionale, "porosa", che, come ha scritto Rosi Braidotti (2014: 57), si forma "nella e dalla molteplicità" ed è "[…] pienamente immersa in e immanente a una rete di relazioni non umane".

Questo processo di "approssimazione" all'alterità, questo continuo gioco di contaminazioni, apre alla possibilità di nuove forme di cooperazione ma, allo stesso tempo, fa vacillare le nostre convinzioni, le nostre credenze, rende sempre più incerta la nostra posizione nel mondo. Fare esperienza dell'altro, come ha scritto Franco Cassano:

> ci mette in discussione a un livello di profondità che non è retorico definire radicale, ci rinvia la terribile sensazione della nostra contingenza, la possibile accidentalità di ciò che siamo, di ciò cui teniamo, ci ricorda nel pieno della nostra vita, anche quando la fine è lontana, la nostra insuperabile finitezza di specie, collettiva e individuale (Cassano 1989: 8).

Note

[1] Con "ingiustizia atmosferica" l'artista fa riferimento al divario sociale ed economico che non permette a una gran parte della popolazione di avere accesso ad aria pulita e a condizioni atmosferiche accettabili (Yi 2021: 56).

[2] Definita come la "convergenza tra postumanesimo e postantropocentrismo", la "svolta postumana" è un evento discorsivo e materiale che invita a riflettere oltre "la cornice antropocentrica stabilita" (Bignall, Braidotti 2019: 1).

[3] Mutuando il concetto dall'ambito letterario e riformulandolo in relazione al lavoro di Yi, la storica dell'arte statunitense Caroline A. Jones ha parlato della "biofiction" come una forma di scrittura biografica "ibrida" che stabilisce un'omologia tra le filosofie della vita, la metafisica e la biologia. "La biofiction, dal mio punto di vista, fonde la scrittura (la 'grafia') con lo studio (la 'logia'). Parte della "scrittura" della vita ora include l'accettazione delle persone non umane" (Jones 2016: 90).

[4] "Allargare e ridefinire la parentela è un processo legittimato dal fatto che tutte le creature della Terra sono imparentare nel senso più profondo del termine", ha scritto Donna Haraway (2019: 148), "e già da tempo avremmo dovuto iniziare a prenderci più cura delle creature affini come assemblaggi e non delle specie una alla volta".

[5] Passando in rassegna la genealogia dei termini "aria" e "clima", Eva Horn (2017: 22-27) ha segnalato che la *medialità* di questo elemento naturale era in fondo già chiara ad autori come Johann Gottlieb Herber e Alexander von Humboldt, sebbene questo aspetto sia stato successivamente "dimenticato e prontamente cancellato", sia a causa dalla concezione moderna della meteorologia scientifica, sia a causa dalla separazione (altrettanto moderna) tra natura e cultura.

[6] Il ritmo delle oscillazioni dei fili di ragno, inoltre, determina l'accensione e lo spegnimento delle luci pulsanti dell'opera *Webs of At-tent(s)ion* (2018), installata nella sala espositiva precedente, creando un'armonica risonanza tra i due spazi.

[7] L'effetto *ballooning* è stato descritto in maniera dettagliata da due scienziati dell'Università di Bristol, Erica Morley e Daniel Robert (2018).

[8] La scelta di concentrarsi sui ragni, inoltre, è dettata dal fatto che nel contesto dell'attuale crisi ecologica, gli animali invertebrati stanno scomparendo a un ritmo sempre più veloce causando un grosso danno all'ambiente e agli ecosistemi (Saraceno 2022: 128).

[9] Tra i vari aracnidi selezionati ve ne era anche uno appartenente alla famiglia degli "Holocnemus pluchei" che viveva tra le mura del Palais de Tokyo. Questo ragno è stato prelevato e portato nello studio berlinese dell'artista, dove ha collaborato con gli altri ragni alla costruzione della ragnatela ibrida. Il sito web dell'artista è navigabile all'indirizzo: https://studiotomassaraceno.org.

[10] Dalle cattedrali barocche ai teatri rinascimentali, dai parchi divertimento ai videogame, negli "scripted space" (spazi sceneggiati) si ha "la sensazione che qualcosa stia andando avanti autonomamente e che ci siano poteri che controllano e strutturano cosa è visto ed esperito" (Andersen, Ulrik, Pold 2011: 113-114). Il termine è stato coniato dallo studioso statunitense Norman Klein.

[11] Il bioreattore è stato realizzato dagli scienziati francesi Jean-Baptiste Boulé e Nicolas Desprat ed è stato esposto in una piccola stanza nel retro della Turbine Hall. Parreno ha utilizzato per la prima volta il bioreattore nel 2016, in occasione della mostra *If This Then Else* alla Gladstone Gallery di New York e lo ha successivamente riproposto anche per la personale al Gropius Bau di Berlino nel 2018.

[12] Con il termine "Chthulucene" – ripreso dal nome del ragno californiano Pimoa Cthulu – Donna Haraway fa riferimento all'era in cui viviamo, caratterizzata da una profonda crisi climatica e ambientale. La studiosa preferisce questo termine a quello di Antropocene, poiché quest'ultimo risulterebbe incapace di rendere a pieno la complessità eterogenea del mondo. Chthulucene, invece, richiama una dimensione "tentacolare" nella quale sono imbrigliate una miriade di concatenazioni diverse, come quelle tra umani e non-umani.

[13] Con l'espressione "reale simbiotico", Timothy Morton (2022) descrive una concezione ecologica dell'essere-nel-mondo che si basa sulla "solidarietà" tra umani e non-umani.

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Complex Identities in Contemporary Animated Cinema between Posthumanism and Ecocriticism

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Abstract

This article shows how animation emerged as a suitable medium for depicting hybrid identities between human and non-human beings. It also shows how animation was an important resource for developing an ecocritical imaginary and ethics that rejected oppositional dualisms and the paradigm of the exceptional human. The first section outlines the rigid and ‘proprietary’ conception of identity and shows how this has contributed to the consolidation of human supremacy over the environment and the non-human. The second paragraph analyses examples of flexible identities based on relationships, hybridisation and change and shows how this kind of identity has contributed to the development of new ecologies. The third section outlines the characteristics of identity in the contemporary posthumanist and ecocritical framework based on sympoietic and interspecies constructions of networks of biological data, personal decisions, conscious and unconscious desires, relations and hybridisations. The final paragraph attributes to the poietic and metamorphic power of animation its effectiveness in representing these posthumanist identities, in showing the agency of non-human beings and in soliciting a fully ecocritical ecological sensitivity, in that it rejects clear-cut oppositions and human exceptionalism by aiming for a radically new way of conceiving human beings, nature, technology and their relationships.

This article aims at showing how animation has emerged as a particularly suitable medium for depicting hybrid identities between human and non-human beings. It also shows how animation was an important resource for developing an ecocritical imaginary and ethics that rejected oppositional dualisms and the paradigm of the exceptional human.[1]

The first section outlines the rigid and "proprietary" conception of identity and how this has contributed to a hierarchical understanding of living beings and the consolidation of human supremacy over the environment and the non-human. This kind of identity will be exemplified by looking at the protagonists of *Princess Mononoke* (1997) and *Ponyo* (2008), directed by Miyazaki Hayao.

The next section will point to the protagonists of *Wolfwalkers* (2020), directed by Tomm Moore, and *Metropolis* (2001), directed by Rintaro, as successful examples of mediation between identities. This case illustrates a flexible and dynamic idea of identity, and the value of relationships, hybridisation and change. It also shows how this dynamic idea of identity has contributed to the development of new ecologies.

The third section outlines the characteristics of identity in the contemporary posthumanist and ecocritical framework. Here, the deconstruction of rigidities and the mediation between opposites is overcome to arrive at the sympoietic and interspecies construction of personal and changing networks of biological data, personal decisions, conscious and unconscious desires, relations and hybridisations (Haraway 2016; Marchesini 2016). The examples chosen to illustrate this type of identity are the protagonists of *Wolf Children* (2015), directed by Hosoda Mamoru, and those of *Zima Blue* (2019), an episode of the first season of *Love, Death + Robots* directed by Robert Valley.

The fourth and final paragraph concludes the article by attributing to the poietic and metamorphic power of animation its effectiveness in representing these types of posthumanist identity and in soliciting an ecological sensitivity. This ecological sensitivity is not only based on conservation and respect for the natural environment, but is fully ecocritical, in that it rejects clear-cut oppositions and human exceptionalism by aiming for a radically new way of conceiving human beings, nature, technology and their relationships (Bennett 2010; Iovino 2008; Morton 2009; 2013).

Rigid Identities and Incompatible Oppositions

One of the most deeply rooted and widespread conceptions of identity in Western thought is, and has been, the "proprietary" one, although the concept of identity is among the most debated in philosophy, with its innumerable definitions. The "proprietary" conception of identity has its origins in the Aristotelian thought and envisages that something can be defined through a list of the properties that connote it on an ontological level. This means that something is defined through the set of all (and possibly the only) characteristics that make that entity as it is and that differentiate it from all other entities. This conception of identity applied to living beings has not only tried to establish their essential properties, but has also aimed at setting a coherent and stable system of relations of similarity and difference that has divided creatures into genera and species and allowed individuals to be defined by their belonging to the same type. This way of viewing the world, and especially living beings, is certainly the one that has proved most useful for taxonomic and classificatory purposes and on which modern science has relied to organise its knowledge, from Aristotle to Linnaeus' nomenclature. Its advantages are obvious, from its logical and formal neatness to its consistent systematic nature and to its convenience in practical applications.

There are features of this way of thinking, however, which, especially when expanded beyond the limits of the epistemology of certain disciplines, have had substantial effects not only in the way human beings have imagined themselves and their relationship with the world, but also on an ethical and social level, even going so far as to establish aesthetic principles. The "proprietary" conception of identity, together with the classificatory view derived from it, have established and fortified the difference as the essential condition of existence. This has led to a clear separation between human and animal, animal and plant, living and non-living, nature and technology, soul and body, spirit and matter, etc. Not only did these divisions become fundamental, but they also became hierarchical: the difference was not established between equal alternatives, but between upper and lower categories. Thus, the first elements of the dichotomies existed not only on the basis of their separation from their opposi-

te, but because of their superiority over it. The culmination of this attitude was the emergence of human exceptionalism, i.e. the belief that human beings were ontologically and ethically superior to all other creatures because they were endowed with something (logical reasoning, language, self-awareness, free will, etc.) that clearly distinguished them from the rest of the creatures.

This ontological position of humanity has also had ethical implications, that is, it has legitimised the deprivation of non-human beings of any dignity, form of will, agency or right as they are morally inferior and, therefore, rightly subject to human arbitrary will. Plants, animals and the entire environment have then become goods at the disposal of human beings, protected, exploited or exterminated according to their needs and decisions, in an ecological relationship based on predation, exploitation and domination.

This inclination towards division and hierarchisation has also taken place in the social sphere, between and within human communities. It is always the "proprietary", rigid and hierarchical logic of identity, in fact, that has enabled many dichotomous divisions and dominations, such as those between genders (with the masculine dominating the feminine) and between populations (with European men above the others).

In the field of aesthetics, too, the dichotomous and hierarchising view has contributed to the creation of a strong model, namely that of "purity". This idea is based on Aristotelian principles that found beauty on the harmony of the parts and on the respect for a categorical ought-to-be. It also bounded with classical and neoclassical ideals that eschew hybridisations of forms, genres and categories. In this case, however, there was no single, stable hierarchy established with humanity at the top; rather, different aesthetics were developed, each celebrating one of the three poles: nature, humanity and technology (each of them declined in countless different ways). Some, in fact, have extolled the beauty of an unspoilt and wild or pacified and idyllic nature; others have placed humanity as the supreme aesthetic model, with its harmony of proportions; and yet others have placed technology at the pinnacle, as the rational and artificial perfection or the display of pure concretised power. Whichever pole is chosen, in most cases the choice has been made and then upheld in the name of the pristine "purity" of the selected model, abhorring any possibility of hybridisation, proximity, intermingling or even coexistence. Indeed, in all classical and neoclassical aesthetics, beauty came to coincide with an ideal of harmony and balance that also implied a search for self-determination and respect for some given canon. If the model is pure and unspoilt nature, for example, then man and technology can only disfigure and degrade it, or at best they can aim at not affecting it and making themselves as irrelevant as possible. If beauty coincides with technology, on the other hand, the flesh of humans and non-humans, their bodies and biology are nothing but limits, a horrible prison that one could aim to eradicate, as in some transhuman aesthetics, for example. In all cases where an aesthetic principle of "purity" dominates, therefore, the one constant is the consideration of hybridisations and mingling as uncanny, disharmonious, obscene or grotesque contaminations.

Even in the sphere of personal identities, the "proprietary" model has led to a rigid conception of identity. If an individual is determined by a set of defining characteristics, they will be by definition the most important components of their inner self and, above all, they will be immutable or difficult to alter. The resulting identity is monolithic and articulated around pivots that are all the more stable, solid and appreciable the more numerically reduced, simple and unproblematic they are. They are placed in a hierarchy determined by the social ladder, and which establishes the individual's destiny. These types of identities are apparently very solid and certainly reassuring for those who are granted supremacy. In fact, they mask the hierarchies they imply by disguising them as a biological and natural fact and are hardly capable of processing change, intercultural and inter-subjective dialogue and relations with the world and the non-human, except in a very rigid manner.

In order to exemplify how these identities are represented in animated cinema, I chose two characters from Miyazaki Hayao's films. Unlike many others in this director's works, they fail to construct for themselves identities able of mediation that steadily accommodate elements of hybridisation. For example, San, the protagonist of *Princess Mononoke* (1997), would be ideally placed to mediate between the humans of Irontown and the spirits of the forest plundered by humans. She was a little girl who was abandoned by her mother and left to the wolves who attacked the caravan with whi-

Fig. 1 | San and Moro (*Princess Mononoke*, 1997, dir. Miyazaki Hayao)

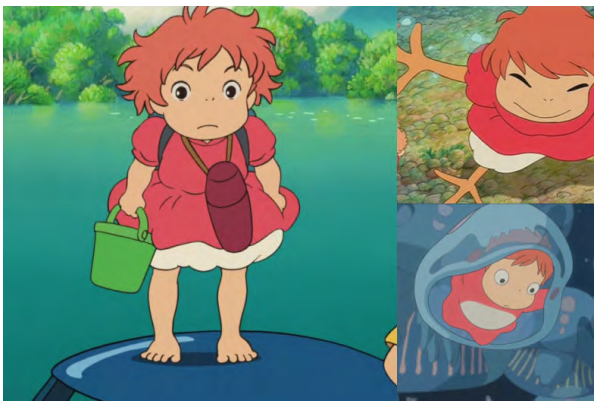

Fig. 2 | Ponyo's forms (*Ponyo*, 2008, dir. Miyazaki Hayao)

ch she was crossing the forest. San was then raised as a she-wolf by Moro, the matriarch of the pack. Being biologically human and culturally integrated into the community of the spirits of the forest, she could, more than anyone else, be able to understand and mediate the instances of the two struggling groups and construct a complex identity for herself [**Fig. 1**]. However, this possibility fails completely, as San conceives of the world in a strictly dichotomous way: the spirits of the forest are ontologically pure and morally superior to her, while the disgust, anger and contempt she feels for human beings is total and unsurmountable. Of course, this is linked to her maternal rejection and her total identification with the spirits and implies a lack of acceptance of complex and deep-rooted parts of herself, which cannot be fully analysed here. The rigidity of the division between human and non-human in which she desires and seeks to fit in, however, is a significant fact in itself.

The protagonist of *Ponyo* (2008) could also be in a very effective position as a mediator: she is in fact the daughter of a sea deity and a human magician, endowed with extraordinary metamorphic abilities that allow her to adapt not only her psychic identity, but also her body to inner changes and to the environment [**Fig. 2**]. Again, however, Ponyo cannot really connect the two worlds. When she decides to leave the sea in order to escape her father's suffocating control and also out of her affection for Sosuke, a human child, she is confronted by her mother with a sharp alternative: either she will return to the sea for ever or she will undertake a test. This test involves her renouncing her powers and relaying on Sosuke's love. If he truly loves her, she will become fully human, losing powers and metamorphic abilities, but if the child is not able to fully accept her, she will vanish, becoming sea foam. Besides the fact that, in the most patriarchal of traditions, the one who has to risk the supreme sacrifice is the woman and the one who determines her destiny (for that matter based solely on his own feelings) is the man, the choice appears entirely dichotomous. Ponyo's extraordinary, vitalistic and aesthetically effective metamorphic ability upsets the established order, it must be limited to childhood and a liminal situation, but it cannot be preserved, it cannot be a bridge between two worlds that must remain separate. Human and non-human are irreconcilable and no truly ecocritical perspective seems possible. Certainly, the film visually denounces the pollution of the sea and provides a very strong critique of human action against nature through the words and actions of Ponyo's father, who arrives at a form of radical misanthropy, and celebrates the beauty and power of nature, but it does not seem to really succeed in proposing a synthesis of the two worlds in a perspective of radical renewal.

Flexible Identities and Instances of Mediation

The scenario described by Tomm Moore in *Wolfwalkers* (2020) appears very similar to that imagined by Miyazaki in *Princess Mononoke*: an expanding city busy deforesting is opposed to a forest inhabited by wolves (there are, of course, countless differences: the cultural context represented, the drawing style, the tone and genre of the work, the characteristics of the characters, the narrative structure, etc). Again,

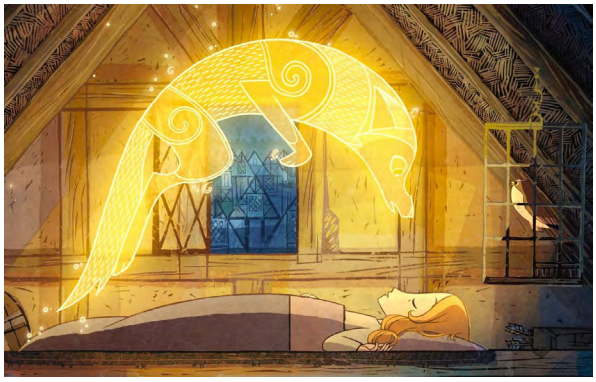

Fig. 3 | Robin's wolf transformation (*Wolfwalkers*, 2020, dir. Tomm Moore)

Fig. 4 | Robots and humans putting together Tima's pieces (*Metropolis*, 2001, dir. Rintaro)

two characters are in a suitable position to mediate: the first is Mebh, a wolfwalker child, daughter of the forest matriarch.[2] In contrast to San, however, she is willing to take on this role; her resentment and distrust towards mankind are mixed with curiosity and a search for friendly contact. In this way, the relationship between her and Robyn, the second mediating figure and the daughter of the hunter hired to exterminate the wolves, becomes the basis for mutual acquaintance of the two worlds and for interspecies relations (Haraway 2016). Not only do two identities come into contact, but they open up to each other and reassess themselves through this contact. They accept the idea that a creature is not restricted to its own species and does not have to be defined in an ultimate way but can reconfigure its identity according to the interspecies relationships and the environment it manages to weave. If Mebh must learn about human beings (for better and for worse), Robyn, inadvertently bitten by Mebh, must also question her own social identity as a citizen, who should hate and fear wolves, and her gender identity as a good, obedient daughter, and her species identity, as a human being. She manages, therefore, to find a personal way to accept and render her hybrid nature meaningful. In this way, not only the hierarchy between human and animal is disrupted, but also social and gender relations are deconstructed. Hybridism and metamorphosis are no longer a dangerous infringement of the inviolable cosmic order (Alaimo 2010; Haraway 2016; Opperman 2016) as they were in *Ponyo*, but become a possible resource for building a new order and a new world. Even on an aesthetic level, there is no abhorrence of contamination. On the contrary, the transformations between human and wolf are depicted as marvellous and enchanting [**Fig. 3**]. The movie, therefore, does not merely suggest an ecological approach based on nature conservation (indeed, in the end the wolves and wolfwalkers have to move to more remote locations and let the city clear the forest), but deconstructs divisions as such. In the movie there is no idea of a pristine nature superior to humankind, nor any call for a reversal of supremacy between humans and nature. The replies to the Anthropocene, thus, are not those dominant in 1970s ecology or deep ecology, but are much closer to the contemporary ecocritical and posthumanist sensibility that aims at sympoiesis, at the interweaving of complex and hybrid relations, at replacing the oppositional ideas of nature and culture with more complex interdependent natural-cultural forms (Iovino 2008; Braidotti, Balzano 2020; Haraway 2016).

A similar perspective is also found in *Metropolis* (2001), directed by Rintaro, yet in relation to the mediation and construction of interspecies and sympoietic relationships between humans and machines. In this film, there is a dichotomous and sharp division between humans and robots or androids, and any proximity or intermingling appears uncanny. Once again, the bridge across which the mediations take place is the hybrid identity of the protagonist. Tima believes she is a girl suffering from amnesia and builds her identity on the assumption of her humanity, while also showing empathy towards machines.[3] It is precisely this feeling that gradually leads the protagonists, and the spectators with them, to rethink certain divisions and principles of human exceptionalism, coming to attribute to machines certain typically human characteristics,

such as feelings and empathy. At the same time, the ethical and moral limits of the human species become clear. When Tima finally discovers that she is a gynoid, she must rethink the dichotomies of the society in which she has lived and question not only human superiority, but the very fact that there are clear differences between human beings and machines. In this film, too, the perspective is far from irenic. Indeed, in *Wolfwalkers* the protagonists and their parents, while failing to integrate the two communities, manage to save both peoples by migrating. By contrast, in *Metropolis* the situation precipitates to the point of an apocalypse that destroys the entire city-state in a massacre of men and machines. This outcome, however, does not derive from the futility of a mediation perspective, but precisely from the durability of dichotomous divisions, which are ontological, but also social and economic (as shown by the Luddite conflicts between the proletariat and the machines and the clear separation of the city elite from the rest of the social body). Indeed, even in the apocalypse, the last prospect of hope is provided precisely by inter-species empathic bonds between the male protagonist and the surviving machines who try to literally put the pieces of Tima back together to build a new, less hierarchical and divided future [**Fig. 4**]. In the ecocritical and posthumanist context, such vision of technology is very relevant: technology is not separated from nature and the human beings and it is placed in a positive and supportive relationship with them. This perspective contributes to breaking down the sharp division between the biological sphere (human, animal and plant), seen as natural, and the technological sphere, pointed out as unnatural, and pushes, instead, towards visions that integrate them. It also strengthens the position of those who do not see the human species as increasingly deviating from the natural state due to its use of technology. In this view it is also believed that technology is the natural evolutionary specificity of human beings (Havelange, Lenay, Stewart 2002) and that it can be a part of ecosystems and in possible positive interaction with them.[4]

Complex Identities Between Posthumanism and Ecocriticism

The previous examples picture worlds dominated by sharp divisions between human being and nature or human beings and technology in which characters with flexible and often hybrid identities on a biological or bio-cultural level attempt to mediate. The divisions are, however, still very significant and the framework in which these characters operate is one of internalised dichotomous rigidity that must be overcome. In a world characterised by social and gnoseological categorisations that are perceived as ontological and pre-existing facts, the philosophical effort must be that of their deconstruction. The point of identity construction, then, is to de-naturalise divisions, to problematise them and trace them back to their cultural and historical origin. For instance, the fact that androids and gynoids do not have feelings, lack free will and empathy in *Metropolis* seems obvious, taken for granted, natural and inherent to them, but instead this fact is problematised, discussed, questioned and thus deconstructed.

In the field of contemporary animated movies with an ecocritical and posthumanist sensibility, however, one can find identity models that show different perspectives in relation to this paradigm. Deconstruction is no longer the most relevant mechanism regulating the change and adaptation of personal and collective identities. This is because we have reached a very advanced level of de-naturalisation and have now understood that almost everything that appears objective to us is actually the result of compromises and interrelationships between the biological and material fact, our perceptions and our cultural constructs. On the contrary, from a need for liberation and the demolition of social and cultural differentiations and rigidities that had led to injustices, neuroses and limiting preconceptions, there has been a shift towards a search for radically new forms of identity construction. The rigidity of "proprietary" models and taxonomic pyramids having been broken down, infinite deconstruction also showed its limits, and the absolute liquidity of identity risked becoming an abyss of anguish and insecurity. This, on the one hand, prompted a paroxysmal and aggressive return to rigidity, but on the other hand also induced a search for new models.

This has established a horizon that is no longer anthropocentric and non-exceptionalist: nature, humanity and technology are no longer separate, male and female are not dichotomies, and the inorganic, biological species and technological apparatuses are part of a network of relationships in which identity is not determined a priori by separation. Instead, identity is labo-

Fig. 5 | Meta-wolf's forms (*Wolf Children*, 2015, dir. Hosoda Mamoru)

riously constructed and continually reshaped by biological data, desires, wills and cultural constructions, through configurations in which affective factors and interspecies relations are of utmost importance (Zanelli 2019). Even the Darwinian evolutionary model has had to incorporate the concepts of sympoiesis and collective evolution (Margulis 1998). Identities, therefore, except for renouncing rigidity and retaining the advantages gained from deconstruction, struggle to find stability in a dynamic equilibrium, in a world of horizontal interspecies relations (Sparti 1996). Everyone must therefore mediate between different instances, accept as part of themselves elements that are natural, artificial and cultural, in a search for meaning where ethics and personal choices, far from losing value, become more relevant than ontology and pre-established hierarchies. In this perspective, "purity" is not only not a lost ideal, but becomes a negation of reality and a reactionary form of the search for lost dominance. At the same time, cultural and techno-biological hybridisation becomes a new common condition.

An example of this understanding of identity is that of the child protagonists in *Wolf Children* (2015), directed by Hosoda Mamoru. In the world in which the story is set, there are creatures who, according to their will and not being able to transmit their condition by bite, can transform themselves into either meta-wolves or actual wolves [**Fig. 5**].[5] One of them falls in love with a human woman with whom he establishes a relationship and begets two children. His death by accident when the children are still very young, however, makes it very difficult for the mother to raise the two sons who have inherited their father's metamorphic abilities. Moreover, they are not always able to consciously manage their form as they lack the physical and emotional control of an adult. The condition of these two children bears many similarities to that of San or the wolfwalkers in the film directed by Tom Moore, but the differences are significant. In fact, the two children do not become hybrids, but are hybrids from birth and do not live straddling two opposing societies or in two factions, but are the only specimens of their species in that context. This is why their quest, personal even before being social, is not about deconstructing barriers or de-naturalising hierarchies, but about constructing meaning. Of course, the two protagonists have to grow up with the awareness of the prejudice against wolves and the hostility and repulsion that their hybrid and metamorphic condition can cause to others and deconstruct them. The focus of the movie, however, is on the *pars construens* of their search for identity. The value of their animal part and how they should relate to their hybrid biology, to other humans and to the rest of the animals is not predetermined, it is an open question that they individually have to define. The ultimate point of arrival obviously depends on their biology, on the different relationships they establish and on their will, but it cannot be definitive, nor can it be infinitely discussed at all times: it must be fairly stable, but always flexible at the same time.

Identities related to the human-machine relationship can similarly leave aside ontology and hinge on research of subjective meaning. In the episode *Zima Blue* (2019) of *Love, Death + Robots*, for instance, the protagonist discovers his biological and ontological identity and then gradually reveals it to the journalist interviewing him and to the audience.[6] The protagonist seems to be a human artist who has gradually replaced his entire body with mechanical parts and electronic devices: a complete cyborg [**Fig. 6**]. The final narrative twist, however, reveals that he started out as a simple robot for automatically cleaning swimming pools and was then implemented and made more and more sen-

Fig. 6 | Zima Transformation into a cyborg (*Zima Blue*, 2019, dir. Robert Valley)

tient by more advanced software and hardware [**Fig. 7**]. Transformations followed one another until he himself appears to have forgotten he was a machine and his metal body had been replaced by a biological one. It is, therefore, a robot that became sentient and then biological and then mechanical again. At first, what strikes the audience is the narrative surprise, which works precisely on the basis of the dichotomous framework that the theme foreshadows. At a later stage, however, it becomes clear that the material that makes up Zima's body and his human or cybernetic origin are completely irrelevant to his artistic production and his search for meaning. His sensitivity, his consciousness and his reflection on the meaning of existence, in fact, have a value that transcends the boundary between machine and human being and are not in the least affected by this worthless dichotomy. Even the final stage of his search for the meaning of existence and a direct and whole relationship with the environment and the entire cosmos (however questionable) is not linked to his biological or species condition. He chooses to return to a not entirely self-conscious simplicity by refusing to be a sentient machine as much as a human being.

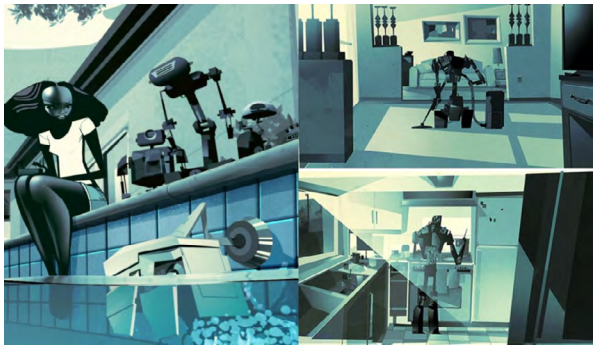

Fig. 7 | Zima evolution as a robot (*Zima Blue*, 2019, dir. Robert Valley)

The relationship between environment, humans and machines in these two examples does not simply seek to limit technological progress and favour the preservation of an idealised nature separate from humankind and technology, as much ecology since the 1970s has done. Rather, it is an ecocritical, posthumanist and anti-anthropocentric perspective that, instead of ontology and categorisations, focuses on overcoming personal and social conflicts through the construction of networks of interspecies relations in a techno-natural-cultural continuum of subjective and context based choices, personal or collective.

The Value of Animation for Post-humanism and Ecocriticism

In addition to the subject matter analysed so far, there is also a link between animation and the representation of hybrid and post-humanist identities in an ecocritical context. This concerns the ontological characteristics and expressive possibilities of the medium itself, as well as the presence of a long and constant tradition. In animated cinema, in fact, these themes have been prominent since the 1970s, 1980s and 1990s, especially in American, European and Japanese cinematography.[7] Considering their presence in feature-length animated films produced all over the world, the relationship between animation and ecocriticism is conspicuous, if not for its complexity and depth, then for its earliness, numerical relevance and continuity.

The metamorphic and poietic power of animated cinema (Wells 1998) are the main reasons that allowed

this medium to be so suitable for dealing with these themes. For decades, the representation of objects and creatures that change shape abruptly, especially when within works with realistic or verisimilar intentions, was rather complex. Admittedly, experts in make-up, editing and technical devices capable of achieving these effects have existed since the origin of cinema, but this was a rather small and very laborious range of possibilities. Of course, the birth and development of CGI simplified everything, but for several years its use at a high level was very expensive. In animated cinema on the contrary, it is very easy, and always has been, to depict sudden changes, gradual appearances and disappearances and metamorphoses from one form to another. To portray hybrid, flexible and often changing identities on a biological as well as cultural level, animation is not the only possible medium, but it is certainly the one with the most established tradition of techniques and communication codes to do so. Depicting Robyn when she turns from a human into a she-wolf in *Wolfwalkers*, for instance, would certainly be possible even with make-up or photorealistic CGI, but animation makes it not only simpler, but also more readable for the audience, who place it in an established tradition of enchanted metamorphoses in animation. The risk of using photorealistic CGI for such a scene, in fact, is to plunge the viewer into the Uncanny Valley (Mori, MacDorman, Kageki 2012) and give the event repulsive and shocking characteristics. The clash between a realistic live action diegesis and unrealistic special effects, on the other hand, could easily come across as comical or suggest an altered, or at least strongly alienating, perception of the event. The drawing and animation style used by Moore for *Wolfwalkers*, on the other hand, due to the characteristics and history of the medium, is well suited to represent a post-humanist horizon where hybridisation and metamorphosis are viewed positively, with wonder and longing.[8]

The poietic powers of animation, i.e. those linked to the possibility of creating a world completely autonomous from the real one, also make animation a particularly effective medium for criticising human exceptionalism and imagining ecological and sympoietic realities. Animation, while not necessarily precluding any referential link with reality (as shown by animated documentaries) or any realistic effect, is certainly one of the languages that can most easily depart from our world. Within a universe that is imagined and drawn independently from the real one, every element, every stroke, every colour, every light, every change is an autonomous stylistic and creative choice (even though it is subject to the limits of the tools and the production context in which it is made). Hence, the strong and productive link between animation and fantasy and the prolificacy in it of genres such as fairy tale, fable, allegory, fantasy and science fiction. If we imagine a world that is very different from our own or completely apart from it, then animation is certainly not an automatic choice, but even in this case it is a channel that rests on a robust tradition and consolidated communicative codes. In our world, that of the Anthropocene, dominated by humans, hybridisations, mutations and metamorphoses are viewed negatively and non-human creatures have no rights or dignity. Therefore, before attempting to realise a sympoietic universe of interspecies bonds, a fantastical representation of it is necessary and animation can contribute conspicuously to its imagination (Meschiari 2019; 2020).

It is precisely the agency of the non-human, whether technological, biological or inorganic, that evokes another strong link between ecocriticism and animated cinema. The theories of the contemporary new materialisms (Barad 2007; Bennett 2010) have much insisted on how even plants and animals, and even inorganic matter and single-celled beings, have the capacity to act on each other and are connected in networks of complex actions and reactions.[9] There is, therefore, a new way of understanding the ecosystem that goes beyond the vision of an inert background made up of non-sentient things that have no agency, no ability to cause effects and no ability to actively influence others (except perhaps in a mechanical and deterministic way). This new perspective, on the other hand, sees reality as a living and changing network of relations and interactions, whether intentional and conscious or not, between entities, human or non-human, on complex levels (Barad 2007; Bennet 2010; Haraway 2016; Morton 2013). Again, to represent this view of the world, animation is not the only possible way, but it has a feature that makes it particularly suitable: that of giving movement and the semblance of life to things that would appear to have none. If cinema is the art of filming a movement by separating it into static images and then reproducing it through them, animation is the art of creating a movement that ne-

ver existed through elements that are in themselves static. Thus, it allows expression through still objects, be they drawings, clay figurines, three-dimensional objects, sand compositions, paintings, nail panels, etc., and is thereby suitable for imagining and representing the agency of the non-human. A considerable degree of anthropomorphisation and projection of the human onto things, plants and animals is involved in these processes, and the metaphorical and allegorical work is decisive, but there is also a clear perception of alienation from Cartesian reality and vitalism of things.[10] This sensation can be so strong as to be uncanny in perceiving how an independent, non-human will is at play and represented; or it can be exciting and a source of a primal wonder resembling the one animism sees in nature. Either way, both of these sensations lead one to consider the environment, plants and objects as not inert, taken for granted and at the mercy of the human will. Thus, animation has consolidated a tradition of backgrounds crawling with life, of animated objects, with human eyes, voices and movements, of conscious plants, of more or less anthropomorphic animals, and of complex and non-obvious links with the environment.[11]

To sum up, the contemporary ecocritical and posthumanist field is characterised by the presence of flexible, layered and hybrid identities, which seek a dynamic equilibrium through creatures that not only mediate between nature, humanity and technology, but are themselves composed as a synthesis of elements that rejects hierarchical divisions as an ethical and aesthetic model. In this context, the treatment of such themes in animated cinema has not only led to outcomes of considerable depth, but in many cases it has prompted the imagination of a paradigm of relationship with the environment and the non-human that is radically different from the one dominating until two decades ago. This outcome is due not only to the thematic exploration carried out by animated cinema, but also supported and facilitated by certain characteristics of the medium, including its metamorphic and poietic potential, and by an established tradition of imagining other possible scenarios.

Notes

[1] A special thanks goes to Silvia Zanelli: her bibliographical advice, the discovery of her work and the fruitful discussion with her have deepened my understanding of the concept of identity in the posthumanist and ecocritical context from a philosophical perspective.

[2] They are anthropomorphic beings with more or less pronounced ferine features and endowed with magical powers, especially thaumaturgic ones. During sleep they can separate the spirit from the body, and the spirit can move in ethereal form or take the physical form of a wolf. Their bite can also transform a human into a wolfwalker.

[3] On the value of empathy in the contemporary ecocritical and posthumanist field, there is an open debate between those who place it as a horizon of hope and possibility for a multispecies and sympoietic coexistence (to the point of constructing real ethics of suffering and empathy) and those who consider this position illusory and irenic, and even a new ideology aimed at concealing power conflicts in the Anthropocene. In this regard see Morton (2019); Haraway (2016); Butler (2006); Braidotti, Balzano (2020).

[4] I would like to thank Marco Pavanini for the ideas and insights I have drawn from his lecture entitled Postumanismo e tecnicità costitutiva umana, which he gave at the Collegio Ghislieri in Pavia as part of the cycle *Il postumanesimo contemporaneo tra filosofia, letteratura e cinema*. The full recording is available on the College's YouTube channel at the following link: https://www.youtube.com/watch?v=-5A9pB76F-SU&ab_channel=CollegioGhislieri (accessed June 21, 2022).

[5] Meta-wolves are hybrid creatures between human and wolf, with fur, muzzle and paws, but bipeds, structurally anthropomorphic and able to communicate using human language.

[6] This episode displays a sensibility, as well as an aesthetic, that is very different from most of the other episodes in the series, which, instead, often employ photorealism and hyperrealism to depict mutations, hybridisation and metamorphosis in an uncanny and negative manner.

[7] Many Japanese and Western science fiction and fantasy films were pioneers in this respect, leading to films such as *Fantastic Planet* (1973), directed by René Laloux; *Wizards* (1977), directed by Ralph Bakshi; *The Secret of Nimh* (1982), directed by Don Bluth; Gwen, or the *Book of Sand* (1985), directed by Jean-François Laguionie.

[8] Due to its expressive, photorealistic and hyper-realistic power, animation is also well suited to depicting hybridisations, mutations and metamorphoses in a deliberately uncanny manner, even to the point of achieving horror shades of great aesthetic and emotional impact. See the results achieved in much animated science fiction, as, for example, did most of the episodes of *Love, Death + Robots*.

[9] The question of agency is different from those of will, self-awareness and intentionality, which are linked to them in complex ways that vary from author to author.

[10] The debate on the value and functioning of the anthropomorphisation of nature is wide ranging and the positions in this regard are varied. On the one hand, it has served to reduce the otherness of nature contributing to an idealised and distorted view of animals that has hindered scientific knowledge and the recognition of their specific forms of agency. On the other hand, however, the possibilities of anthropomorphising nature offered by animation have stimulated in the audience empathic reactions with nature and animals and have even permitted identification with them (see Cubitt 2005; Baker 2001).

[11] Films like *Toy Story* (1995), produced by Pixar Animation Studios, or *City of Lost Things* (2020), directed by Yee Chih-yen, are particularly significant as examples of the perception of the agency of things as living-things.

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Environmental Misinformation and Audiovisual Serial Narratives. An Automatic Analysis of the Twitter Social Discursiveness on *Seaspiracy*

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Keywords

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Sustainable fishing
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Abstract

The ongoing pervasive presence of green media content may increase audience environmental consciousness. Indeed, several authors have highlighted the central role played by visual digital media in bringing environmental issues to public and political attention. Within this context the proliferation of streaming services and audience's everyday use of green media content may facilitate public connections, enhance environmental sensibility, and facilitate behavioural change. This paper explores the insights film and media scholars may get from audience's ongoing debates related to environmental issues when boosted by audiovisual narratives. We investigate the production and circulation of knowledge and environmental misinformation associated with *Seaspiracy* (2021), a Netflix documentary about the impact of commercial fishing. This product was criticized for misrepresentation: NGOs, sustainability labels and experts quoted in the documentary have charged the filmmakers with making 'misleading claims' and using out-of-context interviews and erroneous statistics. The main aim of this study is to explore the role of digital communication – interpersonal and through the media – in the public definition, elaboration and contestation of environmental issues. We focus on tweets related to the documentary *Seaspiracy* to understand how misinformation may spread through audiovisual narratives. We use automatic text analysis tools including sentiment analysis and topic detection to understand how audience responses enable or inhibit the discourse in a shared cultural debate on environmental issues.

Within the contemporary media landscape, environmental communication is rebranding itself through different digital visual media formats such as television programmes and movies, TV series, video games, virtual reality and image-oriented social media. The dissemination of green media content might have a central role in spreading environmental awareness worldwide, enhancing public and political attention (Cox 2006; Hansen 2011; Moore, O'Sullivan 2017; Dibley, Hawkins 2019; Lakew 2020). Since they might facilitate public connection, a concept defined as "an orientation towards a public world where matters of common concern are addressed" (cfr. Nærland 2019), several authors have investigated their possible public impact. For example, Silk et al. (2021) provide an overview of the processes through which different forms of digital visual media may influence human-nature interaction, from the initial production of content, through consumption and engagement. However, understanding what shapes public perceptions of nature and therefore hopefully enhances environment sensibility is difficult (Berenguer 2007; Wright et al. 2015). Conservationist researchers highlight how, in order to achieve effective behaviour change, it is important to understand the cognitive, social and motivational processes that influence human behaviours (Reddy et al. 2017). In addition, providing audiences with green media content that effectively explains how nature and human society interact is an ongoing challenge that can result in trade-offs and unintended consequences (Redpath et al. 2015). Indeed, in environmental communication it is often necessary to maintain a balance between the complexity of nature and socio-ecological system interactions and the need to keep a message simple and engaging (Bickford et al. 2012).

In this context, audiovisual narratives such as nature documentaries represent a traditional tool that has been proposed to increase public awareness. Whiteman (2004) demonstrated how documentary audiovisual content may have a political impact that goes "beyond the typical focus on the opinions of individual citizens" and addresses "substantial impact in two additional arenas: activist groups and decision makers" (ivi: 65). Several different approaches have been applied to studying how nature documentaries shape public perceptions and contribute positively to environment conservation through behaviour changes/intention to change (Barbas et al. 2009; Beattie et al. 2011; Howell 2011; Lin 2013; Jones et al. 2019; Hofman, Hughes 2018). Reviewing empirical and critical methods to study climate change media, Lindenfeld and McGreavy (2014) identified implications regarding how media representations may help to produce sustainable societies with engaged individuals. For example, audiovisual narratives may help audiences construct meaning; moreover, representations may create a discursive space in which audiences seek information, have preoccupations and interest, and potentially act in ways that collectively result in sustainable development (ivi: 2014). However, there is little evidence proving the efficacy of nature documentaries in adopting pro-environmental behaviours among audiences (Dunn et al. 2020; Fernández-Bellon and Kane 2019) since the links between information provided and changes in behaviour are complex and uncertain (Kollmuss, Agyeman 2002; Braun et al. 2018).

Even if the real-world impacts of green media content are challenging to quantify, to improve future media content there is a call for robust evaluation in terms of both documentary-making and conservation (Whiteman 2004; Veríssimo et al. 2017). An increasing number of filmmakers believe that their "films must provide inspiration for people to act on climate change and biodiversity loss, rather than discouraging them from trying" (Aitchison et al. 2021: 1141). Nature documentaries are not the only available tools that may enhance the spread of environmental sensibility. Different digital visual media formats may activate public engagement that are effective in changing behaviours. For example, Dunn et al. (2021) highlight how digital games can be successful in promoting positive ideas about nature and conservation (Mazur Stommen, Farley 2016) while Zhang and Pinto (2021) demonstrate how exposure to climate change memes may increase individual intentions around online civic engagement regarding climate change. However, nature documentaries are still the predominant media for the circulation of green media content, and they are growing as a popular television genre (Koblin 2020). In this context, Yeo and Silberg (2021: 780) underline how

> since 2010, the rise of streaming services and platforms have changed the documentary landscape, altering how documentaries are produced, shared, and discussed. Popular, on-demand streaming platforms provide environmental

documentaries with a broader reach than their predecessors had on broadcast television. The resulting influence and "real-world" consequences can, therefore, also occur at a broader scale, for better or worse.

This study focuses on how environmental audiovisual narratives on an on-demand streaming platform may *participate* in the construction of public discourse. In particular we are interested in unveiling how (and if) environmental principles and scientific knowledge are shaped into visual stories. We focus on the presence of misleading green content that might depict facts and situations incorrectly and therefore create false images of the natural world that might influence audience's environmental perception. As a case study, we use a Netflix documentary entitled *Seaspiracy* (Netflix, 2021) to investigate how audiences have received the environmental themes it addresses through an analysis of Twitter social discursiveness. Since this product has received criticism from fisheries scientists for potentially distorting evidence (McVeigh 2021) and promoting an anti-fishing Western perspective (Belhabib 2021), we want to investigate and reflect on how audiovisual narratives can spread ecological (dis)information through their networks and how they might generate wider negative impacts.

The paper is divided into sections. First, we introduce *Seaspiracy* as a case study; then, since we focus on Twitter social discursiveness, we underline the role of social media in environmental communication; and finally, we implement automatic text analysis methods on tweets associated with the documentary (i.e., sentiment analysis and topic detection). The statistical analyses were performed using R Statistical Software (version 4.2.1).

Netflix and Seaspiracy: A Case Study

Several authors (e.g. Koblin 2020; Yeo, Silberg 2021) have recently underlined how online streaming services such as Netflix, Disney+ and Apple TV+ are investing heavily in wildlife programming. They consider nature programming to be a "smart bet because it is appropriate for all ages and works well internationally" (Koblin 2020). The increases in green content among streaming services may be explained by traditional broadcasters being deterred from the political stance of certain documentaries, such as *Blackfish* (Netflix, 2013), *Tiger King* (Netflix, 2020-2021) and *Seaspiracy*.

Seaspiracy was released on 24 March 2021. Yeo and Silberg (2021) highlight how *Seaspiracy* can be defined as "documentary" according to the characterization given by Smith and Rock (2014): "a series of visually and/or audibly expressed statements connected by a narrative, and communicated from the author/authors to the viewer with the intention it be received as fact". It was produced by Kip Anderson – the producer behind *Cowspiracy: The Sustainability Secret* (2014) and *What the Health* (2017) – and starred Ali Tabrizi, a 27-year-old British filmmaker. The documentary aims to discuss the impact of commercial fishing; its core message is that the solution to save our oceans is for everyone to stop eating fish. As mentioned, many scientists and organizations have criticized *Seaspiracy* for being biased and for using statistics, quotes, and scientific results out of context. Some examples include: the mis-interpretation of an outdated research paper arguing that the oceans will be empty by 2048; confusion around the meaning of fish bycatch and discards; misinformation around the claim that 46% of plastic pollution in the oceans comes from lost fishing gear; and, the claim that sustainable fishing does not exist. Daniel Pauly, a marine biologist, underlines several problems that *Seaspiracy* has with facts and how overall it "does more harm than good […] it twists the narrative about ocean destruction to support the idea that we – the Netflix subscribers of the world – can save ocean biodiversity by turning vegan" (Pauly 2021). Belhabib (2021: 709) emphasises how

> the conclusion that the world should turn vegan to protect the oceans is embedded in white privilege and colonialism. It reflects the lack of inclusion of minority groups in ocean research and fisheries, and their under-representation among experts in these fields. The simplistic concept ignores that more than 90% of the global fishing effort is small-scale and coastal in nature but its catch accounts for only a quarter of all fisheries catches globally, and that 3.2 billion people rely on fish as a source of protein.

Christina Hicks, an environmental social scientist, is one of the experts quoted in the movie who did not approve of its message, tweeting:

> Unnerving to discover your cameo in a film slamming an industry you love & have committed your career to. I've a lot to

say about #seaspiracy- but won't. Yes there are issues but also progress & fish remain critical to food & nutrition security in many vulnerable geographies.

Aufderheide et al. (2009) highlighted how documentary filmmakers have "often justified the manipulation of individual facts […] if it meant telling a story more effectively and helped viewers grasp the main, and overall truthful, themes of a story". Whether deliberately or not, through their narrative choices, *Seaspiracy*'s filmmakers contribute to the spread of misinformation and create (false) images of the natural world that might influence audiences' environmental perceptions. Celebrities also contribute to this trend. Bryan Adams urged his 655,600 Twitter followers to watch the show, tweeting, "Watch Seaspiracy on Netflix. #Donteatfish #Stopkillingfish #Seaspiracy", while four-time Tour de France winner Chris Froome said his mind had "been blown" by the documentary. The consequences of the documentary and its promotion can be seen in how, a month after *Seaspiracy* aired, Sea Shepherd, a non-profit marine conservation activist organization had received around 1,500 crew applications (Aitchison et al. 2021: 1142).

The Role of Social Media in Environmental Communication

Social media (e.g., Facebook, Twitter, Instagram, YouTube) provide the opportunity to generate and collect a huge amount of structured and unstructured data that can be used to extract useful information in many areas. Considering environmental conservation efforts, social media can be a powerful source of data to gain insight into consumption and engagement in relation to visual green media content (Di Minin et al. 2015; Correia et al. 2021; Freund et al. 2021). Even if social media may simply result in further content sharing, it may also have a detectable impact on nature. Kaplan and Haenlein (2010) underline how real-time content and shared information on social media could offer an opportunity to explore innovative strategies to support conservation-focused research, even if, as mentioned earlier, it is hard to understand and measure directly how they enhance real positive conservation outcomes. At the same time, however, social media can have also undesirable effects. For example, Lenda et al. (2020) highlighted how social media can change peoples' behaviours but they may also contribute to sharing misinformation and facilitate the spread of invasive species (Lenda et al. 2021). In this context, Bergman et al. (2022) investigated how social media can impact threatened species conservation and invasive species management. They found that social media can lead to beneficial outcomes (by increasing pro-conservation human behaviour changes and conservation funding and policy) but also have several risks (they may contribute to wildlife exploitation, increase visitor pressure to protected areas, and the spread of misinformation).

Since in this article we are particularly interested in the spread and perpetuation of misinformation in environmental communication due to engagement mechanisms triggered in the viewers of audiovisual narratives, we briefly explore the question of misinformation to give an overview of one of the major risks to society (Lewandowsky et al. 2017).

There are several definitions of misinformation, although "a common theme is that misinformation pertains to information that is false, inaccurate or misleading; note that to be misleading, the information itself need not be false, but may be presented out of context" (Treen et al. 2020: 3). Misinformation online might be unintentional if the person sharing is not aware that the information shared is inaccurate, and it can "spread farther, faster, deeper, and more broadly than the truth" (Vosoughi et al. 2018: 5). Misinformation can pose a serious issue for conservation efforts since people tend to interact more with users that share similar interests (Yeo et al. 2015; de Lange et al. 2019) and content that supports their pre-existing beliefs (i.e., confirmation bias in Bergman et al. 2022: 367), potentially producing echo chambers (Cinelli et al. 2021; Miller et al. 2021). Within this landscape, "finding content that extends engagement with conservation or pro-environmental messages to more diverse audiences is critical to enhancing impact" (Silk et al. 2021: 1133).

Reception: Textual Analysis

This section deals with the analysis of the secondary text (audiences' tweets) produced by *Seaspiracy*'s Twitter community. Twitter is widely recognized as an important platform for public communication (Bruns et al. 2017) and Antonakaki et al. (2021) provide a com-

prehensive review of the major research themes and strategies for data analysis on the platform. Indeed, "by downloading huge number of tweets and using appropriate natural language and sentiment analysis techniques, it is possible to get an idea of the general mood about a specific topic of interest, in a given place and time" (Molteni, De Leon 2016: 221). Antelmi et al. (2018) propose a framework to investigate Twitter communities that is essentially composed of two parts: a *semantic part* that allows for an investigation of the content produced by a given community, developed on three levels (topic modelling, sentiment analysis and cognitive analysis), and a *quantitative part* that provides insights into the behaviour and interaction patterns of users, which is based on the identification of three metrics (activity, visibility and metadata). In this work we focus on how audiences received the themes presented in *Seaspiracy* through the analysis of a corpus of related tweets following two aspects associated with the *semantic sphere*: sentiment analysis and topic detection.

Recently, Twitter has made it easy to gather large-scale datasets on user activities for academic research through its Developer platform.[1] First, we obtained API access from Twitter and collected text data containing the official documentary hashtag (#Seaspiracy) from 1st Feb 2021 to 7th Aug 2022 to obtain a representative collection of the social engagement on Twitter. We collected 35,806 organic tweets (excluding retweets and replies) from 20,314 different users and we selected only the 27,622 English language tweets as the corpus of investigation. **Figure 1** shows user activity and the engagement pattern. The highest point of engagement can be traced back after the release of the documentary where we observe a period of strong user interest. After that the curve slows and we note a solitary peak at the beginning of 2022.

Our first goal was to analyse the tweets' text from a semantic perspective through sentiment analysis. Since Bollen et al. (2011) found that events in the social, political, cultural, and economic spheres have a significant, immediate, and highly specific effect on various dimensions of public mood, suggesting that large-scale mood analysis can provide a robust platform for modelling collective emotional tendencies, we decided to explore this method in relation to the Twitter reception of *Seaspiracy*. This technique refers to a family of tools at the crossroads of statistics, natu-

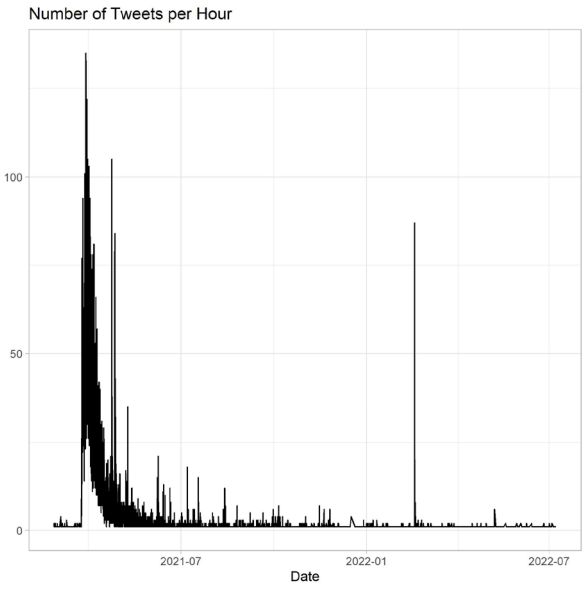

Fig. 1 | Temporal distribution of the organic tweets of the corpus

Fig. 2 | Word cloud showing the results of sentiment analysis at word level using *bing* lexicon

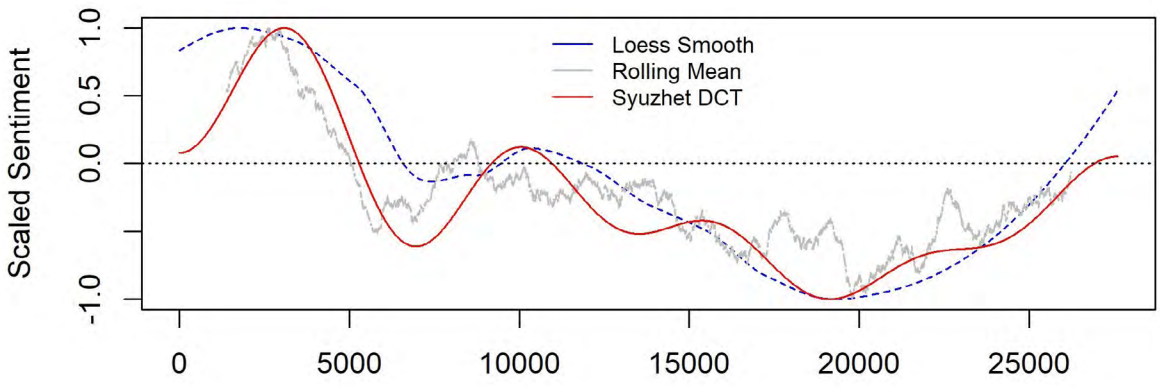

Fig. 3 | Plot of the sentiment trajectory of the *Seaspiracy* tweets

ral language processing, and computational linguistics that are useful for detecting the semantic orientation of individual opinions and comments expressed in written texts (see Giachanou, Crestani (2016) and Zimbra et al. (2018) for a review of techniques and algorithms that have been proposed for sentiment analysis on Twitter). Its main goal is to classify texts written in natural language, considering their semantic polarity and distinguishing positive and negative forms through lexicon-based and machine learning-based approaches. In this paper, for the sentiment extraction we chose to perform the analysis both at word level using the methods *bing* (a lexicon-based approach which assesses the polarity of each word) and at full tweet level using the *sentimentr* library that examines full tweets and assesses a mean sentiment score instead of word-by-word classification. Before the implementation of sentiment extraction, we performed classic pre-processing steps (tokenization, expansion of abbreviations, removal of stop words and other elements without lexical value, like URLs and mentions; see Pano, Kashef 2020).

Considering the results of the analysis at the word level we found that the majority of words are considered negative (1,559 negative words versus 734 positive words). In **Figure 2**, we show a word cloud to demonstrate how words in our corpus are categorized. We can see words such as 'like', 'sustainable', 'good', 'protect', and 'right' are positive, while words like 'killing', 'problem', or 'shocking' are negative. Without further examination, the classification of these words could be misconstrued as it may depend on the context of the full tweet or sentence to understand its meaning.

If we consider the results of the analysis at the full tweet level, we can examine a mean sentiment score instead of word-by-word classification. Seeing the progression of *Seaspiracy*'s social discourse on Twitter over time (from 1st Feb 2021 to 7th Aug 2022) and applying sentiment analysis to each individual tweet,[2] we can visualize[3] the variation of the public sentiments.

Figure 3 shows the emotional arc related to the progression of tweets in time using three different superimposed smoothing techniques to extract a meaningful underlying signal from noisy data: LOESS (local regression), Rolling Mean and DCT (Discrete Cosine Transform).[4] It can be seen that after a neutral situation there is an increase and then a decrease in the sentiment scores. For example, the most negative tweet sentiment (score = -1.809) is related to the following tweet "Slavery, cold blooded murders, diseases, corruption, deception, ignorance, and greed #Seaspiracy", while the most positive one (score = 1.385) is associated with "Seaspiracy (yes the name is ridiculous) is definitely somewhat sensationalist (every film has to be to grab attention), but it does have some really good info and is well worth a watch and considering food choices".

Figure 4 shows how 45% of tweets are negative (12,429), 16% neutral (4,481) and 39% positive (10,722). These results lead us to reflect on some limits of sentiment analysis. For example, it is clear that both twe-

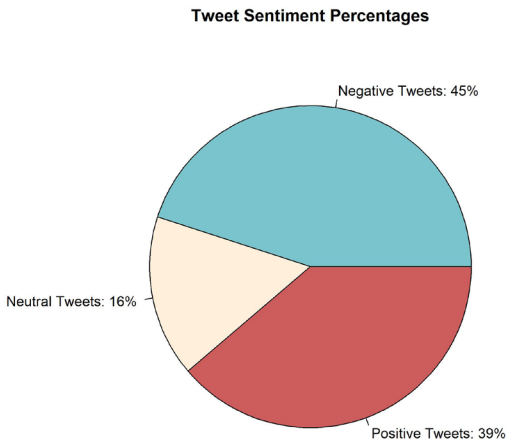

Fig. 4 | Percentages of tweets with positive, neutral and negative sentiments

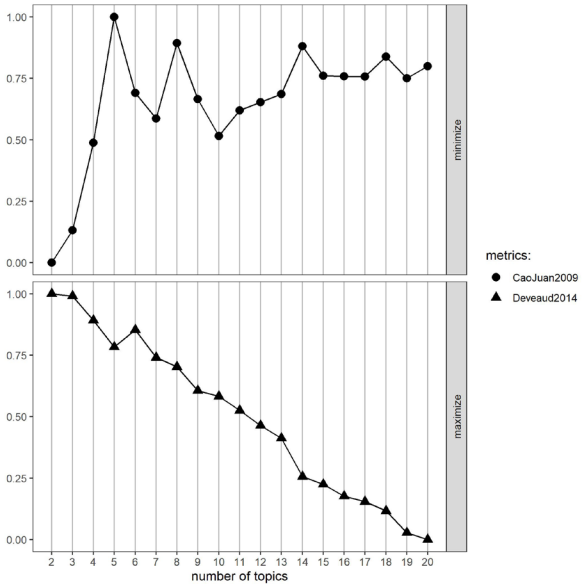

Fig. 5 | Visualization of the optimal number of topics following two metrics (CaoJuan 2009 and Deveaud 2014)

ets refer to a positive evaluation of the documentary, even though their sentiment results are the opposite in score values. The tweet with a negative sentiment owes its negative connotation to the terminology chosen by the user who probably wanted to emphasise their strong indignation after watching the documentary, but this implies an appreciation of the work. The tweet with the most positive sentiment in the corpus also presents a clear appreciation of *Seaspiracy* and it is interesting to note that the user perceives the presence of "really good information" in it. Hence, we can consider the results of the sentiment analysis reliable on 39% of the tweets with positive sentiment; the situation is more complex for the 45% of tweets expressing negative sentiment. At this point we need to round off the textual content, and so we move on to another type of tool to analyse the tweets' text from a semantic point of view: topic detection.

Topic detection is a common procedure in machine learning and natural language processing, and it aims to automatically discover the main topics within a given selection of documents (Mottaghinia et al. 2021). A commonly used method for fitting topic modelling within text data derived from social networks is Latent Dirichlet Allocation (LDA). LDA is a probabilistic model (Ibrahim et al. 2018) that treats each document (e.g., each tweet on Twitter, each post on Facebook) as a mixture of topics, and each topic as a mixture of words and, through a mathematical method for estimating both of these features, aims to find the mixture of words associated with each topic, while also determining the mixture of topics that describes each document. In order to implement topic modelling, we need to consider several steps: having established a Twitter API connection through R and extracted our corpus of tweets for *Seaspiracy*, to set up a proper text for analysis we carried out some data preparation (e.g., removing html links and punctuation, converting to lower case, removing stop words) and created a *document-term matrix* (DTM), which is a common format for representing a bag-of-words-type corpus, that is used by many R text analysis packages. In our data we find that DTM's sparsity is very close to 100, meaning that many words appeared only in a few tweets. An important passage relates to the number of topics, *K*, that we need to define in advance to implement LDA. As highlighted by Schweinberger (2022), "how an optimal *K* should be selected depends on various factors. If *K* is too small, the collection is divided into a few very general semantic contexts. If *K* is too lar-

Fig. 6 | Topics when LDA and K=3. Topics visualised as word clouds with the most frequent words for each topic.

ge, the collection is divided into too many topics of which some may overlap and others are hardly interpretable". The determination of the optimal number of topics can be done following Murzintcev (n.d.) and we used two of the metrics proposed (CaoJuan2009 and Deveaud2014). Since the best number of topics shows low values for *CaoJuan2009* and high values for *Deveaud2014*, according to **Figure 5** we decided to test a thematic resolution of *K*=2 and *K*=3.

After the application of LDA with both coefficients (*K*=2 and *K*=3) we observed that a common topic refers to the media platform where the documentary can be found – Netflix – that contains terms that can have a dual function (Topic 1 in **Fig. 6a**). On the one hand, this topic would act as word of mouth, providing the main information about *Seaspiracy*'s genre ("documentary"), how to engage with it ("watch") and where to find it ("Netflix"); on the other hand, they would create an urgency in the user (e.g., 'need', 'now', "please"). With *K*=2 the other topic is a general one connected to protection of the ocean and the need to stop eating fish and turn vegan. This topic can be better explained if split into two topics, which is what happens with *K*=3. When *K*=3, Topic 2 (**Fig. 6b**) refers to the topic of fishing and specifically to the question of possible action (i.e., 'can') suggested by the documentary: to achieve a more sustainable behaviour people can change their diet and turn vegan (e.g., "sustainable", "change", "time", "vegan", "people"). Topic 3 (**Fig. 6c**) refers to the question of protecting the ocean, saving the planet and the need to stop eating fish (e.g., "stop", "fish", "industry", "plastic", "kill"). With LDA and *K*=3, Topic 1 is the prevailing one with 10,725 tweets, Topic 2 has 6,665 tweets, while Topic 3 includes 6,302 tweets. Through the application of LDA we find the mixture of words that is associated with each topic, but also the mixture of topics that describes each document.

Conclusion

As suggested by Jones et al. (2019: 423), "the time is therefore right to tackle the questions around the extent to which representations of nature on screens affects people in ways which might, ultimately, contribute to conserving that nature". Visual media can play a central role in shaping public attitudes, behaviours and norms in environmental communication. We underline how there is a call both for the investigation of

the robust impact evaluation of green media content (Boissat et al. 2019) and "an urgent need to understand how best to include" more environmental information in audiovisual products (Aitchison et al. 2021: 1139). In particular, Lindenfeld and McGreavy (2014: 124) highlight how audiovisual narrative "as a form of communication, is important to study because how we communicate about environmental issues shapes our perception of them and our ability and desire to take action". To analyse and discuss the interplay between society, attitudes towards environmental issues and media technologies, we conducted an exploratory investigation on Twitter social discursivity connected to *Seaspiracy* through the application of automatic tools (using sentiment analysis and topic detection). We have seen how the dictionary algorithms of sentiment analysis do not allow for effective use of this tool at present due to the ambiguities identified, but the use of deep learning is encouraged in the future.

As suggested by several authors, *Seaspiracy*, as with other documentaries, has the potential to spread misinformation and promote an overly simplistic message. Pauly underlines (2021) how "[t]he most glaring factual error is the film's claim that sustainable fishing does not exist". Our analysis shows how *Seaspiracy*'s social discursiveness on Twitter has promoted the creation of online echo chambers that help spread misinformation in a twofold way. First, since one of the main topics that emerged from the text analysis is the call to watch the documentary it may perpetuate the hype. Indeed, the ongoing presence of the documentary on Netflix and Twitter discursiveness (**Fig. 1**) shows how, after many months in which articles have pointed out the inaccuracies in the documentary, this audiovisual narrative still has the power to impact people's intentions to share information online. As underlined by Yeo and Silberg (2021: 781), "whether intended by the filmmakers or not, the spread of misinformation and formation of misconceptions from documentaries is not restricted to those who watch the film". Second, the topic detection shows how Twitter audiences have been exposed to a background of misinformation about all fishing since they support the end of fishing and the call to turn vegan. As Yeo and Silberg (2021: 782) observe, "such a reductionist solution ignores the diversity of epistemologies that exist and sidelines issues of food security, culture, and systemic inequalities that are intertwined within ocean conservation". Millions of people rely on sustainable small-scale commercial, artisanal, and subsistence fisheries. Not giving a voice to these realities in a documentary that aims to denounce the impact of industrial commercial fishing is unethical.

Several authors highlight how it is necessary that those involved in the production of green audiovisual narratives work with conservationist scientist not only to promote the spread of correct ecological content but also to produce measurable, positive conservation impacts (Reinermann et al. 2014; Jones et al. 2019; Dunn et al. 2020; Silk et al. 2021; Yeo and Silberg 2021). It is fundamental that factually correct information is presented to audiences. For example, Somerville et al. (2021) underline how portraying wild animals as soap opera-style characters is neither honest nor helpful.

An important issue that we would like to underline with this paper is the need for ethical standards in green audiovisual narratives. As Yeo and Silberg (2021) suggest, "there is no regulatory body or ethical code that governs the reliability and validity of information presented in documentary films […] But to have ethical standards for documentary filmmakers, we must first define what we mean by 'documentary'". The analysis that we have presented provides a starting point for studying communication and propagation of discourses related to green audiovisual narratives (i.e., monitoring social engagement mechanisms and environmental sensibility), and more broadly of all forms of green media content, that are useful to shed light on and enhance ethics of communication. These approaches might be useful for future large-scale comparative investigations of environmental communication (which can also be done by considering different genres; Bilandzic and Kalch 2021) and need to be combined with experimental study to promote and measure the real impact that may effectively trigger audience interest into urgent conservation action.

Notes

[1] See https://developer.twitter.com/en/products/twitter-api/academic-research.

[2] We focus on sentiment analysis on a document level where each tweet is considered as a single document, and we intend to determine its sentiment score (polarity) by identifying its semantic orientation.

[3] See Kucher et al. 2018 for a discussion about insights and opportunities in sentiment visualization.

[4] See Elkins, Chun 2019 for a detailed discussion about the three different superimposed smoothing techniques.

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Jérémy Damian è antropologo. Le sue ricerche lo conducono a mappare, negli insterstizi del naturalismo moderno, pratiche collettive di acculturazione di ciò che definisce "delle sensorialità aberranti". Con l'associazione "Pli sur Pli", tenta di costruire degli ambienti propizi all'incontro tra conoscenza accademica, discipline somatiche e scritture contemporanee. Dirige la rivista *Corps-Objet-Image* e ha appena terminato un post-dottorato al Laboratoire PACTE (Université Grenoble Alpes).

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Emiliano Guaraldo è cultore della materia all'Università Ca' Foscari di Venezia. La sua ricerca si concentra sulla cultura visiva dell'Antropocene con un particolare interesse per il rapporto tra l'arte contemporanea e la produzione di immagini tecniche e scientifiche. Ha conseguito un dottorato di ricerca in Italianistica presso la University of North Carolina, Chapel Hill. È stato borsista post-dottorato in Environmental Humanities presso il Center for the Humanities and Social Change di Ca' Foscari e ha lavorato presso l'Università di Università di San Gallo come assistente di ricerca e docente. È coeditore del volume Italian *Science Fiction and the Environmental Humanities* (in pubblicazione). È membro del gruppo interdisciplinare di ricerca artistica Unruly Topologies, con sede in Svizzera.

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Matteo Quinto è dottorando in Studi Umanistici Transculturali presso l'Università degli studi di Bergamo. Ha conseguito la laurea magistrale in Filologia Moderna presso l'Università degli studi di Pavia. Si è occupato di cinema di animazione, memoria, nostalgia, post-umanesimo, intermedialità e di non-fiction nel cinema e nella letteratura.

Jérémy Damian is an anthropologist. His research leads him to map, in the insterstices of modern naturalism, collective practices of acculturation of what he calls "aberrant sensorialities". With the association "Pli sur Pli", he attempts to build environments facilitating the encounter between academic knowledge, somatic disciplines and contemporary writing. He edits the journal *Corps-Objet-Image* and has just completed a post-doctorate at the Laboratoire PACTE (Université Grenoble Alpes).

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Chiara Rubessi è PhD in Arts du spectacle-études cinématographiques (Université Grenoble Alpes) e membro del laboratorio CINESTHEA dell'UGA e del centro CEREFREA (Centre Régional Francophone de Recherches Avancées en Sciences Sociales) dell'Università di Bucarest. È docente in Storia e cultura del design a l'ISIA Design di Firenze. Le sue ricerche interrogano le modalità di trasformazione e organizzazione degli spazi (dal fisico al digitale) nell'ambito urbano ed espositivo per comprenderne la costruzione narrativa, l'interazione con l'individuo e la strategia di concezione dei dispositivi.

Jan Christian Schulz è un *social designer*, educatore e ricercatore indipendente che vive e lavora tra Germania e Olanda. Le sue attività si interessano a all'investigazione di iper-processi ambientali e alla costituzione di ecosistemi relazionali attraverso mediazioni tecniche. Situato all'intersezione tra design e ricerca scientifica, il suo lavoro teorico è accompagnato da un approccio empirico all'intervento sociale via manipolazioni materiali che interroga le realtà dominanti e dispiega le loro trasformazioni.

Jacopo Rasmi teaches Italian studies and visual arts at Jean Monnet University Saint-Étienne. He drew from his doctoral thesis the book "Le Hors-champ est dedans. Michelangelo Framamartino, cinéma, écologie" (2021) and wrote in the company of Yves Citton the essay *Generations Collapsonautes. Naviguer par temps d'effondrements* (2020), of which he signed alone an Italian version (*Collassologia. Istruzioni per l'uso*). He is a curator in the field of documentary and experimental cinema and an editor of *Multitudes* and *La revue Documentaires*.

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