Narrative Simulation: Poietic Strategies and the Modelling of Fictions

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Abstract

In an age of computer modelling, a traditional semantics behind the term 'simulation' and its platonic associations with imitation or pretense has ceded ground to more versatile, if not opposite, applications of the term. This epistemic shift is evident in the way simulation has undergone conceptual and practical reconsiderations beyond ontology. This dissertation arose from this initial enquiry, and the belief that simulation's mimetic strategies can be considered to authenticate, rather than replicate, behaviours of properties under study, with modelling being an essential representational but also poietic process suited to narrative world-building. Correlations can be drawn between simulation modelling and narratology. Models construct frames of reference for target systems through make-believe mechanisms which also validate their truth as fictions – a mechanism readily seen in narratology. Fictional worlds are more than mimetic narrative constructs; they are foremost, approaches to narrative phenomenology and simulation. The reader should feel or experience the textual world as possible, and if specific behaviour or affect is to be elicited, the narrative model requires strategies which sufficiently simulate if not the texture, then at least a mentally intelligible perception of that world. Simulation narratives thus place additional 'writerly' demands on the reader as producer rather than passive consumer of a text. Reading becomes a reconfigurative process (a form of mental re-writing) since the simulation of narrative requires the same imputation of laws and accreditation of behaviours between the source reality and target model present in scientific simulation. In turn, formal demands placed by narrative simulation translates into the need for functional, if highly synthetic, hypermimetic processes, where a secondary reality is augmented. This is especially suitable in cases where object phenomenology is to be prolonged for the sake of reader immundation or manipulation of the text.

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Acknowledgements

Enrolling as a part-time doctoral student at Durham University in October 2011, I would be little prepared for the stimulating and emotional journey that lay ahead. The birth of our son Benjamin that same year coincided with this project's inception; that of Raquel, three years later, with its wonderful complication. Holding me together as I scrambled from one academic assignment to another was Josianne, always unwavering in her determination to see my project through, if but secretly yearning for a return to normalcy.

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For Ben – who started it all;
For Raquel – who prolonged it;
For Josianne – for being there.

Our narrative continues.

Introduction

Simulation: Semantic Problems, Poietic Possibilities

Simulation often makes the news. A day after the much-publicised race between Olympic swimmer Michael Phelps and a Great White shark on July 23 2017, the following headlines appeared: "Simulated Great White beats Michael Phelps in Shark Week race" (CBS News); "Michael Phelps loses race to simulated shark by 2 seconds during Shark Week" (Newsday). Other headlines were less forgiving: "Viewers outraged as Michael Phelps races against great white shark computer simulation" (The Telegraph) and "Michael Phelps 'Raced' a 'Shark', Kind Of. Not Really" (New York Times). The stunt came as a huge anticlimax to viewers but Discovery Channel's scientists were fully aware of the practical complexities and risks of staging such an encounter, not to mention the obvious evolutionary mismatch which invalidated the experiment from the outset. Scientific truth should have been self-evident, but the promise of spectacle was greater than the merits of the experiment itself. Writes Victor Mather: "[S]harks and people are not comparable swimmers. Not even close. Humans, even superhumans like Michael Phelps, swim no faster than 6 miles an hour. Great white sharks hit 25 m.p.h". To compensate for this evolutionary mismatch, Phelps wore a monofin to simulate a shark fin and a specially designed wetsuit suitable for colder ocean water swimming. The distance to be covered was 100 metres; beyond that, Phelps would have stood no chance. The virtual shark Phelps raced against in real time was a computer-generated avatar of an actual Great White lured on a separate occasion "with a fake seal to time its speed over 100 metres in a straight line" (Mather). The reason for this was another evolutionary problem to be side-stepped by simulation: sharks do not typically swim in a straight line (Yahr).

Two things are learnt from this experiment. One is obviously an affirmation of the speeds achieved by the formidable Great White shark and how difficult it is to match these speeds, even with the use of swimming gear that simulates a shark's skin texture and shark hydrodynamics. If nothing else, the Phelps simulation was a good example of applied research, but nothing more. As a simulation it failed because viewers' expectations of the real were manipulated by the physics of the impossible, resulting in an unrelatable scenario where a frustrating trade off was achieved. Simulations have to convince.

But when in 2013 the MIT completed a large-scale cosmological simulation of the universe which recreated "13 billion years of cosmic evolution in cube 350 million light-years on a side" (Aguilar and Pulliam), headlines for the Illustris Project had been more enthusiastic: "Mind-Blowing Computer Simulation Recreates Our Universe" (Seeker). Another simulation made news in 2014: "Supercomputer models one second of human brain activity" (The Telegraph). Therefore, the same audience who would have been intrigued by the virtual mapping of the universe or the human mind refuted a simulated shark. Computation, which clearly posed no problem for simulations such as Illustris, *was* the problem in the Phelps race. Clearly, there are scenarios where a simulation model is neither reducible to a base reality nor is it desirable that it does so.

Simulation is one of those terms burdened by ambivalence, and while the etymology of the word reveals a history pejoratively marked by connotations of imitation, copy-making and counterfeiting of emotion – the manipulation of truth – today it has become a widely sought scientific tool for studying processes and behaviours and making forecasts, reality's *next best thing*. The Latin word *simulatio* makes relatively late appearances in Lucilius, Cicero and Plutarch, although as a concept (but not an actual word) it emerges far earlier, in Democritus, Epicurus and Plato's dialogues on seeming and being, the nature of the image and the ontology of representation. Platonic criticism of *mimesis* (from *mimeisthai*, to 'imitate') and its undeniable centuries-long influence on aesthetics and ontology was probably responsible for the emergence of *simulatio* ("an imitating, feigning, false show") and its verbal derivative, *simulare* ("to imitate" or "make like", "copy", or "represent"). Both words stem from *similis*, which translates as "like" or "likeness", with "similar" and "similitude" being morphological derivatives (Harper, "Simulation"). Thus in Lucilius we find "*bonum simulare uirum se / insidias facere ut si hostes sint omnibus omnes*" (to pretend that they are good men / set traps as if everyone was everyone else's enemy) (Gellar-Goad 231), while Cicero speaks of imagining what succeeds the death of those engaged in affairs of state ("*nobiscum simul moritura omnia arbitremur*"), mentioning how many great men were careful enough to leave behind their effigies, statues and pictures, representative of their bodies but not their minds, the *simulacra* ("*an cum statuas & imaginas, non animorum simulacra, sed corporum*") (Duncan 304).

By the mid-fourteenth century, *simulation* (Old French) became associated with "pretence", the putting on of a "false show" or the "false professing" of news, character or event, while *emulation* (Old French) was associated with the act of imitating with the intention of surpassing rivals – mimicry is a well-studied evolutionary trait of the animal kingdom. In contrast, *dissimulation* (Old French) is associated with dissembling, the *concealment* of one's true feelings or beliefs and finds its roots in the Greek word *eironeia* (Greek for "irony"), possibly as early as Socrates's method of affecting ignorance during his philosophical dialogues (Harper, "Irony").

Some disambiguation of the terms 'simulation' and 'dissimulation' become necessary at this point. Influenced by Machiavelli's political writing, Francis Bacon's 16th century essay "On Simulation and Dissimulation" explains "dissimulation … in the negative; when a man lets fall signs and arguments, that he is not that he is", while simulation is an "affirmative [trait], when a man industriously and expressly feigns and pretends to be that he is not" (26). For Bacon, both simulation and dissimulation are a mark of character, a "veiling and hiding of a man's self" (26). Since "he that talketh what knoweth will also talk what he knoweth not" (27), secrecy is a "virtue", "both political and moral" (27). "Dissimulation" is a weaker form of secrecy arising when someone is "beset by questions" from others to the point of arousing an "absurd silence", or when countenance might betray the secret (27), thus "he that will be secret must [become] a dissembler in some degree" (27). Yet this form of deceit "cannot hold out long" (28). Finally, "simulation" is the more "culpable" (28) form of deceit in being the most convincing, requiring industry and expertise. As a "form of false profession" it is less "politic", argues Bacon, unless it is used in "great and rare matters" (28) and in instances where "there be no remedy" (29), in which case imposturing is justified. When it is not, simulation is a "vice" in being unnecessary and counter-productive when instead of "discover[ing] the mind of another" (28) it "deprives a man of one of the most principal instruments for action; which is trust and belief" (29).

Robert South also accentuated the finer difference between simulation and lying a hundred years later in one of his sermons at Christchurch, Oxford, when he clarified that "for distinction sake, a deceiving by words, is commonly called a lie, and a deceiving by actions, gestures, or behaviour, is called simulation, or hypocrisy" (593). Samuel Johnson eventually incorporated both Bacon and South's definition of

simulation in his *Dictionary of the English Language*, qualifying it as "that part of hypocrisy which pretends that to be which is not" (1839).

I find in Bacon's essay a discernible *praxis* of simulation and the use of a term that resists its semantic history. Simulation is not reduced to an ethical absolute, a signifier of falsity *at all times*, but – for Bacon and his Renaissance contemporaries at least– is deceptive to a great or lesser extent *depending* on the *function* attributed to it. Describing simulation through praxis rather than semantics – what it does, rather than what it is thought to be – would therefore explain the epistemic shift which becomes noticeable in later divergent applications of the term, not incidentally appearing with the rise of computer modelling and the need to simulate complex systems and their behaviour and where the characteristic of deception features nowhere if not in postmodern discourse.

This dissertation arose from this initial enquiry, and the belief that simulation's mimetic strategies can be considered to authenticate, rather than replicate, behaviours of properties under study, with modelling being an essential representational but also poietic process, especially in the case of narrative world-building. This is discussed in Part I. A second more crucial thrust in the argument emerging in Part II is that simulation modelling in the sciences is also amenable to narrative world-building, but while simulation in interactive narratives is subject to ongoing study, there is hardly (if) any research in narrative studies which examines narrative simulation in non-interactive, non-digital fiction. It is hoped that the present study addresses this research gap by proposing an early poetics of narrative simulation. An overview of the dissertation structure and its argument threads is provided below.

In chapter 1, I discuss why (or perhaps because) of its numerous applications today, there is no single theory of simulation. This would coincide with the way theorising about simulation has (partially) abandoned its association with platonic idealism and turned to materialism and cognitive phenomenology, with science becoming simulation's privileged domain. In this chapter I advance the initial thesis that an epistemic shift is noticeable in the way we have come to view simulation today. I offer an early resolution to the innate contradiction we are presented with when considering the main attributes of simulation, such as 'imitation', 'pretension', 'representation' and 'modelling', all of which come to mean something else entirely if simulation is viewed as *praxis*, a process of becoming, enacting or performing rather

than a form of being. This would help account for the epistemic shift mentioned earlier, a shift from simulation as an ontological or semiotic concern to one which is epistemological.

Simulation and imitation are often interchangeably used, and often with the scope of deceit. In Genesis 27, Rebekah instructs her favourite son Jacob to impersonate Esau. When Jacob retorts that his skin is smooth and not hairy and that the blind Isaac will realise, Rebekah "took the best clothes of Esau her older son, which she had in the house, and put them on her younger son Jacob. She also covered his hands and the smooth part of his neck with the goatskins" (Gen. 27.15-17). Isaac is not fooled by Jacob's voice but Rebekah's crude simulation of Esau appears to work (Gen. 27.22-23). Likewise, known mimics in the animal kingdom such as the common cuckoo, lay eggs in host nests while more original ones, such as the cinerous mourner, hatch fledglings with spiky feathers disguised as toxic caterpillars to avoid predation (MacDonald). For the mimic, the simulator, the intention is chiefly to gain an evolutionary upper hand.

It is often said that imitation is the best form of compliment. I would stress that it *complements*. Simulations are desirable when they use a source's attributes to extrapolate and make solid inferences in what-if scenarios from which knowledge is advanced, as is the case of the Illustris Project run by the MIT, which made it possible to visualise for the first-time what might have occurred 12 million years after the Big Bang by running 8000 CPUs in parallel over a three-month period (Aguilar and Pulliam). The point of such simulations is therefore not one of duplicity but of *duplication*, which as a synonym for simulation, must be reconsidered anew as a *generative* rather than replicative force.

Because of variance in the way it has been defined and what it has come to mean – a problem with semantics – simulation needs to be understood through its use and reception. Ludwig Wittgenstein's explanation that beyond a mental representation of a word, a word's "meaning [is] also determined by its use" (54) is an example of the burden of ambivalence that characterises simulation, one resolved through praxis, or use. This also allows us to make a number of inferences regarding the multiple, often (apparently) contradictory, use of the term. It is clear that a semantic shift occurs in the way simulation comes to be viewed in the 20th century, the Information or Digital Age, and although the simulacrum in the wake of Jean Baudrillard – "something having merely the form or appearance of a certain thing,

without possessing its substance or proper qualities" (Sandoz) – belongs to this period, the notion of simulation as simulacra-making is essentially semiotic not empirical, and political rather than poietic.

Chapter 2 shows how in the pursuit and advancement of scientific knowledge, deceit and dissembling lose their purpose, to be replaced by scientific extrapolation, the construing of hypothetical what-if scenarios through mathematical models and silicon surrogates. Simulation in the Information and Digital Age becomes an episteme in its own right and rather than producing lesser versions of the truth, it opens a much-needed window into reality. In this chapter I therefore argue that rather than keep probing what simulation is, we could discuss what it does and how it accomplishes this. This was also the belief of R. W. Conway, B. M. Johnson and W. L. Maxwell of Cornell University who in two separate studies in 1959 and 1963 stated that problems with simulation fall squarely within two broad categories – the *construction* of a simulation and its *use* (Goldman et al. 311).

Simulation theorists identify the Buffon-Laplace model as a very early use of simulation-as-mathematical modelling, used in 1777 to predict the probability patterns of a needle crossing intersecting lines when dropped from a height to estimate the value of π (Goldman et al. 310). The transition from mathematical modelling to computer modelling – characterising simulation since the 1940s – took approximately one hundred and thirty years to happen. Yet, despite changes in function and definition, one constant remains: simulation is thought of as a process. From "the action or practice of simulating, with an intent to deceive", simulation now becomes a "technique of imitating the behaviour of some situation or process … by means of a suitably analogous situation or apparatus" (Sandoz). 'Imitation' also finds more acceptable empirical substitutes in words like "mock-up" and "model", as in this definition from 1954 where simulation becomes "a model or mock-up for purposes of experiment or training" (Harper, "Simulation").

Jessie Cameron Herz however contends that simulation functions as a predicate rather than a subject (qtd. in Prensky 210). This is significant because Herz appears also to anticipate the semantic issues I have discussed in this introduction. She believes that simulation does not carry nominal value but instead functions as a verb. Therefore, it is not a case that simulation *is* but one where simulation *does*. By extension, simulation would not be *a model* but *modelling*. Since simulation proceeds from a form of modelling which involves representation, I therefore differentiate

between functional and semiotic representation; the former being capable of generating signs while the latter sequences and reproduces them for interpretation. I argue that models capable of simulation make use of functional representation while those which do not or cannot simulate behaviour only semiotically represent their referent. Moreover, I debate known issues with representation, such as that of complete fidelity to the source and 1:1 scalar correspondence, through close reading of Stanislaw Lew and Umberto Eco.

In chapter 3, I conclude Part I of this dissertation by explaining and illustrating how simulation as a method or a process is also amenable to literary studies, using Jorge Luis Borges and Umberto Eco as initial readings. In the simulation modelling of source to target behaviours, I discern a system which is not dissimilar from concepts and techniques used in world-building, especially in the elicitation of reader affect. Alan Palmer, in fact, describes that access to a storyworld occurs through a semiotic and discursive exchange between two domains, "the source domain, the real world in which the text is being processed by the reader" and "the target domain, the story-world that constitutes the output of the reader's processing" (*Fictional Minds* 34).[1] During such process, "reader-held real-world knowledge [is triggered] in a way that projects the reader [cognitively] from source domain to target domain" (34), thereby simulating a number of conditions or behaviours of the former. Simulation *as* narrative becomes, predominantly, a generative technique, foregrounding, delaying and controlling the reading-cognition process while engaging the reader directly. Therefore, unlike Alison McMahan's conclusion that because "Plato saw narrative itself as an abhorrent simulation … today the concepts of simulation and narrative

[1] Some clarification of terms is necessary since the terms 'source' and 'target' have gained (different) currency in recent years within Text World Theory, as conceived by Paul Werth in the late 1990s and further developed by Joanna Gavins in the early 2000s. Essentially, a text world is a conceptual metaphor used to explain "the way in which readers understand any given discourse by producing a cognitive realisation of it [with this] imaginative construal … appear[ing] so vividly as to take on a world-like quality" (Gibbons, *Multimodality* 34). While Palmer refers to "the possible worlds that are created in worlds of literature … interchangeably as fictional worlds, narrative worlds, text worlds, and storyworlds" (*Fictional Minds* 33), this is somewhat imprecise. In Text World Theory, 'source' and 'target' are *both* considered to be conceptual domains and mental spaces which can be blended to generate new meanings (Gibbons, *Multimodality* 33). Therefore, while in possible and fictional worlds theory the source world is considered to be actual rather than figurative, in Text World Theory the source would conceptually correspond with a "split-discourse-world" where "the communicative event takes place" between writer and reader to generate a "text-world", an ontologically discrete mental representation that, as Werth asserts, depends "on the resources of memory and imagination, rather than direct perception" (Werth qtd. in Gibbons, *Multimodality* 35). It will become obvious that if we are to adopt the strategies of simulation modelling for narratives, the terms 'source' and 'target' cannot be reduced to discursive practices but must also be ontologically differentiated. Writing, reading and imagining a text world into being *occurs in a primary world that supervenes upon it*.

are often located at opposing ends of the spectrum" (532), I contend that narrative adopts various strategies of simulation sufficient enough for it to be regarded as a form of simulation.

However, this is not to claim that all narratives simulate (anything they are meant to simulate). McMahan's separation of simulation from narrative is also taken up by ludologist Gonzalo Frasca who in his discussion of video games as simulations states that "even if simulations and narrative do share some common elements – character, settings, events – their mechanics are essentially different" (221). Frasca proceeds to offer a provisional definition of simulation: "to simulate is to model a (source) system through a different system which maintains to somebody some of the behaviors of the original system" (223). Frasca's operative term here is 'behaviour' and he distinguishes "traditional media" (his focus is on film-based narratives but we can also extrapolate text-based narratives here) from digital media such as games by according the attributes "representational" and "simulational" respectively (223). For Frasca, representation is not simulation when characteristics of the source object are missing in the model (e.g. audiovisual features); when the model cannot react to stimuli (e.g. input data or joystick movements), and when, in short, the model cannot be *manipulated* (223). While narratives "excel at producing both descriptions of traits and sequences of events" (223), like a photograph they generate only "signs" (223) which can be interpreted but not manipulated. Therefore, they are only representational. Frasca's theory of simulation advocates an openness of outcome requiring a bi-directional response from model-to-user rather than a prewritten one, which is limited and closed. I return to Frasca's argument in chapter 2 and 3, as it requires lengthier exposition, but also to partially interrogate it, again on the basis of the objection I set earlier when discussing McMahan's description. Some form of deliberate authorial manipulation *is* present in the construction of a number of texts, resulting in 'open' narratives whose capacity for (re)interpretation and (re)reading has been likened by David Herman to "a system for building models of action", or "action-modelling" ("Storied Minds" 40) in short. Narratives are not only representational but some also have a poietic propensity requiring reader participation which can be termed *narrative simulation*.

Part II of this dissertation focuses on simulationist strategies as narrative (simulation *qua* narrative) rather than the employment of tropes of simulation in a specific fictional category (simulation as a sub-genre of fiction), providing close

reading of texts from authors as diverse as James Joyce, Virginia Woolf, Ian McEwan, Michael Cunningham, Emma Donoghue, Bret Easton Ellis, Georges Perec, Alejandro Zambra and Mark Z. Danielewski. I argue that a number of literary narratives make use of, and exhibit to a certain extent, simulationist strategies beyond traditional mimesis to construct and 'authenticate' behaviours or properties which obtain in the source world outside the text. I exclude filmic, digital or ludic media from my discussion (unless otherwise necessary), first because considerable scholarship on simulation has tended to attach itself to the latter two, and secondly because despite obvious formal constraints which curtail simulation when applied to non-digital or non-interactive text-based narratives, I believe that some aspects of simulation modelling are still evinced by texts which display hypermimetic and poietic properties – even if such narratives would not be ordinarily considered simulations at all. I use the former term to highlight how the successful modelling of source system behaviours requires more functional and synthetic mimetic structures. Thus, hypermimesis is a heightening of a secondary reality, a narrative process which necessarily engages with, and taps into, an external reality, complete with our experiences and perceptions of it. In chapter 4, I therefore address the concept of reader affect through the cognitive modelling of narratives, assuming that narrative simulation is an interpretive act which draws on various levels of reader cognitive states, engagement and "experientiality" (Fludernik, *'Natural' Narratology* 9), as the reader inter-mediates between source and target worlds and actual and possible events.

Within the affordances of this study, I conclude my discussion of narrative simulation in chapter 5 by addressing it in terms of reader performance, the poietic outcome of hypermimesis. Texts which incorporate multimodal features have been shown to creatively disrupt normal reading processes, forcing the reader to engage with their material structure and multiple narrative pathways in a manner reminiscent of interactive hyperlinked narrative. Thus, beyond cognitive simulation, architexts – texts whose material structure formally encodes narrative possibilities – force the reader to perform several extradiegetic loops by forcing narrative reconstruction and revisitation. In conclusion, I argue that this provides a level of open-endedness and emergent possibilities that are typical of more complex simulations.

Part I

Simulation(s)

A simulation can be defined as: 'a representation of the function, operation or features of one process or system through the use of another'. For [fictional] worlds, it must be possible for the simulation model to be a model of a system or world that is a fiction or 'fabrication'. This makes 'model' a preferable term, since it does not need to be a model of any aspect of reality, while a simulation is more typically understood as representing some aspect of a real system.

Craig A. Lindley, "Narrative, Game Play, and Alternative Time Structures for Virtual Environments" (192-193)

The old forms of information design do not fit contemporary ways of living, knowing … multicausal systems require other modes of modeling – but chaos theory, complex systems, simulation modeling remains under appreciated and theorized in physical sciences, even more so in social sciences and humanities…

N. Katherine Hayles, *My Mother Was a Computer* (30)

Chapter 1
Simulation Theory/ies

1.1 Introduction

In the introduction, I discussed what problems arise when simulation is defined semantically rather than functionally – what simulation means, as opposed to what it does. Having considered several definitions, and by no means exhaustive, we would still be hard-pressed today to identify one which does not yield to simulation's intrinsic paradox, namely its ability to mimic existing systems on one hand while generating emergent behaviours on the other. Conventional assumptions about simulation tend to revolve around its association with imitation and pretense, but in an age of big data analytics and computer modelling, where the desired outcome of a simulation is scientific accuracy, the result has been a pronounced shift in the term's utilisation and conceptualisation.

In this regard, we can see for instance Craig Lindley's attempt at differentiating between the terms "simulation model" and "simulation" in the first epigraph that prefaces Part I. Beyond the obvious problem of using the same term to account for what he considers to be disparate forms of representation, Lindley moves beyond a conventional and contemporary definition of simulation of the type provided by Sandoz and Frasca (see introduction), the Oxford English Dictionary (sec. 1.2), Fonseca i Casas (sec. 2.5) and others, to also account for fictional worlds such as game worlds (in his study) which he considers to be a "fabrication" (192). In this respect, Lindley seeks to disambiguate simulation modelling from simulation itself, employing the term "model" rather loosely to account for a type of simulation that "does not need to be a model of any aspect of reality", while "simulation" is assumed to be its empirical veridical counterpart since it "is more typically understood as representing some aspect of a real system" (Lindley 193). I however find this dichotomy to be somewhat imprecise in its attempted neatness. For one, it assumes that simulations are not model systems (clearly not what simulation theorists maintain; see chapter 2), while conversely also making the assumption that the modelling of fictional worlds essentially simulates its own structures and referents independently of an actual world, a "real system" (193) from which they are

generated. (Again, this is not what is maintained by fictional and possible world theorists; see chapter 3). In seeing one form of simulation as more 'real' or 'truer' than another, Lindley's explanation is yet another example of defining simulation according to a more outdated semantics. It neglects the functional possibilities afforded by the term "modelling", which are at the heart of the ensuing discussion in chapter 2 and extended in chapter 3 to incorporate the modelling of fictional worlds on the basis of – rather than separate to – current simulation modelling concepts.

Semantic definitions of simulation therefore tend to be problematic and intrinsically fallacious: the production of counterfeit images or emotions – truth falsifiers – and the use of empirical models to validate an extrinsic reality are mutually exclusive concepts. The foundational argument is therefore that this ambivalence foregrounds the epistemic shift that distinguishes a discourse revolving around the "culture of the copy", (a term borrowed from Hillel Schwartz), from one which currently considers simulation to be the epitome of scientific modelling.

An early resolution to the semantic problem would be to consider simulation from the perspective of praxis rather than ontology; a system of processes and performed actions, operating within the domain of mimetic reproducibility to generate or construct system or agent behaviours – what it does therefore, rather than what it is. In making the claim that simulational processes are generative, a position adopted in this study and which attributes simulation methods and modelling to narrative theory, we can further ascribe a degree of semi-autonomy to the process. Eric Winsberg mentions how techniques of simulation, in mimicking real experiments, have "a life of their own" (121). Complex modern-day simulations are by necessity semi-autonomous systems in that they both belong to experimental and theoretical domains, yet exist beyond them, moving even beyond the simulation-maker himself. As an example, Winsberg cites the computational technique PPM (Piecewise Parabolic Method), an algorithm which simulates supersonic fluid flow and which is capable of accounting for discontinuous and non-discontinuous states in the simulation by abandoning certain theoretical assumptions that "shock discontinuities" (122) in supersonic fluids can be treated as smooth. However, in reality, real fluids are neither discontinuous nor smooth, but possess "very thin regions of very steep gradients" (122). Another significant example of powerful simulations which transcend their own computability is Google's AI algorithm AlphaGo, which mimics millions of neural connections in the human brain and is

partly self-taught, having played millions of games against itself after initial programming. In March 2016, AlphaGo beat Lee Se-Dol four games to one at the ancient Chinese boardgame of Go, prompting students of the game to declare the AI player's victories as innovative and beautiful (Agence France-Presse).

In a sense therefore, we cannot fully pre-empt what simulations will be able to do next, and this is reflected in its many definitions, which over the years have been revised and enlarged. An attempt at theorising simulation today similarly meets with difficulties as the concept has, on occasion, been regarded as an idealist or mentalist construct.[2] This approach appears to move away from a materialist mechanics – of emergence for instance – that underpins simulation as a physical process. However, I come to question whether the term 'simulation' can be unpinned from scientific materialism at all; first, because of simulation's quasi-natural association and indebtedness to computer processing and virtualisation due to the semantic shift discussed in the introduction – a disassociation of the term from simulacra to a knowledge-based episteme – and second, due to simulation's arbitrariness as a term which lends itself to various studies and applications but not a single unified theory or poetics. Not incidentally, Winsberg makes reference to simulation studies (106) but not to a theory of simulation in describing types of simulations and their functions.

Perhaps just as well, we should speak of simulation(s). This chapter renews investigation into the semantic shift mentioned in the introduction by discussing which theories and approaches, whether idealist or materialist, have contributed generally to simulation studies, of which simulism remains the most controversial. This is the more radical (but not novel) hypothesis that reality itself may be an illusion and the world itself (or our experiencing and being-in-the-world) is simulable by quantum computing down to perception and mental states (Sensagent). Such a discussion is necessary to determine whether the concept of simulation changes according to discipline or domain, and if so, how. I argue that an epistemic shift naturally follows from a reconsideration of semantics. However, while simulation nowadays tends to be equated with epistemic models based on more materialist ontologies rather than circuitous arguments on the nature of the illusory

[2] See for instance cognitivist theories of simulation such as Robert Gordon's (ST) simulation theory which has come to replace (TT) theory-theory in folk-psychology or Neil Bostrom's reality-as-simulation argument, which bridges both idealist-realist domains, both discussed in detail in section 1.4, and chapter 4 and section 1.5 respectively.

real and multiple 'reals', the fact remains that the move from a philosophy of idealism to one of scientific materialism does not satisfactorily account for cognitive theories of simulation which are based on non-deceptive pretense (make-believe) and are therefore *phenomenological* and idealist in nature. This also recalls problems with qualifying 'emergence' and 'possibility spaces' in Mark Bedau and Manuel De Landa's work on simulation and which seem to occupy both materialist and idealist states, since a number of physical phenomena exist potentially until manifested, therefore being real but non-actual.

An understanding of the diversity attached to simulation studies – a diversity in part attributed to the term's burden of ambivalence (see introduction) – is necessary before we can discuss simulation as praxis rather than an ontology. It would also facilitate current and future discussion on the amenability of simulation modelling to narratology, which notion is central to this dissertation. In effect, Katherine Hayles remarked in 2005 that simulation modelling remained, at the time, "under […] theorized" both in the "physical sciences" and the "social sciences and humanities" (refer to second epigraph, Part I), because "multicausal systems require other modes of modeling" to account for "contemporary ways of living [and] knowing" (*My Mother Was A Computer* 30). How simulation(s) model, what they typically model, and whether they could also apply to narratological modelling, therefore provides space for further discussion in the rest of this chapter and Part I.

1.2 Simulation Studies

It is almost axiomatic to regard simulation studies as the natural offshoot of computational modelling, which has deconstructed the physical world and rendered it in the form of intelligible digital data and interactive images. This is not necessarily a bad thing as simulations in this case are being used as epistemological tools. For instance, in a recent study on mathematical modelling and the Anthropocene, James J. Pulizzi extended digital reconstruction to history itself, making the bold claim that "the Anthropocene only exists thanks to complex climate simulations run on arrays of microprocessors computing in parallel" (83), in other words not so much an actual or visible historical event as a product of computer simulation. But then again, historical events were never actual or visible; they are narrativised or cinematised for our edification. Pulizzi contends that "if history is text, then history is over – numbers have replaced text" (84). Allowing for Pulizzi's premise that the historical

past has been overwritten and encoded through computer modelling in the form of "billions of data points" (83), then simulation can also be used to mediate the present and predict the future in the form of digital data and technical images which are machine produced. This again need not be dystopian but redemptive, certainly for a world which cannot be considered "untouched by human activity" (the Anthropocene) and neither one we could conveniently withdraw from to survey or "fix the environmental damage" (88). Writes Pulizzi:

> … the age of the technical image requires us to capture the past and present with ever-greater completeness and accuracy, so that … our information apparatuses may create a simulated world for computers to run faster than reality itself. By arriving at its future before the universe does, we can perhaps better plan our own future. (89)

This knowledge-based economy made possible by simulation-as-episteme leads us to question how simulation generates knowledge and what kind of knowledge this might be, implying that there is an irreducible aspect to simulation which is associated with unpredictability of outcome. Deborah Dowling has stated, quite correctly, that simulation involves "trying things out" and "watching to see what happens" (qtd. in Winsberg 117). If simulations were merely non-generative models of static behaviours or events, then there would be little purpose in running them, as data and results could be fully anticipated, making the simulation redundant from the outset. One would not need to wait and watch what happens next if future activity were entirely predictable.

Pulizzi's argument for a "simulated actuality" through which "we live not in reality but in the real time of a complex simulation of reality" (84) could however be ambivalently construed in Baudrillardian terms, one where "the Anthropocene is *real*, but [one] we can only know … through computational models" (84). This meshing of the virtual and the real in simulations is a reminder that actual objects such as books, also begin their life as graphical illustrations on screen, becoming "actual only after other machines extrude them" (84). For Vilém Flusser, "the age of the technical image" (qtd. in Pulizzi 85) has resulted in a digital universe rendered intelligible only through the tapping of a digital keyboard, directing the computer to reassemble raw data into a "conceivable, representable and comprehensible" experience (qtd. in Pulizzi 85). It would seem that what literally precedes the real in

an age of virtual designs, digital blueprints and 3-D printers is the image (or the simulacrum).

Pulizzi's example of the simulated Anthropocene is based on mathematical and computer modelling, yet one which ironically privileges the image and the virtual by granting it the status of an episteme. Simulation has long been subjected to a discourse marked by historical and political ideology and it is one which does not resolve simulation's burden of ambivalence – can its mimetic mechanism be trusted as a source of knowledge? This will become clearer in section 1.3 when I discuss simulacra and the hyperreal by outlining early philosophical and aesthetic concerns with imagery and representation, culminating in the simulacrum as a cultural marker of the postmodern. Here, invariably, the discussion gravitates to (mostly inconclusive) debates about simulation's capacity for falsity, duplicity, impersonation and effacement; of distinctions between the real, the non-real and the hyperreal; first order and second order objects, and the actual and the virtual. Yet, if we simply make a case for simulation as an ontology (therefore calling into question the reality of the simulated object) or address it semiotically (with cultural implications for the simulated object) the case for scientific simulation should technically flounder. Yet clearly this has not happened, as Pulizzi's example demonstrates, and we therefore must ask ourselves why.

The first instance, describing simulation by ontological status, presupposes the simulated object to be a copy, and whether virtual image or actual object, still inferior to the real referent it was modelled on. The semiotic approach follows from the anti-aesthetic platonism of the first by declaring the simulacrum to be today's real (or making the claim that we cannot have access to the real anymore since the simulacrum is a sign that points everywhere and nowhere). The ontological and semiotic approaches couch a philosophy that goes against a definite epistemology – we cannot establish truth if knowledge of what is real and what appears to be real is occluded. In this manner, both interpretations of what simulation is would be at odds with the notion of scientific simulation that we are accustomed to today, and one which freely uses models and virtual entities in conducting its experiments. A fallacy arising from simulation's mimetic function now becomes apparent.

Ontological or semiotic approaches to simulation are counterproductive. In pursuing the term semantically, these approaches vest simulation with an irreconcilable epistemological fallacy where simulation becomes both synonymous

with counterfeiting – the falsification of truth – *and* empiricism, its validation. The fallacy here should be evident. The generation of false or imperfect copies cannot possibly result in the furthering of scientific knowledge, yet the latter has become simulation's project today. The prevalence of scientific simulation demonstrates that this fallacy has been overlooked or dismissed when simulation acquired a new valence, that of an episteme. Surprisingly, this epistemological fallacy is only glossed over in lexical and etymological entries, with little or no explanation given beyond old and new definitions of the term 'simulation', nor how one gave rise to the other.

To illustrate this point, the Oxford English Dictionary provides three definitions, but despite listing rich examples of its use from the year 1340 up to 1978, there is no explanation for this shift in meaning/s nor the obvious epistemological fallacy that arises if we had to attempt to pursue the term through semantics. So, according to the Oxford English Dictionary, simulation is:

> 1. a. The action or practice of simulating, with intent to deceive; false pretense, deceitful profession.
> b. Tendency to assume a form resembling that of something else; unconscious imitation.
> 2. A false assumption or display, a surface resemblance or imitation, *of* something.
> 3. The technique of imitating the behaviour of some situation or process (whether economic, military, mechanical, etc.) by means of a suitably analogous situation or apparatus, esp. for the purpose of study or personnel training. Frequently *attrib*. (2019)

The coda to definition 3. ("frequently attributed") confirms the epistemic shift, since in definitions 1.a and b. simulation is described in terms of performing an action, in 2. in terms of producing an object (simulacrum) and in 3. once again in terms of performing an action but whose modern-day purpose now fully contradicting 1.a and b, yet one whose meaning has become *de rigueur*.

While it is not the scope of the present study to explore simulation's epistemic shift beyond what is necessary for my arguments, a fuller exploration of this shift would certainly be of significance to a growing scholarship in the interface between philosophy of science and simulation studies, of which this doctoral dissertation aims to be of some contribution.

1.3 Idealism and the End of History

It should now be quite evident that the epistemic shift alluded to so far is due to simulation – as a mimetic or representative concept – changing according to discipline or domain, in much the same way that mimesis has had a long history of acceptance and refusal. Divergence does not merely result from a changing semantics of simulation (imitation→deceit→modelling→authentication) but also when simulation is seen as an idealist *phenomenon* (in sociological and cognitive theory mainly) as opposed to a *tool* whose roots lie in scientific materialism (De Landa's examples of mathematical and computer modelling of the physical sciences for instance). However, there is no single Simulation Theory which unifies these approaches. We should perhaps speak of simulation(s). For instance, Sean Cubitt's "simulation theory" is one located, by his own admission, in "the philosophy of history [and] heavily influenced by the subsequent rise of sociology" (5), therefore focusing on the ideas of Guy Debord, Jean Baudrillard, Paul Virilio and Umberto Eco, whose work "typify the theory" (5).

Cubitt's simulation theory discusses simulation as a form of modified behaviour whose relation to the simulacrum turns it into a process through which second-order and inherently 'untrue' objects are created. The pervasive neo-platonic influence in early scholasticism and Christian eschatology, especially in the wake of the Iconoclastic Controversy in the Byzantine Christian Church in the 8th and 9th centuries, resulted in violence against the veneration of idols, portraits (Greek, *eikōn*) and false images (French, *semulacre*). The simulacrum differs from simulation in being considered "a material image", "something having merely the form or appearance of a certain thing, without possessing its substance or proper qualities" (Sandoz). The simulacrum is offensive because it is simulation at work on a *surface level*, a ready-made likeness which is but a "mere image, a specious imitation" (Sandoz), twice or thrice removed from the Platonic Real. Through their staticity, simulacral models differ from simulation as a process since there is no modelling of behaviour or action, offering little in the way of cognitive challenges. Therefore, simulacra remain a type of simulation-making distinct from the empirical.

In his influential work on *Simulacra and Simulation*, Baudrillard initially adopts the same differentiating principle as Francis Bacon's (see introduction), pithily saying that "To dissimulate is to pretend not to have what one has. To simulate is to feign to have what one doesn't have" (3). The exception in Baudrillard is that

unlike Bacon, he reads simulation/dissimulation in terms of a reality principle which goes beyond pretension, a principle which comes progressively under attack from "*the precession of simulacra*" (1) where signs come to signify themselves and "a profound reality" is "denature[d]" and rendered "absent" (6). This "principle of reality" (3) becomes crucial to any qualification of simulation – whether semiotic or scientific – since the act of pretension is a deliberate subversion or augmentation of *what already exists* but also the suggestion of *what could exist*. Thus, according to Baudrillard, to dissimulate "implies a presence" (3). One gives an indication of not being or not having what one actually is or has (or inversely) such as the man who feigns sickness by staying in bed and making others believe he is really ill. In contrast, simulation "is more complicated than that because simulating is not pretending" (3). For Baudrillard it is a coming-into-being of what was never existent, or "absen[t]" (3). "Whoever simulates an illness produces in himself some of the symptoms" (3), and this psychosomatic condition – of making oneself believe that he is sick – becomes untreatable. The symptoms are 'true', at least, for the delusion, but for nothing else.

Again, like Bacon the greater evil according to Baudrillard is simulation, yet it does not imply a moral weakness but a disconcerting erasure of the reality principle. Whereas dissimulation "leaves the principle of reality intact" (3), Baudrillard's concept of simulation compromises the ontology of the real. In this sense, it is neither "true" nor "false", nor "real" or "imaginary" (3). It is the *simulacrum*. Baudrillard's words echo this aporetic hollowness: "The simulacrum is never what hides the truth – it is truth that hides the fact that there is none. The simulacrum is true" (1).

For Baudrillard the simulacrum is what results from the process of simulation. It is a semiotic process and one which "liquidat[es] all referentials" and resurrects them artificially in the "systems of signs" (2). Baudrillard is not overly concerned with "imitation [or] duplication, nor even parody" (2) yet is preoccupied by the creation of a "hyperreal" that "offers all the signs of the real" (2) and subsequently effaces all traces and distinctions to it. All that is left is "the orbital recurrence of models" (3), although Baudrillard neglects to elaborate further on this metaphor, especially since objects in orbit presuppose a bigger centre around which they revolve (the real?). Presumably, however, Baudrillard intends simulacra to be a series of models which orbit *one another*, thus dispensing with the need for a fixed or original source.

To illustrate this, in Don DeLillo's novel *White Noise*, Jack Gladney experiences the simulacrum first-hand when Murray Jay Siskind drives him to Farmington, in the

American Midwest, to see a particular tourist attraction. “Five signs” proclaim that they have arrived at “THE MOST PHOTOGRAPHED BARN IN AMERICA” (12) where tourists with an array of cameras obsessively snap away at the sight while a man in a booth sells postcards and slides of the same attraction. The barn, however, remains undescribed by DeLillo and is consequently *invisible* to the reader in order to prove the point that viewed through camera lenses or captured in the form of postcard or photograph, the real barn becomes of secondary interest and ceases to be. Without the system of signs, the barn would simply lose its “aura” (12) and remain a commonplace barn, one of thousands, possibly not warranting any attention. Yet ironically framed within this system of signs, the popular barn is still nothing if not a simulacrum, existing-as-image. Murray notes that “No one sees the barn … “Once you’ve seen the signs about the barn, it becomes impossible to see the barn” (12). In being “the most photographed barn” the edifice becomes semiotically an image while the selling of postcards in the foreground propagates its circulation as image. Incidentally, the “short-circuit[ing] [of] the signs of the real” (2) that Baudrillard speaks of is manifested when Murray wryly observes that the obsession with taking images rather than with viewing the barn reaches its apex when the tourists start “taking pictures of taking pictures” (13) (of an image, the barn), a recursive act typifying Baudrillard’s “orbital recurrence” (3) of simulacra.

Cubitt makes a case for a historical and politically grounded theory of simulation in calling “simulations: pictures no longer attached to the ideas, images without originals” (Cubitt 3). He returns to first principles, essentially those based on Socrates and Plato’s argument that the *eidolon* (later translated into Latin as *simulacrum*) is a shadow which has lost its original function and therefore, rather than directing us towards truth and knowledge of the Ideal (the world of perfect unchanging Forms) misdirects us towards artistic copies or representations. This gradual detachment from the Ideal is therefore more than a mere distraction; it negates ontological hierarchies altogether. In Cubitt’s words, “the famous shadows thrown on the walls of a cave [give] us some inkling of the perfections of the [external] world even as [they] hide it from us” (3), but once we “forget that they are only dim reflections of the ideal world, the shadows lose their function of imitating and so directing us towards the Ideals, and become simulations”; (3) read: simulacra.

If idealism is the “unfolding of an immaterial Reason, or the visible form of an invisible Idea” (2), what is presented to us by simulation essentially runs counter to

idealistic philosophy. To represent the unchanging Forms is both to repeat these forms as well as to change them through misrepresentation, so that what remains is far removed from a source, if there ever was one. Simulation tends to invest in a material rather than an ideal reality, favouring object over idea and product over concept. This would correlate with a form of materialism which privileges physicalism – only that which can be physically accounted for can be said to be real. Yet in essentially non-representing any actual referent nor an idea but itself, the object of simulation is at the same time unanchored to the real, making of simulation theory a frustrating "theory of nullity" (145).

In reading simulation from the standpoint of, and issues with, philosophical idealism, Cubitt also identifies a decisive moment when that idealism – and with it, the nature of an unchanging and sole Truth – is challenged by the Enlightenment. "The modern world of the eighteenth century [certainly] more advanced in terms of scientific and technical knowledge" appears as a historical moment where "Truth – and therefore illusion – becomes a historical issue" (4). Yet if by Socratic definition, and in the tradition of idealism, truth is unchanging, "and since individual philosophers could not be more intelligent in the eighteenth century AD than in the fifth BC, some other condition must have altered" argues Cubitt (4). Immanuel Kant is cited as a solution for what Cubitt perceives to be a shift in human thought and epistemology. In 1784 Kant had proposed "a philosophy of history", one where humanity must work to reach the epitome of "rational maturity" and as a species be "destined to become reasonable, but not individually" (qtd. in Cubitt 4). This would explain how Socratic idealism remains a collaborative and communal project, a lifelong ministry and an evolutionary milestone; according to Kant, humanity still desires to attain the Ideal/Truth, yet this attainment is a gradual journey towards enlightenment.

Cubitt's description of simulation theory being "a special instance of the philosophy of history" (5) runs counter to Kantian epistemology and classical idealism. Rather than the human species directing its efforts and using its natural capacities towards the achievement of a "universal civil society administered in accordance with the right" (Kant qtd. in Cubitt 4), twentieth-century modernism has presented us with capitalism and a culture of consumerism whose

> objects of consumption are unreal: they are meanings and appearances, style and fashion, the unnecessary and the highly processed. Such at least is the

> emphasis of simulation theory, which sees in this movement … the evidence for a new philosophy of history, one without the white light of Reason to guide us towards its fulfilment. (Cubitt 5)

Simulation thus defined by Cubitt is equated with a historical (anti)epistemology. The history of mankind has been one of negotiation between falseness and truth, of seeming and being and of the need to distinguish between shades of reality which are a pale and often material reflection of an eternal and immutable real (the Socratic tradition). With modernism and the ideas of Kant, Hegel and Marx appears truth relativism, the idea that truth might be partial to context, whether linguistic, societal or cultural, and that truth's "realisation [has been] postponed into the future, but [that] truth and reality would eventually coincide" (Cubitt 6). Simulation theory after modernity – essentially a manifestation of the postmodern – is nihilistic, representative not of a moment which is continually postponed but "the possibility that there is no such moment, and that truth and reality have both been lost along the way" (6).

Cubitt makes the final admission that simulation theory's "central argument … has concentrated too much on the relationship between representations and things"[3], expressing the need to focus instead on "relationships among people" (6), in the hope that this semiotic impasse is surpassed. This definition of simulation theory as a theory of representation, and one which is "never adequate" (146), keeps teetering on the edges of philosophical idealism and abstraction, especially in its undifferentiation (Baudrillard), where it is "neither rational nor irrational" (145) and there is "no longer any difference between consumers and producers" (145), nor between media and ourselves since "we have already assimilated the codes of the media, and the codes have already assimilated us" (144). Read this way, Cubitt's analysis of simulation theory based on the theories of Debord, Virilio, Eco but especially Baudrillard, is one which ultimately does not account for a scientific or materialistic view of simulation as a system process or an epistemic tool. In treating simulation as a theory for the proliferation of modern-day simulacra while admitting that it is historically located, it nonetheless fails to account for a specific moment in modernity where simulation becomes a valid instrument of scientific representation and modelling, signifying an epistemic shift.

[3] Refer to previous arguments in the introduction and chapter 2.

1.4 Mind Reading as Cognitive Simulation

If Cubitt's simulation theory, as an unfolding philosophy of history, is anti-idealist and anti-representational, mental Simulation Theory (or ST) is, by contrast, fundamentally idealist. Robert Gordon first made use of the term in an 1986 article on folk psychology to discuss a philosophy of mind distinct from Theory-Theory (TT), which assumes that one can represent (read) other people's mental states based on tacit knowledge of 'folk' laws or principles connecting mental states with sensory stimuli, behavioural responses, and other mental states ("Folk Psychology" 158-71). A Theory-Theory of mind is one based on a number of implicit rules and logical sequiturs which a child learns through exposure, experience, evidence and validation/elimination of hypotheses that either turn out to be right or wrong, the so-called "Child-Scientist Theory-Theory" (Barlassina and Gordon). A putative example of one such principle is the "Law of Practical Syllogism" where "If *S* desires a certain outcome *G*, and *S* believes that by performing a certain action *A* she will obtain *G*, then *ceteris paribus*, *S* will decide to perform *A*" (Barlassina and Gordon).

Simulation theorists however believe that resorting to this theory of mind reading is inefficient since all we need to do is to mentally map others' decision-making processes within our minds; in other words, "*reuse* our own cognitive mechanisms to mentally simulate others' mental states" (Barlassina and Gordon). An analogy of simulation modelling from a study by Stephen Stich and Shaun Nichols (qtd. in Barlassina and Gordon) further illustrates the differences between TT and ST. If we wanted to predict the behaviour of an airplane under specific atmospheric conditions, we could obviously take the airplane's specifications into account and using the physics of aerodynamics, construct a theoretical model of the plane's behaviour under these circumstances. In this scenario, which would correspond with TT, logical inferences are drawn from a priori theoretical principles. Alternatively, we could build a scale model of the airplane and run a simulation to test what would actually happen mid-flight. The Theory-Theory condition assumes that "while knowledge of aerodynamic theory is explicit … our knowledge of the Theory of Mind is typically *implicit* (or tacit) [and lying] outside awareness and reportability" (Stich and Nichols qtd. in Barlassina and Gordon), meaning that one would not be able to know whether another person is sufficiently aware of aerodynamic theory or not. However, "when we run a simulation of someone else's mental states, we do not need to build a model: we *are* the model – that is, we use *our own mind* as a model of others'

minds" (Stich and Nichols qtd. in Barlassina and Gordon). Thus presented, Simulation Theory claims that even in information-poor scenarios assuming a "default state" for the mental model in which "the simulator simply makes no adjustments when simulating another individual" (Stich and Nichols qtd. in Barlassina and Gordon) is more practical than Theory-Theory and works just as well, if not better, simply because it is process-driven and does not need to be extensively guided by any internal theory and awareness of that theory. Proponents of ST claim that it works purely on the basis of common sense and common behaviour, assuming human nature to be a universal on the basis of which self-actions and decisions can be attributed to others. Departure from this default would only be necessary "when we perceive relevant differences between others' situations and our own" (Barlassina and Gordon). For instance, it would be illogical to assume that someone walking across a fragile-looking suspension-bridge with the wind blowing would not share the same concerns that cross our mind as we walked down the same bridge, seeing that there is an underlying scientific law that governs what load can be sustained by a suspension-bridge in such conditions. In such a scenario, however, it is also enough for us to recourse to folk psychology – we could probably decide to take the bridge knowing that others have done so in worse weather, or, that heavier loads were carried over this bridge, implying therefore that we personally stand an equally good or better chance of crossing safely. Mental simulation and attribution therefore works when "a system *S* tries to simulate the state of a *relevantly similar* system *S**" (Heal qtd. in Barlassina and Gordon), in which case the simulator simply needs to re-run internally the process similar to the one S* underwent. Channelled psychologically as a form of empathy (without its implication with sympathy or benevolence), ST becomes a "device for forming predictions and explanations", a scenario where one would say "that's what I would do if that were me" (Short 2).

The main qualifier for ST, and therefore, of mind reading, is *relevant similarity*. This recalls an early semantics of the term in which simulation is seen to be the act of impersonating or mimicking and which Gordon non-pejoratively adopted as a descriptor for mental replication or re-enactment. In fact, Alvin Goldman and Karen Shanton explain that a Latin semantics for simulation, *similis*, can be applied to cognition to explain how

> one cognitive event, state or process 'simulates' another event [in the sense that] it imitates, copies, or reproduces the second event. In the mind reading

> literature, this sense is captured by other labels for simulation (e.g. 'replication' or 'recreation'). Another useful term, often employed in the cognitive science literature, is 'reexperience' ("Simulation Theory").

Goldman and Shanton have considerably developed the theoretical framework behind ST, explaining the cognitive processes that underlie "low-level" and "high-level simulation-based mind reading" as well as "intrapersonal intertemporal simulation" ("Simulation Theory"). Since ST is entirely a process of re-enactment of mental episodes either "undergone by the subject herself or by someone else in the past, present, or future (or a hypothetical scenario)" (Goldman and Shanton, "The Case for Simulation Theory" 2), it assumes a form of "introspection" or "self-attribution" (17) which goes beyond mere observation of behaviour and is therefore self-experienced. Citing an experiment run by Andrew Meltzoff and Rechele Brooks, Goldman and Shanton illustrate the link between self-experience and attribution-to-others, where infants with prior experience of wearing a blindfold are less likely to follow the gaze of an adult with a blindfold (knowing that they are incapable of looking at them) than infants who have not experienced being blindfolded ("The Case for Simulation Theory" 5). This experiment indicates the crucial difference between 'knowing' theoretically through observation that blindfold impairs vision and experiencing impaired vision oneself. Simulation theory therefore involves introspection; even though the children cannot physically observe themselves wearing the blindfold, they consciously or subconsciously know what it feels like to be with one. This "special, first-person information" is used "as a premise in theories about others' mental states" (Goldman and Shanton, "The Case for Simulation Theory" 5).

While Gordon rejected the idea that mental simulation involves the "transference of a mental state found in the self onto a target" (Gordon qtd. in Goldman and Shanton, "The Case for Simulation Theory" 20), Goldman argues that this is not possible in the case of third-person mind reading, which is essentially first run through one's mind. Goldman and Shanton cite Daniel Gilbert's hypothetical scenario – "How would you feel if you discovered your partner in bed with the mailman?" – which involves trying to predict someone else's decision-making by (mentally) visualising the same scenario (qtd. in Goldman and Shanton, "The Case for Simulation Theory" 12). This is a three-stage process involving a series of imaginative constructions which are believed to operate in the target person, or, in the language

of idiom, seeing through another person's eyes; reading their mind; being on their wavelength; thinking alike, or stepping into their shoes.

"The first stage of the imaginative construction is creation of a set of initial states (in the self) antecedently thought to correspond to states of the target" (Goldman and Shanton 12), or what Daniel Gilbert, Michael Gill and Timothy Wilson call "mental proxies" (qtd. in Goldman and Shanton 7). Thus, using Gilbert's hypothetical infidelity scenario to predict how someone is likely to act if they found their partner in bed with another person, "a good heuristic would be to imagine … the encounter and see what emotions or feelings surface during the imaginative act" (Gilbert qtd. in Goldman and Shanton 7). Objections frequently levelled against simulation theory is that this heuristic may be unreliable due to the unfamiliarity of the scenario being fed into the imagination (e.g. it might be an unfamiliar scenario, so no frame of reference or context exists for me to be able to imagine/recreate it realistically) or due to the "egocentric bias" ("The Case for Simulation Theory" 8-13), which leads one's strong-held beliefs or inhibitions to 'contaminate' the process of projection (thus projecting one's deep-seated beliefs onto the target's, rather than attempting to simulate how the target would decide to act). Gilbert however claims that these "prefeelings" are still simulations insofar as a mental re-enactment is attempted, no matter how successful or otherwise the outcome is (qtd. in Goldman and Shanton 7).

"The second stage consists of feeding … inputs into one of the mind's operating systems and letting it output a further state" (Goldman and Shanton, "The Case for Simulation Theory" 12). These operating systems refer to both cognitive systems as well as mental states which the authors classify as "genuine" states, which are not the products of pretense; "simulated" or "pretend" states, resulting from assumptions made about others (imagining being them), and "E-imagined" states of emotion, which are not currently the mind reader's own (12). Simulation theory retains that genuine states are to be consciously kept distinct from pretend states and which are being attributed to the target; a confusion of the two results in lack of accuracy. In this case, the mind reader weighs one state against the other through a decision-making system that is simulated; subjecting himself to the 'same' experience while "quarantining" or "inhibiting" his own mental states (14), or what Gordon calls the "egocentric shift" (qtd. in Barlassina and Gordon). Failure to do so results only in first-person simulation – one cannot predict the likely behaviour or emotional state of

others if one insists in seeing things from one's perspective only. This would also (partly) account for narrative empathy and reader involvement; as Richard Walsh has observed, "caring about characters is the fictional equivalent of caring about people" (*Rhetoric* 152).

The final phase involves the mind reader to read or detect the chosen output state and attribute it to the target, having re-enacted mentally the decision-making process this target would make under similar circumstances (Goldman and Shanton, "The Case for Simulation Theory" 12). Therefore, as I have previously argued, even in cognitivist theory, simulation is a *process* that moves from *mimicry* to full *reconstruction*, even if this reconstruction occurs within a core neural network "consisting of [the] medial prefrontal and frontopolar cortex, medial temporal lobe, lateral temporal and temporopolar cortex, medial parietal cortex including posterior cingulate and retrosplenial cortex, and [the] lateral cortex" (Schacter and Addis qtd. in Goldman and Shanton, "The Case for Simulation Theory" 16). In fact, Goldman and Shanton have associated mimicry or imitation, what they term "interpersonal mirroring" (10) with a low-level mind reading driven by external stimuli. In contrast, "high-level mindreading is typically reconstructive [and] tends to involve the imagination, which retrieves and permutes contents from memory … a slower, more effortful process" (11). Where mind reading is concerned, simulation is therefore also poietic.

If at the core of simulation theory is the employment of "imagination, mental pretense or perspective taking" (Goldman and Shanton, "Simulation Theory"), mechanisms which any student of literature will identify as being intrinsic to the writing and reading of fiction, then it naturally follows that the process of mind reading is present in narrative fiction as well.[4] This association between simulation and reading and watching a theatrical performance or a film was made in the early 1990s in the work of Richard Gerrig, Keith Oatley and Alan Palmer among others, and coincides with early theorising on folk psychology and simulation as an offshoot of theory-theory. Raymond Mar and Keith Oatley explain how simulation is related to narrative in at least two specific ways:

> The first is that consumers of literary stories experience thoughts and emotions congruent with the events represented by these narratives … Readers of novels, filmgoers, and theatergoers all undergo simulations of

[4] See chap. 3, initially, although this concept will be explored at length in Part II of this dissertation.

> events. They experience what feels like genuine fear when a serial killer bursts through a door, for example, despite the fact that the threat being portrayed is not real. The second way in which literary narratives are related to simulation is that stories model and abstract the human social world. Like other simulations (e.g. computer models), fictional stories are informative in that they allow for prediction and explanation while revealing the underlying processes of what is being modeled (in this case, social relations) … The abstraction performed by fictional stories demands that readers and others project themselves into the represented events. (173)

The first argument makes a case for narrative phenomenology, that is, narratives are structured and written in such a way that they invite reader-affect, which is possible if we mentalise descriptions of character dialogue, behaviour and thought-processes as in mind reading. According to Gerrig, we allow ourselves to be "transported" into an imagined world (Gerrig qtd. in Mar and Oatley 178), which is a cognitive duplicate of the social world while "absorbing [the] emotional consequences" that comes with the experience (Oatley qtd. in Mar and Oatley 174). This so-called "Paradox of Fiction", or "paradox of emotional response to fiction" (Schneider), is neatly summed up in Walsh's essay title, "Why We Wept for Little Nell" (306-21) and crucially relates to ST in narrative. It does come with its own problems however, hence the paradox. If for us to be moved emotionally (to tears, anger or horror) by what we learn about people and situations requires believing that these fictional people and situations really exist or have existed, such "existence beliefs" (Schneider) are nonetheless naturally stalled when we engage with fictional characters or texts. How then can we account for actual emotional responses to fictional characters and events? Simulation theory, coupled with narrative theory, might provide a number of adequate responses to this paradox. Whether it is a text's structure or its content or a combination of both which allows for a neat simulationist argument has been amply debated, however what is certain is that some form of mental modelling / re-mapping / re-enactment is necessary. As will be amply discussed in chapter 2, simulations offer a plausible model when direct access to information is unavailable. If socially, people tend to form "models of the minds with whom they interact" (Frith and Frith qtd. in Mar and Oatley 175), allowing them "to infer other people's mental states, to which they have no direct access" (175), in literature, characterisation allows the same form of mind reading.

The second premise made by Mar and Oatley – that simulation in fiction is based on abstraction – holds true of computer modelling as well, which is scalable up

to a certain point due to current limitations in processing power. Fictional modelling, as well as computer modelling, assumes that simulation can never duplicate reality in its entirety, however it can be selective in what it chooses to replicate. Fictional narratives are microcosmic simulations, abstractions of a more complex, ineffable real, yet they permit a certain level of ontological reproducibility, enough to sustain our interest and belief in the fictional / virtual world. The strategies shared between mind reading (or ST), narrative modelling and reader-affect, crucial to the development of a theory of narrative simulation, will be further discussed in specific detail in chapter 4.

1.5 Simulism

Both theories of simulation mentioned in the previous two sections recognise conceptualisation and abstraction as phenomena that precede or supplant any tangible real to some extent, but this is where they part company. While Cubitt's description of simulation is ideological and exteriorly manifested, "a political theory" based on mass consumption and "the endless reduplication of the same" (Cubitt 5), simulation as a theory of mind is cognitive and introspective, a duplication of a very different sort altogether, where "one *mental* event, state, or process is the reexperience of another mental event, state, or process" (Goldman and Shanton, "Simulation Theory"). The distinction between these two approaches to simulation theory – one which denigrates the *eidolon* and one which justifies it – not only recalls the problems of ambivalence which arise in trying to define what simulation *is* (the semantic fallacy), but also leads to the conclusion that simulation cannot be simply grouped under either idealist or materialist approaches since even a common ground now gives way.[5] Furthermore, despite the epistemic shift in how simulation has come to be viewed today, from a model of counterfeiting to an epistemological one, this shift does not correspond to precise historical moments, and neither is it demarcating, synchronous or complete. As seen in the preceding sections, antonymous approaches to simulation often tend to manifest themselves within the same domain and within the same historical period, fulfilling different functions.

[5] The problem reoccurs in Nietzsche, Deleuze and Lacoue-Labarthe's readings of the Platonic *simulacrum*. The image/copy is now considered as an aesthetic in its own right and one that 'reverses Platonism', as opposed to Foucault, Baudrillard, Eco and Žižek's belief that the image and the copy are an anti-aesthetic that imperil and occlude the real.

While I have made a case for explaining simulation through praxis, or simulation-as-process in the introduction, we face similar but lesser difficulties if we describe what simulations *can or cannot do* (what is ultimately simulable) and what system of means generates the simulation. Since the problem tends to be irrepressibly bound to technology and the simulative medium nowadays, if we sufficiently advance both, the potential for simulation becomes irresistible. This forms the basis of Nick Bostrom's computer simulation argument, a hybrid theory which merges Cartesian and Kantian phenomenology[6] with the infinite possibilities permitted by advanced computer power and programming.

In 2001, Bostrom published a paper, revised two years later, with the suggestive title "Are We Living in a Computer Simulation?", making the argument that a sufficiently advanced posthuman civilisation might want to "run detailed simulations of their forebears or of people like their forebears" (243), although offering no specific reason why they would want to do so.[7] Bostrom departs from the assumption of "substrate-independence" (244), a concept within the philosophy of mind that describes how "mental states can supervene on any of a broad class of physical substrates" (244). This implies that mental states such as consciousness are not dependent on particular physical states but can inhere in various others, manifesting themselves through them while additionally influencing them (the mind-over-matter argument) – essentially Husserl's philosophy of a consciousness which is not *in* the mind. Bostrom adopts this merging of idealism and materialism into his argument for consciousness, since a computer simulated human being must be both sentient and conscious (in partiality).[8] If consciousness can be said to manifest itself through "carbon-based biological neural networks inside a cranium" (244), the substrate-independence theory should in principle see consciousness being liberated

[6] Immanuel Kant's "transcendental idealism" posits that ultimately "we can have no cognition of an object, as a thing in itself, but only as an object of sensible intuition, that is, as phenomenon" (17-18).
[7] Lisa Randall has dismissed Bostrom's hypothesis on his wide application of probability theory, but also on the grounds of species-narcissism, saying that "it's incredibly egotistical for us to assume that some highly advanced civilisation would build simulations that look just like us, and the probability argument only works if countless alien civilisations saw the human species as something worth simulating."
[8] It is a precondition for all simulated beings that sentience and consciousness remain partial. While the fear of 'awaking' harks back to Plato's Allegory of the Cave, full consciousness is not desirable due to the moral and computational implications involved in maintaining the simulation running smoothly. Bostrom suggests that a reality-simulation might need to constantly edit simulated brain states if the simulated being discovers anomalies in the system, or "skip back a few seconds and rerun the simulation in a way that avoids the problem" before it "spoils the simulation" (247).

from its fleshy enclosure and reproduced through advanced silicon-based processors inside a computer, a surrogate for the human brain (244).

Says Bostrom, a "posthuman simulator would have enough computing power to keep track of the detailed belief-states in all human brains at all times" (247), with an estimated ~10^{33}–10^{36} operations per second, the equivalent of processes in one human brain multiplied by 100 billion humans over a 50-year period (246-7). This projection is reached when one takes into account all immediate visual input (~10^{14} operations for retinal enhancement) (Moravec qtd. in Bostrom 245) or synapse-triggering (~10^{16}–10^{17} operations per second) and factoring in macro-level changes and experiences of the physical environment (246). Memory is not considered to place heavy demands on simulation in comparison to simulating the brain cortex since the "maximum human sensory bandwidth is ~10^{8} bits per second" (246), therefore sensory events incur negligible cost. Moreover, a silicon-based digital simulation would result in "substantial efficiency gain" over a carbon-based biological being since non-biological processors are considered "more reliable and more versatile" (246).

Bostrom finally makes the convincing premise that ultimately how much computing power is required to run a world simulation depends on the scope and granularity of the simulation (247), or in other words, detail to phenomenology. This concept is intrinsic to simulation studies today and in its broad Husserlian idea relates to what is perceptible and experiential through one's consciousness or point-of-view; how objects appear and how they are experienced. In materialistic terms, this can also be discussed through DeLanda's notion of "the structure of the space of possibilities"(DeLanda 5), whereby an object or entity's spatial structure may be such that it leads to some properties being actual and others remaining potential unless exercised. (DeLanda illustrates this point by explaining that a knife's sharpness is its property and is dependent on its triangular atomic structure, otherwise it would be blunt, while its capacity to cut things is potential until exercised – we would not know how 'cuttable' an object is nor how sharp the knife is until it is used to cut said object) (4). In short, entities – whether simulated or not – display "an ontological relation between properties and capacities" and "while properties can be specified without reference to anything else capacities to affect must always be thought in relation to capacities to be affected" (4).

Simulations are therefore phenomenological. Like virtual reality systems, their reception and success is determined by participant behaviour, sense and affect. Berkeleyan in phenomenology (*esse est pericipi* for Berkeley meant that objects of sense exist only insofar as they are being perceived), simulations like Bostrom's could permit realism of affect and perception without compromising on the computer power required to run them in real time. To this effect, Neil Bostrom's computer simulation argument offers a rather neat Berkeleyan logistic when he claims that:

> Simulating the entire universe down to the quantum level is obviously infeasible, unless radically new physics is discovered. But in order to get a realistic simulation of human experience, much less is needed – only whatever is required to ensure that the simulated humans, interacting in normal human ways with their simulated environment, don't notice any irregularities … On the surface of Earth, macroscopic objects in inhabited areas may need to be continuously simulated, but microscopic phenomena could likely be filled in *ad hoc*. (246-7)

While obviously Bostrom's hypothetical simulation does not negate the presence of a non-observable or supra-segmental reality, the mechanics of a world simulation prioritise individual consciousness over scope and granularity (247). The devil might be in the details but first he should reside in the mind.[9] How we personally and consciously experience the visible world determines the success of a computer simulation in which we are simulated entities among millions of others. For Bostrom, the supra-segmental reality is sensorially irrelevant – we are aware that the physical universe is composed of atoms, yet this is not what we see, nor what catches our mundane attention. Essentially, therefore, partial simulation should be enough to permit the observability of the world as it literally unfolds in front of one's eyes in sufficient detail, enough "not to notice anything suspicious" (13).

Bostrom's computer simulation argument remains a thought-experiment in the affordances of simulation and the simulable. The conclusion derived is that "unless we are now living in a simulation" (with there being no actual way of knowing as the system would be programmed to filter states of consciousness), "our descendants will almost certainly never run an ancestor-simulation" (255) due to the high possibility that "no species at our level of development [will ever] become posthuman" (251). Beyond the high probability of (near)extinction, near-extinct

[9] In his "Meditations", René Descartes discusses his "malignant demon" or *deus deceptor* ('deceptive god') hypothesis, a metaphor for a powerful illusion capable of deceiving the senses by simulating an external world and bodily sensations (79-84).

future generations might not have acquired, mastered or rediscovered the technology necessary to permit world-mind simulations by this stage, or certainly, none which would have simulated subjective mental states.

While Bostrom's simulation depends on essentially materialist mechanics to run (a supercomputer which generates consciousness) it is also ultimately Plato's Cave redux. This means that it allows for multiple levels of reality of which we, as simulated entities, occupy one yet we cannot possibly know which since in Bostrom's words, "the posthumans running our simulation are themselves simulated beings; and their creators, in turn, may also be simulated beings. Reality may thus contain many levels" (253). One would be tempted to make facile associations here by associating all simulations or simulation-making that are idealist in concept with counterfeit, duplicate or inferior realities whose objective is to mask or negate a real source. However, this is certainly not the case with ST, since it is certainly not the objective of a mind reader to mentally simulate self-deceptive states of mind or duplicate a subject's experience with the intention of appropriating it. (Empathising with others and 'being in their shoes' does not imply that I want to be them but rather *think* like them).

Similarly, the argument that simulation is a reproduction of a lesser copy – that it is only an imitation or a surrogate experience – denigrates the power of mimesis and its propensity for construction, creativity, access to complex information and forecasting. Implicit in my claim that simulation moves from mimesis to poiesis is therefore the notion of simulation-as-process rather than simulation-as-product, which allows little scope for evolution or progress and is therefore a static reproduction. We are reminded of Herz's claim here and mentioned in the introduction to this study, that simulation functions as a predicate rather than a subject; like verb phrases in a sentence, simulation qualifies itself through an action (a story simulates an altercation between lovers; a computer simulates thunder cell formation; a diorama simulates a Napoleonic battle and so on).

If simulation starts first as a mimetic process, then we now need to look at the way this process works. I will argue that a discussion of mimetic representation is also prone to error (there are various forms of mimetic representation, and most do not simulate anything), yet as seen from the theories previously discussed, simulation is by nature re-presentational in assuming that various aspects of reality

can be re-presented through modelling. It now behooves us to ask what type of models can be used for simulations, how they simulate and when they fail to do so.

1.6 Summary

In an age of big data analysis and computer modelling, a traditional semantics behind the term 'simulation' and its platonic associations with imitation or pretense has necessarily ceded ground to more versatile, if not opposite, applications of the term. I have made the argument that this pronounced shift in the term's conceptualisation and use arose from, or despite being marked by, a semantic fallacy which tends to be overlooked or ignored. This fallacy arises from the intrinsically exclusionary ambivalence of the term. The Oxford English Dictionary, for one, defines simulation in terms of imitation with deceptive intent or to describe surface resemblance, but also describes it as the imitation of behaviour for the purpose of study or training. The pervasive use of powerful computer simulation models today is evidence of an epistemic shift, one where simulation has undergone conceptual and practical reconsiderations beyond ontological discourse. Simulation is now foremost considered an epistemological tool based on mimetic processes necessary for the testing and validation of scientific processes to further scientific knowledge. Thus, considering simulation from the perspective of praxis, as a process of enacting behaviours within a system of mimetic reproducibility rather than treat it ontologically would help explain the epistemic shift that has occurred over time, more incidentally with the advent of information modelling. In short, we need to start considering what simulation does, rather than what it is (thought to be).

Another difficulty besetting simulation studies (and the use of the plural form is quite apposite here) is that there is no single theory which unifies simulationist thought or approaches across disciplines as diverse as computer engineering, cognitive psychology and sociological and cultural theory. In part, this is because the concept has had a long association with idealism and the platonic legacy, finding a 'natural' niche in the commodification culture of the twentieth-century and its obsession with images, their processing and their proliferation. Simulation thus defined by Cubitt in the wake of Baudrillard, Jameson, Debord and others is equated with a historical (anti)epistemology – simulation seen as a process which creates simulacra, copies which efface and replace the source. This theory is incommensurate within scientific materialism, which considers simulation to be a

physical process dependent on source inputs and capable of unpredictable and emergent outcomes, proof of complex systems at work beyond the observable.

The epistemic shift that is evident from reconsiderations of the concept does not demarcate an actual historical moment or transitional event, one where simulation ceased being seen an idealist phenomenon and started being considered a scientific tool. For instance, cognitive or mentalist theories of simulation such as those proposed by Gordon, Goldman and Shanton, in which non-deceptive pretense is invoked as a heuristic to imagine and mimic the mental states and behaviours of others, remain quite dominant within simulation theory today, with application to narrative studies. Additionally, simulism, the belief the we are living in a computer-generated reality or that such a reality could be technologically and ontologically feasible (Bostrom), necessarily merges idealism and materialism in its assumption that sentience can be sufficiently simulated through software to permit a convincing 'material' experience of the artificial world, but one necessarily dependent on computer processing and technology.

Finally, simulation needs to be considered as a process which transcends its own mimetic or representational aspects – it is generative and therefore poietic to an extent. Facile distinctions between source and copy or actual and imitation denigrate the power of mimesis and its propensity for construction, creativity, and forecasting when used in simulation. Thus, the notion of simulation-as-process rather than simulation-as-product extends simulation modelling beyond a restrictive and problematic semantics. More significantly, it allows us to consider it entirely within the domain of narratology within which it can be seen to operate, both from the perspective of reader-affect theory (a literary correlative of mind-reading discussed by Gerrig, Oatley, Palmer and others) as well as narrative world-building through the simulation modelling of plausible fictions.

Chapter 2
Simulation Modelling as Science

2.1 Introduction

This chapter shifts the discussion from the ambiguities of semantics to one that considers simulation through its functions – what simulation achieves and how. To this end, we turn attention to simulation modelling, which in both static and dynamic simulation types, is a mimetic process that allows properties, attributes or behaviours of an object to be reconstructed and run on an analogous system or model. This is particularly the case for dynamic simulations which, as Stewart Robinson and Pau Fonseca i Casas assert, necessarily progress over time. This aspect of behaviour-generation which evolves during the process of simulation validates conclusions reached in chapter 1: that pursuing simulation through semantic or ontological definitions is intractable while regarding simulation as praxis (as process) is not. Jeff Rothenberg (75-92) and other simulation theorists have reached the same conclusion in perceiving simulation to be a form of modell*ing* rather than the construction of a final model.

Crucial to simulation modelling is referentiality; a model refers to and substitutes for a source, even if that source is fictional. This aspect of modelling a simulation is particularly interesting since fictional narratives are constructed and enacted along similar principles of representation, even though academics such as Gonzalo Frasca and Richard Walsh have taken issue with such associations. Distinguishing between videogames and traditional narratives, Frasca has argued that simulation is not a form of representation because simulation is an open-ended process whose system permits modifiable behaviour (thus interactive) while representation is traditionally closed, controlled and unmodifiable (as in the case of literary narratives) (221-236). On the other hand, while Walsh has seen no need to oppose simulation and representation, arguing that "a simulation models – that is, represents – a system", he insists that "the crucial point is that it does so in systemic terms" ("Emergent Narrative" 77), meaning that simulation is restricted to reproducing and running rule-based processes rather than "the particulars of a spatio-temporal environment" directly (77). Thus for Walsh it is "simulation and

narrative [which] are categorically distinct modes of representation" (77) since what emerges from a simulation are "certain behaviours of that system … in analogous form" rather than "emergent narrative" (77). Walsh does eventually concede that in the case of interaction with a simulated environment, such as in digital gameplay or interactive narrative where the "fictional world evolves over time" (78), simulation "produces a represented spatio-temporal world [which] is a sufficient criterion for narrativity" (78). Frasca and Walsh therefore consider simulation to model behaviours within interactive systems, which discussion is taken up in this chapter to determine to what extent models can be said to represent behaviours of the source system and what they are expected to simulate.

I argue that while all simulations are necessarily models, not all models are capable of simulation (if by simulation we intend a functional process). In this chapter, it will become evident that simulation proceeds from a form of modelling which *does* involve representation. What this representation entails needs to be clarified in the light of the arguments made by Frasca and Walsh. I therefore propose that we allow the same considerations for the term 'representation' as we did with 'simulation' by differentiating between functional and semiotic representation; the former being capable of generating signs while the latter sequences and reproduces them for interpretation. Models capable of simulation make use of functional representation while those which do not or cannot simulate behaviour only semiotically represent their referent (which is represented as a sign-equivalent).

Functional representation which models behaviour requires effective modelling and maintains a number of correspondences between the physical (or source) system and the system model. The essential connection between system modelling and representation remains the real-world and its referents, however we must be aware of making certain assumptions that may turn out to be fallacious, these being that reality (or aspects thereof) are always readily representable; that the system model requires perfect resemblance or fidelity in order to be successful, and that fictional referents cannot be successfully modelled or represented (the latter to be discussed in chapter 3). Although simulation modelling is mimetic, it does not necessarily require full fidelity or resemblance, as Bas Van Fraassen and John Casti explain, indicating that the criteria for successful representation might lie elsewhere. Crucial principles in scientific representation, such as distortion and misrepresentation, asymmetry, selective resemblance, duplication, scalar

correspondence and model fidelity are therefore discussed in conclusion to this chapter alongside critical readings of Stanislaw Lem's "The Seventh Sally", Jorge Luis Borges's "On Exactitude in Science" and Umberto Eco's "On the Importance of Drawing a Map of the Empire on a Scale of 1 to 1", which texts inform the arguments made previously relating simulation to modelling and thus to a very specific way of representing referents.

2.2 Simulation as Modelling

I have claimed that the falsity/truth ambivalence attached to simulation can be partially resolved if we reconsider the imitative/copying aspect of simulation from a functional perspective – simulation-as-process. Now we need to explain how this process works. The following sections in this chapter are aimed at developing an understanding of modelling mechanisms since simulation is foremost a *mimetic* (representative) activity before it turns generative. Modelling is also a prerequisite for narrative studies since the claim that (some) narratives can be simulative implies understanding how narrative models are constructed and enacted. In the examples that follow I will therefore use analogies that should start bridging the gap between simulation modelling and narrative simulation.

In his report to the RAND Corporation entitled "The Nature of Modeling", Jeff Rothenberg identifies three essential attributes of modelling, which are

1. *Reference*: It is *of* something (its "*referent*").
2. *Purpose*: It has an intended cognitive *purpose* with regard to its referent.
3. *Cost-effectiveness*: It is more *cost-effective* to use the model for this purpose than to use the referent itself. (77)

The first attribute is modelling's representative or referential function, linking the model to its referent or set of referents. In this case since the model *is not* the referent but *stands for* the referent or some of its elements; we can say that modelling is a form of representation. Jen Webb describes the latter in terms of "substitution" (2)), "the process of standing in for someone or something, or acting as a substitute for the 'real thing'" (3), the referent in this case. These qualifications – acting as, substituting, standing for – should be overly familiar from definitions of simulation we have considered so far (specifically Frasca's) in this dissertation's introduction since "to

simulate is to model a (source) system through a different system which maintains to somebody some of the behaviors of the original system" (Frasca 223).

Models which are not modelled on real-world referents still require a referential framework (being modelled *on*) if they are to be rendered at all intelligible. As a temporary side note, we can name fictitious entities such as Italo Calvino's fifty-five inexistent *Invisible Cities*, *The Blazing World* in Margaret Cavendish's utopia, the magical steampunk world of Bas-Lag in China Miéville's novels or Metropolis and Gotham City in popular culture. We can additionally refer to semi- or quasi- fictitious referents such as Avalon or Atlantis, all described in sufficient detail to permit a form of identification with, and speculation, as to the model which inspired their construction. As intelligible models they simulate possible but non-actual worlds, inviting various reactions from us. Therefore, a model need not represent anything real (Rothenberg calls it a "pseudo-model") (78). However, in the absence of an existing referent, its substitute "must be objectively testable in order to serve as 'reality' for the model" (78). This condition is particularly binding for fictional constructs such as fictional worlds and their characters, actions and events, with the crucial difference that the condition for objective testability mentioned by Rothenberg is replaced in a work of fiction with the condition of "fictional verity" (Eco, "Fictional Places" 436), Eco's interpretation of Samuel Coleridge's argument for suspending one's disbelief when reading implausible narratives. As Eco says, "these [fictional constructs] do not excite our credulity, because, by virtue of the fictional pact that binds us to the author's words, even though we know they do not exist, we *pretend* that they exist" (436-7).

In situations where the model is however based on an actual referent, the reasons behind constructing the model are manifold but usually related to Rothenberg's third attribute, that of cost-effectivity. In some instances, it may be easier, cheaper or more ideal to simulate behaviour or phenomena than attempt to measure or observe them in real-time and *in situ* (for instance tracing the creation of black holes from the collapse of a super star, which process yields tremendous amounts of magnetic radiation). However, a model's construction depends on its functional aspects; what aspect/s of its referent is intended to be modelled since "no model can faithfully reproduce *all* aspects of its referent (only the referent itself can do this)" (Rothenberg 78). Rothenberg follows this claim with the principle that a model can never be "identical to its referent" but is always "an *abstraction* … in the

sense that it can never be completely faithful to it" (79). Mar and Oatley make a similar point, which is that because "all simulations rely on abstraction", incorporating only essential data through "selection and exclusion", they "are not direct copies of reality" (175-6). This is also the issue with representation, of which modelling is ironically perhaps the most faithful instance. Apart from the limits of representation – since there are things lying "beyond representation or beyond satisfactory articulation" (Webb 4), such as one's own death – there exists the bigger issue of re-presentation, in that "any representation changes 'things as they are' if it makes those things present in a different way'" (7), which is after all what (re)presentation means. In like manner, to model a referent is to represent the referent otherwise, using a different medium (and therefore, a different frame of reference). Thus, Rothenberg's report on "The Nature of Modeling" mentions that the modelling media themselves are dependent on "form, their relationship to reality, their purpose, the way they interact with their users, the way they are used, … the certainty of their data …, their treatment of time …, the kinds of questions they can answer" (76) and so on. It is a given that while mathematical modelling, which makes use of "qualitative interaction" (77) to yield "impact" (78), is capable of meeting all of the above criteria on its own terms, this form of symbolic or immaterial representation, to which mathematical and computer modelling belong, might not always be the desired or requisite output. (For instance, there is a reason why crash test simulations are mainly run using physical test-dummies and real cars, although virtual crash testing has also been introduced in the industry.) In other words, choosing which model best simulates the referent is making a conscious choice on how the referent will be re-presented while maintaining a number of fidelity conditions. (This point is discussed further in sec. 2.6).

Despite the fidelity argument – how can simulation models simulate reality as closely as possible – this qualification of modelling (to model a referent is to represent it otherwise) puts paid to simulation's terms of ambivalence mentioned previously, that it can be both reality-obstructing/reality-validating. Rothenberg's argument that a model is an abstraction of its referent (and not an actualisation) can be extended to simulation itself. Simulations are identifiable with but ultimately *distinguishable from their referents*; essentially we are aware when an object or a process are being simulated and when they are not. In this, there can be no attempt at deception. However, should simulation be capable of completely erasing or

blurring the distinction between referent and its simulation, when the simulation or the model *is* the referent, as in the case of Jorge Luis Borges's map of the empire on a scale of 1:1 (2.8), a veritable epistemic and ontological problem is posed. We would then be haunted by the spectre of Baudrillard's simulacrum, the "desert of the real" (Baudrillard, *Simulacra* 1). We would also be right back at the very beginning of the simulation paradox. Despite these philosophical conundrums, scientific empiricism has little time and regard for the latter beyond the speculative, and while the dangers and implications of simulacra have provided varied and fertile philosophical discussions since Plato's attack on the 'thing' itself and its images, simulacra have largely been relegated to the realm of speculative fantasy, science fiction and literary fiction.

Rothenberg's claim that "there is little consensus on how simulation relates to modeling" (77) – by which he means that it is broadly thought of as a way of using models in a general rather than particular manner, or by using a highly specialised subset of techniques – does not imply that no connection exists. In fact, a number of authors introduce modelling as a prerequisite to simulation.[10] In this study I employ the term 'modelling' as one of the necessary stages which representationally assigns to simulation – and implements – those functional parameters that render simulation an actual process. In other words, simulation *proceeds from* a form of modelling which *involves functional representation*. Marko Hofmann, J. Palii and Goran Mihelcic similarly claim that "models are conceptualizations of (real world) referents and computer simulations are executable expressions of these conceptualizations" (135).

Rothenberg identifies a number of aspects of modelling found in simulation, which are "comprehension, planning, prediction and manipulation" (78). These approaches can be subsumed under behaviour or affect in that they require user interactivity. (Frasca makes a similar point when he states that simulational media permit simulation only as long as they allow manipulation of their internal rules to output a result.) (Frasca 227-29). For Rothenberg, therefore, simulation involves constructing an "active, behavioral analog of its referent" which "models sequences and (possibly) timings of events in the real world" (80). "Simulation is a *process* in

[10] Among others, *Simulation Modeling and Analysis* (5th ed.) by Averill Law (2014); *Simulation Modeling and Analysis with ARENA* by Tayfur Altiok and Benjamin Melamed (2007); *Simulation: The Practice of Model Development and Use* by Stewart Robinson (2014); *Modeling and Simulation: Theory and Practice*, edited by George A. Bekey and Boris Y. Kogan (2003) and *Formal Languages for Computer Simulation* by Pau Fonseca i Casas (2014).

which a model of *any* kind is used to imitate (some aspect of) the behavior of its referent" (80).

The construction of a simulation model might initially involve abstract representational inputs (usually mathematical) which establish the ground-rules for the simulation before it can take place. In themselves, these representational inputs are semiotic markers assigned to depict attributes, properties, values or set parameters, yet of little unique or independent value otherwise. Think of a lexical inventory consisting of hundreds of thousands of words which discretely have very little purpose if not acting as simple referents, and often abstract nominal ones (e.g. preposition words such as 'since' or 'on'), but which acquire semantic significance in syntactical combination and in context. Modelling therefore involves a bottom-up approach to simulation, and it is only when these inputs are made to converge syntactically that the process is set in motion.

A mathematical model theory of simulation is usually the most common bottom-up approach adopted since models constructed out of pure information are the easiest to compute and replicate digitally, especially in cases where the objects being observed have properties which are not amenable to controlled laboratory experimentation, planetary formation for instance. Employing known physical laws by taking into account the "gravitational attraction of particles, angular momentum and conservation of energy" and introducing "lumps of matter into smooth, homogenous clouds of various compositions …] rotating in different ways" (Dole qtd. in Casti 10-11), all computed as a set of mathematical propositions, Stephen H. Dole was able to simulate a number of fake solar systems in 1969 that were qualitatively similar to our own in terms of planetary mass and distance from a central star. This proved that with a proper understanding of the tendencies for the coalescence and growth of planets, rules could be constructed to allow for the manipulation of variables until the experimental simulation was able to generate an entire and virtual planetary system. Dole observed that "planetary or multiple-star systems still result when the parameters are altered over a wide range" (Dole 13), as long as the *a priori* conditions for planetary formation are adhered to. While various input combinations produced planetary configurations which ranged from numerous small planets to "small inner and outer planets [with] very large midrange planets, [t]he main point of the exercise [was] that … combinations of input parameters […] produce synthetic planetary systems bearing a close resemblance to the solar system" (Dole 15).

A bottom-up approach to simulation modelling therefore allows us to go further in our analysis of a model's relationship with its real source. It allows us to interrogate a simulation's model internal construction and consistency, all factors which determine its *permissibility* not merely in the surrogate world of computer software but in the external world on which it was generated. This element of permissibility is of particular interest when we discuss the simulation of fictional pseudo-referents in narratives in chapter 3.

2.3 Static versus Dynamic Models

Modelling and the functional aspects of simulation are interrelated. The sections that follow theoretically address this interrelationship to explain in more detail *how* simulation simulates (or how it represents), and *what* is amenable to a successful simulation (or what can be modelled). If we concede that narrative is an analogue of simulation modelling in some respects, the principles which emerge can then be mapped against specific narrative methods in an attempt to establish whether narrative simulation has any practical basis beyond the theoretical.

The paradoxes that accompany simulation modelling and the simulable (what can be modelled by simulation) complicate matters. In chapter 1 we established that a fixed definition of 'simulation' is impossible since the term's meaning is dependent on its use (which use is also marked by context). An inability to speak of *a theory* of simulation likewise leads to similar problems with identifying *a theory* of modelling. Although the burden of ambivalence which introduced this study discussed the problems which arise in pursuing semantic definitions of the term 'simulation', similar but lesser constraints are evident when we attempt to define simulation through praxis. These constraints arise when specifying what simulations can or cannot do as modelling mechanisms.

The following functional definition is given by Stewart Robinson, who like Jeff Rothenberg and various others, discusses simulation as "[a]n imitation of a system as it progresses through time" (3). The *active* or *dynamic* aspect is crucial to Robinson's (and others') understanding of simulation, to which he attributes computer-based simulations such as those used in weather forecasting and game consoles as well as non-computer based physical simulations such as model railways and remote-control boats. Robinson however goes on to give other examples of simulations which *do not* progress through time, such as the football player who simulates foul play, the

forger who imitates the work of a great artist or "the Strip in Las Vegas [which] is full of imitations: the Eiffel Tower, the New York skyline, Venice" (2). For Robinson, these are static simulations, but simulations nonetheless, differing from the previous examples by existing only "at a point in time" (2).

Robinson's attempt at arriving at a functional definition of simulation is however undermined when it is conflated with the semantic problem described previously. For Robinson, "imitation implies mimicking or copying something else" (2). In claiming that simulation is the "imitation of a system" by basing it solely on a temporal context ("as it progresses through time"), Robinson's definition confuses process with product and system with object. Robinson assumes the forger's work to be a static simulation and identifies the forgery with a simulated product which does not evolve further (a simulacrum). Yet the process of its production, simulation-as-imitation, and one which occurred over time is not taken into account. Similarly, the Las Vegas attractions are static objects which however serve to actively modify and shape human behaviour and activity, simulating a particular historical and cultural reality. More problematically, while weather patterns can be called a system since one can observe complex variable changes occurring over time, this system is not analogous to controlling a model boat or placing model trains on a closed loop. Certainly, the activity of the latter will also unfold over a period of time, to the point of annoying repetition, yet what complex behaviour is being modelled here or how commensurate these 'systems' are with their real-life counterparts remains questionable. Is there a propensity for a change in their state of affairs? More specifically, what is being simulated here: a scale model of a train as it completes its predestined trajectory, with the occasional switching of tracks, or a system which intelligently monitors and autonomously optimises and directs traffic on a rail network (not the case with the model railway)?

Robinson's identification of *moving* model trains and boats as simulations recalls to some extent Frasca's assertion that "simulation can exist in non-electronic devices such as traditional toys" (Frasca 222). Like Robinson, Frasca considers toys (or any other object) to be simulative; however, unlike Robinson, his definition of simulation stipulates what the simulation *ought to do* for it to be called a simulation. Frasca differentiates between object representations – when they exist as signs – and object simulations – when they are "not only signs but machines that generate signs according to rules that model some of the behaviors of [the source object]" (Frasca

223). Movement, for Frasca, would only be *one* of the source object's behaviours. A more crucial aspect would be simulation's *relative unpredictability*, which unlike a represented object, such as a plane landing in a film sequence or a photograph, has no "fixed or unalterable" (223) outcome and is dependent on user input data. (In a simulation, the plane may or may not perform a smooth landing, or not land at all). Frasca's functional definition of simulation therefore is one based on user engagement, a term I prefer to his more limiting use of the word "manipulate". Through engagement, a variety of actions will "modify the behavior of the system in a way that is similar to the behavior of the actual [source object]" (223). When the level of similarity or the level of engagement/user input are low, we face a partial simulation or merely, just a static model.

In Robinson's definition, the term 'simulation' is somewhat liberally applied, and while it is understood that simulation involves some form of modelling, or to use Robinson's term "imitation", not all forms of imitation/modelling are fit-for-purpose, or simulative. Therefore, while all simulations are by necessity models, not all models are capable of simulation. (Again, recall my response to Robinson's model train as an example). Likewise, we may frame the proposition thus: *not all simulations are capable of effectively modelling behaviours*. To understand this final point, and especially since we need to revisit these concepts later in discussing simulation *as* narrative (Part II), we must discuss what effective modelling is, to what extent it is representational and how it represents. By discussing a number of theoretical principles related to simulation modelling and representational strategies, I hope to clarify the claim made in section 2.1, that simulation is a process of modelling which involves functional representation.

2.4 Simulation ≠ Representation?

Frasca would disagree with my use of the term 'representation' to define the simulation process, claiming that although we have constantly relied on narrative modes of representation to understand, give structure to and explain our realities, "it is usually difficult to accept that there is an alternative to representation and narrative [which is] simulation" (Frasca 222). Frasca structures his argument for simulations *not being* representational mainly on the premise that simulations provide a mechanics of manipulation and open-endedness which is otherwise lacking in more traditional representational forms such as narrative. Says Frasca: "we like to

believe that we are responsible for the consequences of our actions – but it is not a feature available in storytelling. After all, as we learned from classical Greek drama, stories and fate go together" (226). But "unlike what would happen in storytelling, the sequence of events in a simulation is never fixed. You can play it dozens of times and things would be different" (226).

Frasca does acknowledge a shared terrain between narrative representation and simulation, which is that of semiotics, yet while traditional textual media are "made of sequences of signs" (222), non-traditional simulational media such as cybertexts (Espen Aarseth's term) or games "behave like machines or sign-generators" (222). The generative capacity of simulation, which I have called poietic, is therefore highlighted by Frasca as the reason why simulation is not representational nor based on representation. Traditional media might "excel at producing both descriptions of traits and sequences of events (narrative)" (223), but their representational facility does not permit them to "generate signs according to rules that model some of the behaviours of [the referent]" (223). On the contrary, simulation "does not simply retain the – generally audiovisual – characteristics of the object but it also includes a model of its behaviours. This model reacts to certain stimuli (input data, pushing buttons, joystick movements), according to a set of conditions" (223).

The argument set by Frasca could be construed in terms of the limits of representation and what becomes unrepresentable. Jen Webb cites Christopher Prendergast's claim that "everything is representable" (qtd. in Webb 4), yet as we have briefly discussed in the previous section, there might be domains of conscious personal experience – such as one's death (or birth, I might add) – that quite ostensibly do not lie within the possibilities of factual representation. Webb also cites Theodor Adorno's haunting reference to the 'unrepresentability' of the Holocaust (qtd. in Webb 4). Then again, if writing poetry after Auschwitz is barbaric, according to Adorno, it certainly has not stopped writers, photographers, artists and film makers from representing the Holocaust, whether they were its survivors or not. The same applies to cognitive experience and other phenomenal aspects of our mental lives, as well as the experiencing of life and death – narrative, artistic, filmic and ludic representation (the subject of Frasca's study) has certainly taken us even beyond the latter and well into the after-life. This inevitably brings us therefore to Prendergast's other observation, that "it is not that representation as such is impossible; it is rather

that it fails in its task" (qtd. in Webb 5). One presumes here that it fails to capture a good mimetic likeness of the source, a factual verisimilitude, whether by design, accident, inability or limitation.[11]

In Frasca's claim that "simitiocs" (simulation semiotics) involves more than sign sequencing and interpretation but sign-generation (223) I see a shift in the argument from simulation as non-representational to simulation and affect. Frasca explains how visualising a process through a traditional medium such as film and through a simulation might look exactly the same; "their semiotic sequences might be identical, but simulation cannot be understood just through its output. This is absolutely evident to anybody who played a game: the feeling of playing soccer cannot be compared to the one of watching a match" (223). According to Frasca, user manipulation or engagement in this case are what reconstitute simulation's semiotic sequences through their experimentational or performative potential. For Frasca, simulation must have the capacity for affect – one feels what it is to play soccer; one influences the game of soccer by playing it – and while narrative representation might (partly) achieve sensation, it fails to achieve "indeterminacy" (226) (of outcome). Thus it is not generative or poietic.

This is all well and good except for the fact that simulation – whether of the ludic kind predominantly discussed by Frasca or the more experimental epistemic forms I have used as illustrations so far – still require a representational framework and a representational dynamic prior to user engagement or manipulation. One definition of representation offered by Prendergast is that representation is "to make present again, in two interrelated ways, spatial and temporal" (qtd. in Webb 8). This is representation as *"Darstellung*, the notion of making or *rendering* presence" (8). The second is "*Vertretung*: the substituting of something for something or someone else", or "*delegating* presence" (8). In both respects, simulation as an act of modelling *something* implies both spatio-temporal representation *and* delegation. According to Prendergast's first definition, a simulation necessarily co-exists in the real world but is still separate to its source, therefore it re-presents it. Accounting for the second definition, user presence occurs either through digital proxy (since operationality within a simulation implies the user's behaviours being simulated in-game) or by pretension (the user pretends he is actually piloting a plane in a flight simulator, for

[11] Artistic license, for one, and the object of Plato's discontent, is a deliberate refusal of "the logic of representation" (Webb 5), an attempt at conveying something else or something otherwise, perhaps to capture "a mood, a feeling" (5). It is a case of misrepresentation by design.

instance); either way both instances imply delegation. Simulation therefore does not simply actualise what is conceptual by creating a digital or physical surrogate, but it also employs forms of character embodiment or incorporation (viewing the game world versus being-in the game world).

The argument therefore is not that simulation and representation are dissimilar, but what affordances are granted by simulative representation (certainly a lot more) which are not granted by other forms, such as static models, pictorial art, photography, performance, cinematic narrative, textual narrative and digital narratives/cybertext. Simulation cannot be divested of representation. One cannot simulate the experience of death or dying (ostensibly with the aim of averting it, since in digital games one of the innate rules would be survivability, which implies not dying at all costs – unless the experience of death *is* the target experience) before this has been sufficiently and objectively modelled for the user to re-experience it subjectively. Whether outcomes are fixed and decided, or more flexible and open, simulations remain governed by internal rules. They may be rules that "can be manipulated, accepted, rejected and even contested" (Frasca 227) but rules which elicit similar constraints and approaches in simulations as would any other representational system (interactive or not) which also imitates real or fictional systems. The fact that one cannot merely cross over a broken bridge in one leap in a realistic simulation (the same applies for games with physics-fidelity engines) does not make it any different in the narrative description of a character who similarly must find a way to cross over to the other side without risking his life with a single leap. And when fictional characters *do* jump (or fly) over incredible spans with ease, the issue is not with the medium but with choice of genre and its affordances with spectator/reader/gamer beliefs. In either case, representation, like simulation, is intended to be functional; it "is *made* to happen; and it is made to happen by people" (Webb 8-9).

Frasca asserts that simulation certainly does not "announce the end of representation" since the latter remains irrepressibly popular; "it is an alternative, not a replacement" (241). But as I have attempted to show, it is *not* "an alternative" to representation – there is no alternative. Simulation is the natural and next logical extension to mimetic representation, a hypermimesis if we will. Simulation may certainly "contes[t] our notions of authorship and also the boundaries that we are used to apply to works of art [due to] meta-rules" (Frasca 241). However, these meta-

rules that allow a user to modify the conditions and structure of the original simulation model "do not imply either the death of the author or the player's freedom" (240). In Frasca's words, "with or without meta-rules, the simauthor [simulation creator] has the final word [and] total player freedom is impossible since it would imply that no rules are unchangeable and therefore the game could literally become anything" (240). If simulations must be anything at all, they are definitely *about* something and cannot simply "become anything" as this would compromise the structural integrity that allowed them to be modelled in the first place.

If simulation is an act of modelling – and Frasca's argument for meta-rule creation is explicit enough in this regard – this requires a form of mimetic representation to occur at various levels, cognitively and systemically. Consequently, it follows that simulation is representational *to some degree*. This would explain why Frasca admits in an afterthought that "simulation and representation only differ in a matter of degree. But for the sake of clarity during these early days of ludology, it may be safer to consider them as different" (243). We must therefore accept that Frasca's arguments for simulation and narrative representation are primarily ludic and not extended to other forms of modelling or representation, nor are they final.

2.5 Representation→Modelling→Simulation→Re-presentation

If, as Frasca insists, simulation is not representational, then what is it? Jeff Rothenberg, and quite a few others[12] as a matter of fact, treat it as such. "A model is a special kind of representation" (79) asserts Rothenberg, while "simulation is a kind of *modeling* rather than a kind of model" (80). Note how Rothenberg's emphasis on the present participle suffix in his definition tallies with Herz's use of the term simulation as a sentence predicate ('to simulate') (see introduction and sec. 1.5). In this manner, simulation qualifies itself through action, not as an object or an end-product. But here we must be careful. Is film, certainly a representation of narrative in motion, a simulation? Frasca would claim that it merely represents the film maker's ideology or vision but does not allow its audience to physically contest or adjust that narrative by manipulating its structure or story. Rothenberg would probably claim that while the process of film creation is simulative (an act of modelling), viewing the final product is not. The same could be said of the performing

[12] Refer to ft. 9, section 2.2.

arts, which are certainly action-based but not all being experimental enough to permit evolution, unpredictability of outcome and audience involvement.[13] *Depictions* of dynamic action as such, therefore, are not simulations; clearly a lot more is demanded of simulation modelling than just a process of visual referentiality.

At this point we can derive a cognate from my previous assertion in section 2.3, which was that while all simulations are by necessity models, not all models are capable of simulation. We may propose the cognate as such: *models capable of simulation are functional representations of X while those not capable of simulation are just semiotic representations of X.* This clarification of how simulation relates to modelling as well as its representational capacity draws from Robinson's and Frasca's gripe with static simulation and representation respectively, both of which concern close-endedness (sec. 2.3). Central to Robinson and Frasca's definitions of simulation is the notion of process and function; for Robinson, simulation must have a dynamic aspect (be able to progress through time) while for Frasca it must be capable of reproducing or generating behaviours. Conversely, for Robinson, static simulations which do not progress or evolve in time are simulacral while Frasca maintains that any form of imitation which is not capable of generating "indeterminacy" (226) is merely representational. The distinction being made here therefore, is between a model which enacts and permits a number of behaviours, and therefore has a functional capacity, and one which is referential but 'passively' semiotic. These are also phenomenologically distinct.

Modelling/simulation-as-process implies a presence – it supplements real-world behaviour. This form of functional representation allows us "special insight into how to … shape [a slice of] reality to our own ends" (Casti 18). On the other hand, simulation-as-semiotics implies an absence – non-behaviour. Static displays provide at best explanations regarding past observations but are otherwise "silent" beyond this" (Casti 18). To illustrate, a photograph of the Coliseum (or DeLillo's Most Photographed Barn)[14] for promotional purposes does not stack up in terms of simulational capacity against an augmented reality application that dynamically overlays in real-time the Coliseum in its heyday with the existent ruins of the present

[13] Frasca mentions Augusto Boal's "Theatre of the Oppressed" which combines "forum theatre" with audience games to encourage critical social and political debate. Boal's "forum theatre … re-enacts the same play several times by allowing different audience members to get onto the stage and take the protagonist's role … The audience is encouraged to participate by improvising solutions to the problem being staged" (227). Thus, for Frasca, forum theatre is simulative.

[14] See introduction.

day. Both are representations of the Coliseum, certainly, but the former cannot be said to *simulate* the Coliseum but merely *represents* it (in a much reduced, partial, and commodifiable form) while the second simulates the experience of the user being-present-in-the-past. The two are therefore phenomenologically distant. Representations which simulate or which model something involve processes and a degree of engagement by the user. They are generative and poietic, not merely replicative.

Given that models are representational, how do they simulate? Or to be more specific: what type of models are capable of functionally representing a number of behaviours or aspects to the extent that they can be considered good simulations? Pau Fonseca i Casas proposes the following:

> Simulation is the imitation of the operation of a real-world process or system over time. *The act of simulating something first requires that a model be developed*; this model represents the key characteristics or behaviors/functions of the selected physical or abstract system or process. *The model represents the system itself, whereas the simulation represents the operation of the system over time.* (265; my emphasis)

Fonseca i Casas's definition consolidates previous definitions that discuss simulation in terms of imitation, process, real-world reference, behaviour, and temporality, but crucially differentiates between the *system model* and the *finished model*, which is the simulation itself. The temporal aspect of simulation, its "operation of the system over time" (265), again recalls Robinson's distinction between static and dynamic simulations, with emphasis now being squarely placed on a simulation's unfolding "over time". Essentially this means that for simulations to simulate something, one expects to see what emerges from the interactions that occur from the system's characteristics, independently or not of user manipulation. The implication is also that static 'simulations' do not essentially simulate anything as no real-time or real-world process is occurring; they are merely descriptive system models which, according to John Casti, cannot be "manipulated so as to modify the reality the model tries to represent" (19). In other words, based on the cognate we developed earlier, *descriptive system models are semiotic markers of X* while *a finished model simulates by functionally representing X*. We can further differentiate a system model and the finished model (the simulation) on the basis of abstraction versus interaction, staticity versus dynamicity, non-contiguity of components versus contiguity of

process, and incompletion versus 'completion'. All former qualities refer to the non-functional system model while the latter qualities are observable in the finished, and therefore necessarily functional, model. Simulations are therefore *functional, interactive models* on which a *change or emergent behaviour can be predicated*.

Consider Naim A. Kheir's model of simulation modelling below (Figure 1):

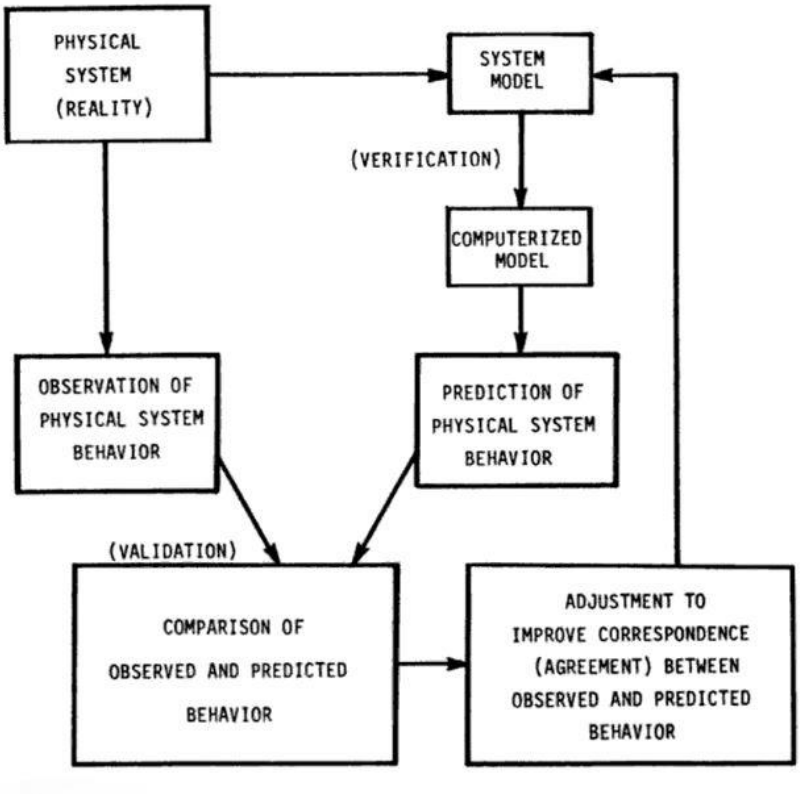

Figure 1: Cross validation of system and real-world behaviours
Source: Kheir, *Systems Modeling and Computer Simulation* 5

Kheir equates "system" with *any* reality based on "any ordered set of interrelated physical (or abstract) objects" (5) while "modeling" is "the study of the mechanisms inside a system" inferred through "physical laws and relationships" (5). Theoretically, therefore, a "system model" (5), or its computerised implementation, can be autonomously run based on internal laws or relationships, yet in reality the success of a simulation depends on very stringent correspondences – or at least a close approximation – with what Kheir calls the "physical system" (5). In fact, the diagram above displays all models and processes stemming from the physical system, a metaphor for the type of reality being simulated, but also one which is necessarily reducible to a materialist ontology (it must be observable or measurable).

The construction of a system and computerised model – the simulation – is an ongoing empirical process requiring full observation of the behaviours to be

simulated in an attempt to lessen inaccuracy when these behaviours are generated by computer. But regardless of its complexity, a computerised/ simulation model remains a re-presentation of reality because while it reflects the physical system (source reality), this reflection (its compositional structure) has been assembled through "the modeler's understanding of the reality, its components, and their interrelations" (Kheir 5). (Slavoj Žižek, for one, would argue that representation is culturally mediated and therefore ideological, but also epistemological. Or in the words of Jen Webb, "we can only see, or make sense of what we see, on the basis of how we understand the world to be") (18). But unlike the modelling of fictions, for example, simulation modelling cannot assume certain liberties which are often frequently exercised by the former. Kheir's diagram in fact specifies accuracy and credibility as two *sine qua nons* in simulation modelling which are obtained through validation and verification.

The objective of scientific simulation is precisely to permit replication and prediction of behaviours and phenomena through "replicatively valid" and "predictively valid" models (Zeigler qtd. in Kheir 6). These generate data which matches the "data acquired or to be acquired from the real system" (6). A high degree of correspondence between the physical system (reality) and the system model (simulation) is absolutely necessary. This correspondence is ensured through observation of real-world behaviour. Kheir's model assumes an epistemological approach and implies a pre-test design and implementation phase where users are absent. The creation of a more advanced system model through a computer simulation in Kheir's diagram depends on an interplay of verification and validation processes where the simulation itself is substantiated to ensure that "the computerized model represents the system's model within specified limits of accuracy" (6). Until this is achieved, the model is "modified to reduce the differences between model and system behaviors" (6).

That simulation is an act of modelling and is therefore representational should by now be quite evident. As demonstrated by Kheir's diagram, the essential connection between system modelling and representation remains the real-world and its referents since "models are constructed with the purpose of representing some aspect(s) of reality" (Casti 10). However, we cannot assume that reality is always readily representable (recall Prendergast's argument in sec. 2.4) nor that the reality being simulated is necessarily 'this one' (see chap. 3). Rothenberg's report to

the RAND Corporation mentions how in instances where the model does not ostensibly represent or refer to an actually existing object, the structure of the model must be such that it lends itself to permissible simulation. In this case, the real-world and its laws *sanction* the non-actual object which is synthesised through simulation modelling. Erik Orbons and Zsófia Ruttkay from the University of Twente undertook one such project in creating an interactive application capable of displaying a series of impossible worlds designed by the artist M.C. Escher, whose structures eschew known physical laws by exploiting perspective and illusion over a two-dimensional surface (201-8). Both Escher's constructions and Orbons and Ruttkay's three-dimensional simulation of his structures are an example of how non-actual or downright impossible objects become (pseudo)referents through simulation modelling. In this case, a two-dimensional object which places three-dimensional demands on the viewer is now re-presented/re-configured three-dimensionally over an interactive digital medium (thus laying bare the illusion).

The difficulties of representing/modelling impossible referents aside[15], a real-world referent and its model could be functionally incommensurate, and this is evident in the way the model has been designed to represent its referent. For instance, a rotating and overhanging plastic scale model of the solar system and a digital model subject to simulated changes over a compressed timescale stand for, and represent, the solar system quite differently. In turn, an ink drawing of the solar system, complete with orbital paths and ring particles, might be good enough for someone to identify it as such, but resemblance in this case only presents a much reduced – and subjective – two-dimensional form of representation. (One might additionally claim that a diagram does not model anything, but merely depicts, but then we would have a hard time trying to account for symbolic or schematic models whose mathematics, a further abstraction, gives rise to actual working systems.)

We may be tempted to say that all three models represent the solar system, in that an actual and identifiable referent exists, however none of the three models possess the same *indexicality* (Van Fraassen 59) towards this system (they refer to different *aspects* of the solar system). The plastic scale model indexes the solar system's planetary configuration, dimensions and surface colours, permitting comparison between planets and serving as an educational tool. However, it tells us

[15] Different constraints are encountered for the various media used to represent pseudoreferents, however I will primarily be focusing on textual media and narratives and to what extent they can simulate an impossible referent. See chapter 3.

nothing about their composition or evolution. On the other hand, the digital model indexes planetary formation by simulating the conditions that gave birth to the solar system, validating or invalidating assumptions about its astronomical past. However, the empirical data generated would only be of value to a select few. Finally, a drawing of the solar system represents it graphically, as an assortment of circles and lines whose configuration is intended to clarify or accompany a description or an explanation, but certainly nothing beyond this. Thus, all three models represent the same referent differently in accordance with the models' intended function. It is clear therefore that simulation modelling is not only inseparable from function but is dictated by it (especially if one model is more tractable than another while retaining the required level of representative complexity).[16] What is perhaps more at stake here is the *representational value* (what attributes need to be represented and how?) which we allocate to the modelling/simulative medium.

The literature suggests that it is easier to arrive at certain conclusions regarding the nature of models than trying to define the nature of representation, which as Henry B. Mayo claims, is "something of a [theoretical] morass" (qtd. in Pitkin 6). For instance, Hannah Pitkin discusses representation politically (as representative governance, political representation and so forth), yet reaches the conclusion I reached earlier in this dissertation's introduction where I claimed that semantical definitions eventually tend to outweigh, if not cripple, more functional definitions of the term. Writes Pitkin: "some recent commentators have maintained that 'representation' is vague or 'ambiguous', that it 'may sometimes be one thing, sometimes the other', that it is 'used in various senses in different connections'" (5). She concludes that "representation has no fixed meaning [and] the various theorists disagree because they are in fact talking about different things … Or perhaps, if the meaning is not fixed, each writer is free to use the concept as he pleases" (5). However, in discussing how simulations represent, we are not free to use the concept of representation (or modelling) as we please, as previous discussions should have served to show. The following sections, which conclude this chapter, are intended to illustrate the various paradoxes associated with representation, especially the main contention that resemblance (as a value) is as necessary to representation as it is to simulation modelling. (In fact, it is crucial to neither).[17]

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[16] See Rothenberg's discussion of simulation modelling principles in section 2.1.

[17] *Correspondence* between the physical system and the system model is absolutely necessary, as is evident in Kheir's diagram (see Fig. 1). However, correspondence need not trade on resemblance of

2.6 Representation Of/As

Bas C. Van Fraassen opens his extensive study on the nature of scientific representation by referring to a decidedly unscientific episode where verisimilitude – achieving life-like resemblance – is taken to its representational extremes. The contest between the great Greek painters Zeuxis and Parrhasius, recorded in Pliny's *Natural History* (Bostock and Riley xxxv:36), is perhaps the earliest and most convincing attempts at artistic hyperrealism, a term which has fast gained currency in the visual arts since the emergence of photorealism in the 1970s. It is also an account of artistic duplicity, depending on one's aesthetic bias. According to Pliny, Zeuxis's portrayal of a bowl of grapes was so convincing that birds flocked directly to peck at the painting, with one bird breaking its neck in the process (Kunze). Parrhasius then asked his rival to draw back the curtains behind which his artistic masterpiece lay. Zeuxis was unable to do so as the curtains were not real. Realising that Parrhasius's artistic hyperrealism had deceived a trained artist's eye while his own could only deceive birds, Zeuxis promptly declared Parrhasius the greater artist.

Van Fraassen notes the evident seduction in the notion that representation has to be highly mimetic; after all, verisimilitude (and any deviations from it) is one of Plato's main philosophical preoccupations. However, Van Fraassen draws attention to the fallacy in claiming that representation can be "equated with the presentation of a likeness" or that "resemblance to what is represented is … crucial to representation" (11). While not denying that *some* aspect of resemblance is necessary for representation to occur, Van Fraassen argues soundly that the criteria for successful representation may simply lie elsewhere – in "distortion, infidelity [and] lack of resemblance in some respect" (13).

Van Fraassen cites an axiom by Nelson Goodman, who calls "naïve" the belief that "A represents B if and only if A appreciably resembles B" (qtd. in Van Fraassen 11). He then proceeds to give an example from Plato's discussion of ontology and aesthetics in the *Sophist* where it is clear that regardless of the accuracy (or otherwise) an artistic copy shares with its original, representation is still the result (12-3). In the argument that ensues in the *Sophist* between Theaetetus and The Stranger from Elea, the former's claim that a copy is "something that's made similar to a true thing and is another thing that's like it" (Cornford 239d-240a) is countered

features in order to work, either in the simulation's output and certainly not in its input. Low fidelity simulations simulate processes whether there is actual resemblance to the source or not (sec. 2.5).

by The Stranger who reminds him that this does not apply to images in general and that achieving perfect likeness is not only technically impractical but at times aesthetically unwarranted, as in the case of

> those sculptors or painters whose works are of colossal size. If they were to reproduce the true proportions of a well-made figure … the upper parts would look too small, and the lower too large, because we see the one at a distance, the other close at hand … So artists, leaving the truth to take care of itself, do in fact put into the images they make, not the real proportions, but those that will appear beautiful. (235e-236a-197).

In this case, the precondition to achieving mimetic verisimilitude and authenticity in representation is ironically distortion, not resemblance. One could however argue that the intention behind deliberate distortion of features is to compensate for scale, dimension, perspective and distance, all relational factors which affect how the work of art is finally perceived.[18] The intention therefore remains mimetic verisimilitude, or aesthetic likeness. Van Fraassen cites a passage in Ernst Gombrich's *Art and Illusion* which seems to be the basis of this Platonic dialogue and corroborates my point:

> The Athenians intending to consecrate an excellent image of Minerva upon a high pillar, set Phidias and Alcamenes to work … Phidias … did consider that the whole shape of his image should change according to the height of the appointed place, and therefore made her lips wide open, her nose somewhat out of order and the rest accordingly … when these two images were afterwards brought to light and compared, Phidias was in great danger to have been stoned by the whole multitude, until the statues were at length set on high. For Alcamenes his sweet and diligent strokes being drowned, and Phidias his disfigured and distorted hardness being vanished by the height of the place … (qtd. in Van Fraassen 12-13)

"Deliberate departures from resemblance" (13), as Van Fraassen observes, may be required for successful representation however what makes representation successful in the passage above is the *intended final effect* achievable only through distancing. Distortion in fact has the opposite effect when Phidias's effigy of Minerva is inspected up close – the Athenians cannot see any resemblance and fail to associate this 'disfigured' representation with the goddess Minerva, or with any typical human face, hence their outrage. In this respect, representation is phenomenological and tied

[18] Van Fraassen in fact dedicates various chapters to frames of reference and relational representation in *Scientific Representation* (33-86).

to both affect and final effect. Distortion may be similarly invoked as a means of parody. "A caricature misrepresents on purpose" (14), but the intended final effect of distortion through caricature is humour and satire, not perspectival shift. In this second case, representation is intended to be semiotic, purveying "an interpretative attribute" (15). No one can claim that a caricature bears any *actual* likeness to the intended target of representation, but then again, the fact that we can readily associate a caricature with (specific attributes of) its referent is indicative of successful representation through selective depiction (our attention is drawn to what is the case and what is not). Coupled to this is the nature of the representational medium and its permissibility – what it allows the image-maker to do and achieve. Representation is therefore constructed on a matrix of correspondences, some requiring less inference than others, and while full resemblance is not a prerequisite to achieving representational success, the ability to claim that something is *like*/*not like something else* places constraints on form and depiction. In other words, while an image or a model may be represented *as* Y, it must contain enough referential context (what I have termed a matrix of correspondences) to allow us to see that Y is indeed a representation *of* X (and not Z or B).

Furthermore, representation-as propositions must invariably attach themselves to representations-of propositions. Says Goodman, "a picture is a picture *of* something, and depicts that something *as thus or so*" (qtd. in Van Fraassen 17). Or, phrased otherwise, denotation through representation requires referential correspondence. However, as Van Fraassen observes, this correspondence is hardly ever symmetrical. "If representation did require resemblance to its target, the target would then resemble its representation but not represent it" (17). To illustrate, Van Fraassen explains how a photograph of an object, its representation, requires "a 'collapsing' of shades of color and of three-dimensional spatial structure into two dimensions" (18). Certainly, a well-composed photograph will capture and represent a number of visual attributes belonging to the referent (while necessarily omitting others), and representational resemblance in this case lies in having common properties. However, although the relation of the target to its referent is one of "homomorphism" (same form/shape) it is one-directional and necessarily reductive. Says Van Fraassen, "that A is a homomorphic image of B certainly does not entail that B is that of A" (18). This occurs because the target is a *reduced* model of its referent. As we have seen from our discussion of simulation modelling so far, abstraction and

selective depiction still generate successful models, yet the model is not the referent (it only represents or models some of its attributes). Thus, "certain modes or forms of representation (but not all) do trade on *selective* (and not arbitrary) resemblances for their effect, efficacy, and usefulness, and … this typically goes in one direction only" (18). In principle, therefore, representation *of X* requires that X is represented *as X*[2].

Re-presentation is therefore always 'incomplete' and different in its remediation. Casti narrates an incident involving Pablo Picasso's portrait of Gertrude Stein. Hearing complaints that his picture did not look at all like the writer, Picasso is said to have dismissed these, claiming that "in the end she will manage to look just like it" (22). Casti adds that in later years, Picasso's portrait of Gertrude Stein was lauded for being an admirable likeness of the writer, proof that representation is not only reconstructive but serves to modify behaviour (22-23). In what appears to be a reverse Heisenbergian reading of modelling/representation and affect, what is observed (the representational target in this case) has the capacity to change the observer by modifying expectation, only for that expectation to 'modify' the referent in turn.

The problem of asymmetry of representation is compounded when a sign is assigned symbolic status. Webb draws our attention to ontological differences between a form of representation which has direct referential status and is therefore "grounded in the real world" by being "based on resemblance", and one which is a "representative sign" (Webb 32). The former "is based only one step away from the thing itself" while the latter is "at least twice separated from the thing itself [since] its connection with the referent is arbitrary; which is to say, it is not grounded in any actual association between sign and signified" (32). This discourse is unmistakeably post-structuralist and Saussurian since it implies that a wedge has been driven between referent and its model, however, in simulation modelling, this demarcation is never fully absolute. As we have seen, in the construction of models the connection with the referent *cannot* be arbitrary even if representation is primarily a selective abstraction. However, we cannot fully ignore the idea of re-presentation, which is essentially a two-tiered process where, to paraphrase Van Fraassen, the target in fact resembles its representable form, not its referent. Louis Marin makes a similar observation when he theorises that behind representation lies

> a simultaneous double operation of repetition and substitution between things and ideas through the mediation of the sign: an idea represents a thing (it is the thing in the mind), but that representation can only be achieved in relay fashion, by way of another thing that represents the first thing in turn for the second. (23)

The concept of asymmetry in Van Fraassen and Marin can be depicted in the following diagrams, both illustrating how a real three-dimensional referent can be represented through close resemblance (but with partiality) in Figure 2 or symbolically, through a series of sign-substitutions (this time with more evident ideological partiality), in Figure 3:

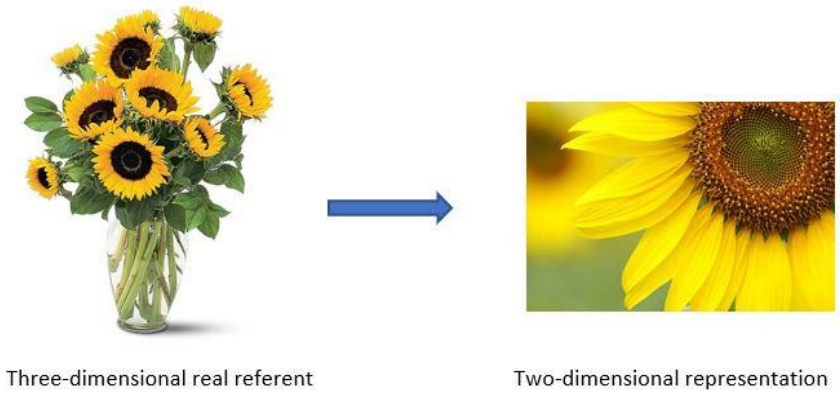

Figure 2: One-directional asymmetrical representation (Van Fraassen)

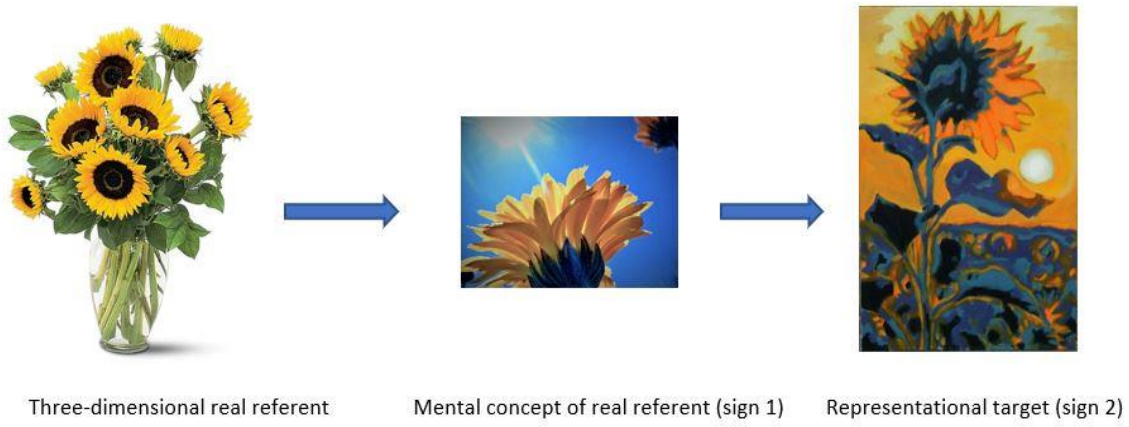

Figure 3: One-directional asymmetrical representation through repetition and substitution (Marin)

Van Fraassen's insistence that representation is asymmetrical is also evident when one considers representation's functional aspect. (For instance, the representational target in Figure 2 is not the same as in Figure 3, even if both have the same referent).

In Figure 3, a different concept of the referent has been projected onto the final representation (which is certainly more ideological than aesthetic). Van Fraassen's question, "What is [an image/sign] being used to represent?" can be translated as "Z uses X to depict Y as F" (21). Van Fraassen's formula reminds us that simulation operates on the same principle by being a representation *of one system as another system*. (Sec. 2.2 makes reference to a similar observation by Frasca who claims that simulation models one system *through* a different system by retaining some of the behaviors of the original system; 223).

Interpretive problems may result if there is lack of consensus on the (right?) choice of X, for Y and F to necessarily follow. The practice of representing is therefore always a conscious and functional act since representation is bound to its *use* (Van Fraassen 23-26); and scientific representation, crucial for simulation modelling, is therefore a matter of "pragmatics rather than syntax or semantics of representation in general" (25), a conclusion already derived in discussing what simulation does, as opposed to what it means.

Choosing and modifying one's representational medium is undoubtedly context-dependent and function-driven. Van Fraassen cites Ned Block who asserts that "What *any* representation represents, and *how* it represents … depends on the system of representation within which it functions" (qtd. in Van Fraassen 21). (Rothenberg draws the same conclusions for simulation modelling; sec. 2.2). This system of representation must be somewhat transparent; hence the matrix of correspondences I have mentioned earlier in this section. (Also recall Kheir's system of simulation modelling in section 2.5, where the system model must run on very stringent and observable correspondences with the external physical system, which is used to verify, validate and correct its behaviours.) If representation is pragmatic, dependent on an agreed context of use and driven towards achieving an ostensible function, then Z can use X to successfully depict Y as F *only if we are sufficiently acquainted with X* and can see *how it has been used to represent Y as F*. In a way therefore, representational *knowledge* is retrospective: a theory of representation "cannot 'represent' a phenomenon that hasn't been observed" (Suarez qtd. in Van Fraassen 26), although simulation modelling is still used to represent what-if futuristic scenarios.

Van Fraassen makes the initial argument that representation is not equivalent to resemblance, but this argument only holds if we asked what representation is. If

we had to ask, "How does this or that representation represent, and how does it succeed?" (33), then resemblance – or mimesis – enters firmly into the equation, especially if this form of representation involves scientific modelling such as simulation. Van Fraassen however reminds us that "resemblance need not consist in sameness of properties, but can also be at higher levels", while "effective use of resemblance must always be selective" (33). We have seen how simulation modelling trades on selection and abstraction, but what would happen if we decided to forego all of this and go for a complete and 'perfect' model, one that would go beyond approximation? Could we push the limits of mimetic similitude in simulation? The final two sections in this chapter seek to answer these questions by discussing the notion of fidelity in simulation modelling and other attendant paradoxes of representation.

2.7 As Above, So Below: Lem's "The Seventh Sally" and the Perfect Model

If representation is to be effective it must be selective, and if a model is to be considered sufficiently good (for its designated purpose) then it has to be based on selective resemblance. For reasons of tractability and cost-effectiveness, as outlined in Rothenberg's report to the RAND Corporation (sec. 2.2), scaled down models are often able to replicate the same behaviours as their full-scale referents provided that they have structural conformity and sufficiently meet the environmental requirements in which they will operate. Van Fraassen makes reference to Richard Tolman's "principle of dimensional homogeneity", or "principle of similitude", which claims that "structurally similar objects will display the same behavior in structurally similar circumstances" (qtd. in Van Fraassen 51). Interestingly, while it is generally assumed that a scale model of X must be an object which is structurally similar to X but on a reduced scale, according to Tolman's principle the obverse should also hold true, that is, a scaled-up model should technically display the same behaviour if circumstances were similarly engineered. (For reasons of cost, implementation and tractability, simulations however are – current computer power permitting – scaled down and partial models). Tolman's belief in dimensional homogeneity led him to hypothesise – not without attracting criticism – that as long as physical constants retained the same values, "the fundamental entities out of which the physical universe is constructed are of such a nature that from them a miniature universe

could be constructed exactly similar in every respect to the present universe" (qtd. in Van Fraassen 51).[19]

I have discussed at length simulism in section 1.5, focusing on Bostrom's argument for simulating livable reality, with its technical and ontological complexities. Hypothesising the creation of a microcosmos – a scaled-down version – has also proven to have perennial appeal, if fictional worlds, toys and computer games are good enough indicators. If models are functional constructs, we must now turn our attention to what they achieve. This in turn should inform us about the success or otherwise of the simulation model's design. What *possible outcomes* might result from simulating a microworld which is a perfectly teeming replica of our own? Surely, such an ambitious and functional model would require total fidelity to its real-world counterpart for it to function accordingly. Yet again, as with Van Fraassen's argument for resemblance not being crucial for representation, according to Casti, "complete fidelity in [a] model is far from a sufficient condition to deem the model a good representation of reality" (21). For more pressing reasons of simplicity, clarity and tractability it is entirely unnecessary "for a good model to faithfully capture all aspects of the phenomenon it represents" (23), nor would its design be bias-free.[20]

The problems with 'completely faithful' models can be illustrated by using Stanislaw Lem's story "The Seventh Sally or How Trurl's Own Perfection Led to No Good", to give it its full title. Trurl, ingenious robot constructor and a recurring character in Lem's short-story anthology *The Cyberiad*, comes across Excelsius the Tartarian, previous despot of Pancreon and Cryspenderora, now forcibly exiled onto a barren asteroid (Lem 161-71). Excelsius demands that Trurl restore him to his throne, but noticing "the flame of vengeance [in] the monarch's eyes, and his iron fingers clutch[ing] the air, as if already closing around the throats of his beloved subjects" (162), Trurl provides the humiliated despot with a harmless alternative – a scaled down mock-up of a kingdom complete with

> plenty of towns, rivers, mountains, forests and brooks, a sky with clouds, armies full of derring-do, citadels, castles and ladies' chambers … marketplaces, gaudy and gleaming in the sun, days of back-breaking labor, nights full of dancing and song … a fabulous capital … a council of hoary sages,

[19] Tolman went on to revise his hypothesis in later papers especially since the similitude argument could not be applied to gravity.

[20] Partly also because phenomenology dictates that the phenomenon under observation and design is not absolute or fixed, so it is subjectively experienced. Ongoing research in quantum mechanics in fact calls into question the objectivity of observation, proving that "two observers can experience seemingly different realities" (Proietti et al. 1).

> and winter palaces and summer villas, plots, conspirators, false witnesses, nurses, informers, teams of magnificent steeds, and plumes waving crimson in the wind … (162-3).

A functional simulation requires development over time, but Trurl's miniature model is no mere replication of a mechanical process. His simulated kingdom is foremost a "microminiaturized society" (163), and therefore must be capable of modelling behaviour and channeling emotion. Thus, the fabled constructor throws in "the necessary handful of traitors, another of heroes … a pinch of prophets and seers … one messiah and one great poet" (163), makes microscopic adjustments and endows "the women of that kingdom [with] beauty, the men [with] sullen silence and surliness when drunk, the officials – arrogance and servility, the astronomers – an enthusiasm for stars, and the children – a great capacity for noise" (163). Frasca's pre-condition for simulation design was that simulation should be capable of generating behaviour through user manipulation of its internal laws. Trurl, familiar with the difference between a toy model and a dynamic simulation, fits his microcosmos in a box and shows the despot Excelsius how to "program wars, quell rebellions, exact tribute, collect taxes" (163), manipulate inputs and outputs and pay particular attention to the system's "critical points and transition states … the maxima and minima of palace coups and revolutions" (163). Then, satisfied that he has created the perfect model of a kingdom, Trurl returns to his home planet to brag about his achievement with Klapaucius, a fellow constructor, leaving Excelsius to experiment with his new kingdom, from which "a tumultuous cry of gratitude, like the squeaking of tiny mice" (164) can be heard rising up from the box once the deposed monarch abolishes a death penalty and lightens some levies.

Klapaucius however fails to share Trurl's enthusiasm, grimly pointing out that creating a civilization which was a hundred million times smaller, sentient and bound by the same physical properties as our own – a condition of Tolman's principle of similitude – and then abandoning it to the cruel whims of Excelsius was both reckless and immoral. Trurl tries to defend himself from Klapaucius's accusations by invoking a materialist argument, claiming that "the whole kingdom fits into a box three feet by two by two and a half" and that "it's only a model" (166) and that "births, loves, acts of heroism and denunciations are nothing but the miniscule capering of electrons in space" (167). Klapaucius's angry retort is that microscopic phenomena which have also been programmed to experience a phenomenological reality such as "dawns,

sunsets and bloody battles" (166) are now also constrained to experience pain, toil, suffering and death in relation to the simulated beings' temporal and spatial properties. "And what importance do dimensions have anyway?" (166) points out Klapaucius. "In that box kingdom, doesn't a journey from the capital to one of the corners take months – for those inhabitants?" (167), reminding us that a perfect model must also possess perfect correlational properties.

Klapaucius insists that Trurl's biggest oversight was not in having created a "simulator of statehood" (167) in the first place but in having modelled a microworld where all (or most) conditions of physical and mental reality have been met, whether these conditions are beneficial or otherwise to its micro-subjects. We can see how Trurl's simulation does not simply exploit resemblance at this point but goes beyond it. Mimetic representation has given way to duplication, a poietic construction of "a kingdom as lifelike as possible, so similar to a real kingdom, that no one … could tell the difference" (169). For Trurl's simulation to be perfect, it must venture beyond similarity into duplication, which is where slippery issues with ontology become more slippery ethical ones.[21] Trurl cannot prove to Klapaucius that he has not managed to create suffering (as a necessary property of a feudal system), but only imitated it. The system's completion and the model's perfection need to forestall any presuppositions that the simulation is merely a simulacrum. As Trurl wistfully admits that

> [e]ven before I took my instruments in hand, when the box was still empty, I had to anticipate the possibility of precisely such a proof – in order to rule it out. For otherwise the monarch of that kingdom sooner or later would have gotten the impression that his subjects were not real subjects at all, but puppets, marionettes … there was no other way to do it! Anything that would have destroyed in the littlest way the illusion of complete reality, would have also destroyed the importance, the dignity of governing, and turned it into nothing but a mechanical game. (169)

Klapaucius's objections in Lem's story are more than just cautionary notes on the liberties permitted by simulism. They compel us to assess the theoretical nature of modelling, its fidelity to the real, and whether there is a line between mimetic resemblance and mimetic duplication which simulations can or cannot cross. That

[21] Klapaucius's objections move from ontology to ethics – the accusations are that Trurl has played an irresponsible creator game, one where he is an absconding god who abandons his living, feeling creations to a life of misery.

simulation *is not* duplication is a point strongly argued by John Searle in an article from 1980 where he insists that computer intelligence does not possess intentionality, and that any attempt to create artificial intentionality through programming would require duplication of the causal powers of the human brain ("Minds, Brains and Programs" 417-57) – something that the fictional Trurl achieves when creating his microworld – but as yet, no actual machine.

Searle considers computer simulations to be incapable of replicating cognitive processes, and that a distinction must be made "between the program and [its] realization" (428), specifically because "the equation 'mind is to brain as program is to hardware' breaks down at several points" (428), mainly in falsely associating software outputs to mental states. Searle does not concede that a principle of similitude exists between a simulation model and its referent, let alone duplication, whose prior condition is extreme fidelity to the real. He argues that

> [t]he idea that computer simulations could be the real thing ought to have seemed suspicious in the first place because the computer isn't confined to simulating mental operations, by any means. No one supposes that computer simulations of a five-alarm fire will burn the neighborhood down or that a computer simulation of a rainstorm will leave us all drenched. Why on earth would anyone suppose that a computer simulation of understanding actually understood anything … For simulation, all you need is the right input and output and a program in the middle that transforms the former into the latter. That is all the computer has for anything it does. To confuse simulation with duplication is the same mistake, whether it is pain, love, cognition, fires, or rainstorms. (428)

Searle's argument (currently) holds true for computer simulations, which although functional representations, remain abstractions. Then again, Searle's claim against simulation being duplication cannot be extended to other forms of physical simulation, such as company fire drills (low-fidelity) and firefighting simulations (high-fidelity) in which edifices are set on fire and controlled. Anders Hammarström makes a similar point when he argues that it can be difficult to draw the line between simulation and duplication in instances where the model is entirely functional and shares several actual properties with its referent. He asks, "is an artificial heart a simulation or a duplication of a real heart? Is a prosthetic leg a simulation or duplication of a real leg?" (Hammarström 23). Fidelity in Hammarström's examples is not just desirable but a crucial requirement, as the model becomes a functional organic surrogate, but this argument risks getting lost in a semantic binarism which,

as we have seen in chapter 1, tends to plague semantic definitions of simulation. (In this case we would be tempted to ask: When is an object a copy when it reproduces all source behaviours? Can a synthetic object be sufficiently good so as to replace a natural one? What status do we accord a real fake? and so on). More specifically, Hammarström's argument flounders in the case of computer simulation – both of his examples are in fact related to actual synthetic products not digital outputs. Searle's objection is that we cannot reduce materialist processes to idealist states nor extract physical phenomena from virtual representations ("No one would suppose that we could produce milk and sugar by running a computer simulation of the formal sequences in lactation and photosynthesis") ("Minds" 430). Unless we have ample proof to the contrary, we must therefore concede that for simulation to be considered a referential *duplicate* it must be (i) capable of erasing/blurring perceptual differences between a referent and its model, and therefore (ii) substitute system for like system (not an analogue) while (iii) being sufficiently capable of replacing its source in its source environment while retaining/deriving the same or original behaviours on which it was modelled. In general, however, physical or virtual simulations only partially meet condition (iii) and definitely not condition (ii) – simulations generally use analogous systems of modelling which are more tractable.

So, is Trurl's simulation model – one which sufficiently meets all three conditions of duplication above, despite being a microcosmos – a perfect simulation? Casti argues that this microkingdom "is *too* perfect" (21) to be good and that Trurl's Microminians acquire "the same degree of reality as their macroworld counterparts simply by virtue of their perfection" (21). But Casti's conclusion that "complete fidelity in the model is certainly far from a sufficient condition to deem the model a good representation of reality" (21) is logically inconsistent with Lem's narrative – Trurl consciously replicates and fulfills the conditions of a despotic kingdom and no other. Additionally, by his own admission, "anything that would have destroyed … the illusion of complete reality [would have] turned it into nothing but a mechanical game" (Lem 169). And because Trurl's perfect simulation is such a good representation of reality[22], the story takes on a whimsical but not entirely unexpected

[22] One objection at this juncture would be that Trurl's perfectly faithful model is still, to an extent, ideologically representational and therefore not bias-free. If Trurl's model is a faithful representation of reality, we should perhaps ask: whose reality is Trurl's model faithful to? References to personal qualities in Lem's story such as the beauty of women, the surliness of men, the arrogance of officials and so on remain general inferences, not universals.

turn. Rushing to Excelsius's asteroid to make reparations, the two constructors behold

> [t]he entire planet … covered with countless signs of intelligent life. Microscopic bridges … spanned every rill and rivulet … The night side of the sphere was dotted with glimmering cities, and on the day side one could make out flourishing metropolises, though the inhabitants themselves were much too little to observe … Of the king there was no trace … 'Look!' said Klapaucius, pointing to a little cloud no larger than a thimble and shaped like a mushroom; it slowly rose into the atmosphere. 'They've discovered atomic energy … And over there – you see that bit of glass? It's the remains of the box, they've made it into some sort of temple.' (Lem 170-71)

The outcome necessarily follows from Trurl's commitment to complete fidelity; the kingdom is after all a self-organising, generative model. The Microminian civilisation evolves and perfects its technology, in spite (or because of) Excelsius's manipulations, breaks through its captive system and overthrows the tyrant to establish a stable democracy where it can flourish. I therefore have issue with Casti's conclusion that complete fidelity does not make a good model, principally because Casti does not fully qualify what he means by 'good' here, although he gives further examples of what a model should achieve, such as simplicity, clarity, tractability, lack of bias and trustworthiness (20-31). Is a good model one which fully performs according to its intended functions? One that is fully undifferentiated from its source? Or one that simply yields satisfactory results? These are all pertinent questions but they are not mutually commensurate. Trurl's model might be a very good duplicate of reality but goes beyond simulation-hood when it becomes fully auto-sufficient. It becomes its own referent, the real thing, and stops being a simulator for Excelsius to experiment on. As Klapaucius finally observes, Trurl made the "unforgivable mistake of overperfecting [his] replica … creat[ing] that which was possible, logical and inevitable … the very antithesis of a mechanism" (Lem 171).

Despite its felicitous ending, Stanislaw Lem's "The Seventh Sally", remains a fictional caveat on the dangerous possibilities of high-fidelity simulations which come too close to being *the real thing*. We also sense a dire platonism at work here. Klapaucius seems to be arguing that a good model is one which reminds its user that it is a model (of something), sufficiently similar to its referent but not its duplicate, and certainly not its replacement. A perfection of the model is therefore ontologically and ethically wrong ("Don't you see", he warns Trurl, "when the imitator is perfect,

so must be the imitation, and the semblance becomes the truth, the pretense a reality!") (168). On the other hand, Trurl downplays these accusations by initially insisting that his simulation is nothing more than a small-scale model of a kingdom and therefore only faithful to its own internal system, by no means bearing perfect resemblance to Excelsius or Trurl's own bigger reality. Yet, Trurl's model is a very accurate simulation since it does not involve an abstraction of properties but downscaling of a number of them. Even the tyrannical Excelsius dully understands that behind the thick glass, "size was not what mattered here, for government is not measured in meters and kilograms, and emotions are somehow the same, whether experienced by giants or dwarfs …." (164). Trurl's model therefore remains a good fictional example of Tolman's principle of similitude where the physical constants of the macroworld are retained and replicated in their micro-counterpart.[23]

Lem's compelling fiction aside, model overperfection – what Paul Teller calls "the perfect model model" (qtd. in Van Fraassen 45)– is neither possible in principle nor in practice, as it turns out. Van Fraassen argues in *Scientific Representation* that 'perfection' implies changing the representational medium of the model, thus opting for a foundational mathematical (or digital) model which would render the model more geometrically accurate than its referent (45-6) – but then becoming practically useless, thus negating the functionality criterion which we have established for modelling. Neither would a perfectly accurate scientific image remotely resemble its real-life referent; this affects the fidelity criterion. Similarly, scale too considerably affects a model's propensity for simulating activity and behaviour, let alone mental states. Van Fraassen gives the example of a scale model of an airplane of extremely miniscule proportions, reduced by a multiplicative factor of 0.0001 (50). In respect to shape, the airplane is the same. Van Fraassen argues that like any other plane, this scaled-down model requires an engine for uplift and propulsion, however its size will necessarily impose limitations on its engine and flight duration. Moreover, even if a suitable engine were provided and the plane could fly, its "relation to air resistance will be quite different at this scale: the air, after all, has not been similarly scaled down in any way" (50). Thus, if scaled-down models are to retain their functional capabilities and be more than just semiotic models, "other features besides [their] size must be scaled as well, and not proportionately but appropriately" (51). This

[23] Although this is inaccurate, since, as Derek Woods points out in his work on scale variance, "variable physical constraints produce disjunctures among scales" (133). Size therefore does matter, and scaling-down or scaling-up modelling is hardly every smooth.

again calls into question the model's fidelity to its source, and how much re-presentation is necessary in perfecting a simulation model that must replicate most of the original behaviours on which it was modelled. We have considered perfect fidelity from the aspect of scalar reduction. But what if complete representational fidelity meant a one-to-one scalar correspondence between a referent and its model? Again, it is fitting that a theoretical discussion of similar paradoxes of representation is prefaced by another work of fiction.

2.8 The Map is not the Territory: Borges's "On Exactitude in Science" and the Paradoxes of 1:1 Correspondence

In one of his fantastic ontologies-as-allegories, "On Exactitude in Science", Borges narrates how in a fictional "Empire" cartography once achieved such a degree of perfection that one-to-one scalar representation of the Empire's territory was possible:

> … the map of a single Province occupied the entirety of a City, and the map of the Empire, the entirety of a Province. In time, those Unconscionable Maps no longer satisfied, and the Cartographers Guilds struck a Map of the Empire whose size was that of the Empire, and which coincided point for point with it … (325)

But again, scientific exactitude proves to be undesirable as far as ultra-faithful models go. In Borges's story, future generations declare this map to be "useless" and let it fall into a state of disrepair, with its "tattered ruins [now] inhabited by animals and beggars" (325).

Borges does not explain how 1:1 correspondence is to be achieved. The singular postulate for his fictional map's creation is that it coincide "point for point" with the territory it simulates. Of course, Borges uses no such term – simulation – although his story-fragment is a thought experiment in simulation theory and the paradoxes of mimetic fidelity, an exercise which Eco took up in 1982 with his essay "On the Impossibility of Drawing a Map of the Empire on a Scale of 1 to 1" (89-90). Eco's extrapolation of Borges's story shows how simulation is primarily a modelling process and not an end result (as Baudrillard supposed it to be)[24] but also puts to task

[24] For instance, Marie-Laure Ryan is critical of Baudrillard's insistence on considering simulation only in terms of simulacra, "fully formed objects [that] don't seem to be the product of a creative process

Borges's postulate of one-to-one scalar representation. In contrast, Baudrillard proposed an allegorical and political reading of Borges's story, made famous in his postmodernist essay of 1981, "The Precession of Simulacra", in which he retraced simulation to older platonic preoccupations with the deceptiveness of images and the way they displace their referents. Baudrillard therefore interprets simulation as a delegitimising process, a move which has philosophical and historical antecedents (see introduction and chapter 1) and while his arguments do not impinge on the current discussion of simulation modelling, occasional reference is made as necessary throughout this dissertation.

How is Borges's story an exercise in simulation? Based on the premise that simulation is representational, the answer lies in the reason why Eco and Baudrillard both found the same story to be irrepressibly semiotic – it is a work of fiction which doubles for representational theory itself, its limitations and its inherent paradoxes. The title of the story itself, "On Exactitude in Science", prefigures the method. Unlike generic cartography, where map modelling involves a severely *reduced* and therefore partial representation of the original territory, Borges's 1:1 postulate foregrounds scientific simulation, the precise modelling of the behaviour or attributes of one system through the use of another. A typical non-Borgesian map is representative of its source territory but does not attempt to simulate it in any way, let alone demand one-to-one fidelity in the way the territory and its inhabitants are depicted on a day-to-day basis. It is therefore inexact. As a miniature copy, it does not reflect or attempt to generate its source through its own model. Of course, it remains representational – we can still somewhat identify the territory it ostensibly refers to – yet this 'territory' has been greatly diminished and divested of reality. The non-Borgesian map is a mere map, a multi-dimensional object transplanted onto a two-dimensional plane.

On the contrary, since Borges's map is co-extensive with its source to the point that it covers it completely, it implies simulation as its mode of generation, even if Borges never actually explained how the process should be carried out. Borges's single premise, one-to-one reproduction of the empire, subjects cartography to the creation of another 'empire', one superimposed over the current one, to the extent that the model now becomes indistinguishable from its source. (Paradoxically this

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and [which] do not seem to fulfill a specific purpose" (*Narrative as Virtual Reality* 63). Ryan shares my belief that simulation is essentially a functional process.

might explain why eventually the men who commission this gargantuan map find it to be essentially meaningless, a futile semiotic exercise, since it reflects only too faithfully, mise en abyme, an already-present territory. The map becomes a topographical mirror.) At this new juncture in Borges's story, simulation – as model theory of what is ontologically permissible – becomes very significant.

Eco and Baudrillard's work presents divergent theoretical departures from Borges. Both writers focus on the Borgesian map in terms of simulation, but the discourse and trajectory they take are different, reminding us of the burden of ambivalence the term has carried in the past. Baudrillard reads Borges in terms of semiotic *product* while Eco's study, more faithful towards simulation in its re-creation of a real-world system, explores the possibilities permitted by faithful scalar representation, therefore initially focusing on simulation as an actual *process*. Eco's position on simulation, and one which I have also adopted in this study, is therefore not just semiotic but poietic, constructive through re-construction. In an attempt to explain how Borges's creation of the map of the empire on a scale of 1:1 could be carried out, Eco's essay generates its own multiple fictional scenarios. Eco's attempt at simulating the Borgesian map, albeit theoretically, is an admirable task, and interestingly one which Borges himself did not take up.

Unlike Baudrillard, Eco does not approach Borges's "On Exactitude in Science" from the perspective of allegory and cultural criticism. Employing analytical and scientific rigor, Eco appears determined to test what 'exactitude' entails, or more specifically to seek solutions for the problem of one-to-one scalar and planar correspondence as present in Borges's sketch. These solutions move from geometric topology (orientation of the map) to phenomenology (simultaneous experiencing of the map and its territory) and finally to semiotics (referential paradoxes of a 1:1 map), aspects which define and delimit simulation modelling or representation.

Eco's exercise begins with a few caveats and premises. The map must be created to the exact ratio specified by Borges in his story. It cannot be a plaster cast as this would constitute encapsulation (yet would require some form of enveloping to account for every topographical relief). The map cannot be relocated to a bigger surface area, such as a desert, of a "second, separate empire" ("Impossibility of Drawing" 85). (Borges pre-empts this objection by explaining that the map "coincided point for point" with the empire and that "in the Deserts of the West … there are Tattered Ruins of that Map" ("Exactitude" 325), implying that in the empire's deserts,

the map's suprastructure has been laid bare). One-to-one correspondence is oddly taken to represent, for Eco, an absolute fidelity to the empire. Thus his simulated map must also depict "artifacts" and "the totality of the empire's subjects" alongside the expected "natural reliefs" (85), an indication that Eco entertains a historical and political notion of empire as opposed to the merely geographical (which is traditionally what a map depicts). The map cannot be an atlas, yet can be constituted of a number of "partial projections" (85) (or smaller map sections) produced "over a reasonable amount of time" (85) and "sutured" (86) to eventually construct the entire empire. Finally, the map must act as a "semiotic tool" (86), permitting reference – by means of cartographic representation – to the underlying empire but not direct access, manipulation or visibility into its territory or affairs, an insurmountable problem as any changes to the empire cannot be then perceived on the map which ultimately represents it (the empire would have changed in constitution, but not so the map of the empire, which is therefore rendered unfaithful).

This preamble to Eco's simulation is interesting in itself as it allows us to see what *preconditions* must be taken into account to realise with fidelity Borges's impossible task based on two governing parameters – a scale of 1:1 and the necessary convergence of all topographical points where the map meets its territory. However, as Eco's conceptual simulation gains momentum, it becomes evident to Eco and the reader that any attempt to create a suspended and opaque map or an extended, adjustable and transparent one leads to irreversible semiotic paradoxes not unlike the observer effect, where any placement of the map "would alter the ecological equilibrium of the territory itself" (86) if it blocked the sun's rays or hindered precipitation. Unavoidable movements during the unfurling of the map would also "alter the positions of the subjects that the map describes" (89), therefore giving rise to an untruthful map. In this, Eco perceived the same semiotic paradoxes and cartographic futility found in Lewis Carroll's *Sylvie and Bruno Concluded*, a philosophical fantasy predating both Eco and Borges in premise and postulates:

> "That's another thing we've learned from *your* Nation," said Mein Herr, "map-making. But we've carried it much further than *you*. What do you consider the *largest* map that would be really useful?"
> "About six inches to the mile."
> "Only *six inches*!" exclaimed Mein Herr. "We very soon got to six *yards* to the mile. Then we tried a *hundred* yards to the mile. And then came the grandest idea of all! We actually made a map of the country, on the scale of a *mile to the mile*!"

> "Have you used it much?" I enquired.
> "It has never been spread out, yet," said Mein Herr: "the farmers objected: they said it would cover the whole country, and shut out the sunlight! So we now use the country itself, as its own map, and I assure you it does nearly as well." (Carroll 556-57)

In Eco's conceptual simulation, scalar reproduction now gives way to the pragmatic problem of positioning the map in such a way that it can be consulted while remaining distinct and faithful to the territory it represents:

> … Once the map has been drawn and spread out, either the subjects remain on the territory beneath it, or they climb on top of it. But if the subjects were to prepare the map while it is above their heads, not only would they be unable to move, because every movement would alter the positions of the subjects that the map describes … but further, in moving they would cause tangles in the very fine membrane above them … once more making the map unfaithful: it would assume a different topological configuration, producing disaster areas not corresponding to the planimetry of the territory. ("Impossibility of Drawing" 89-90)

Eco identifies a number of cumbersome ways, none of which obviate the problem of the observer paradox. Thus, for instance, a map suspended on corresponding elevated stakes above the territory and viewed from below leads to partial perception while to fully appreciate the map in its totality, an aerial perspective is necessary, but one which would still result in an inaccurate map since now it would be erroneously representing the wrong number of inhabitants as one has left the territory to survey the suspended map (87-88). (Eco does not comment on how the 1:1 map would need to be adjusted to account for demographic shifts, such as births and deaths.) Removal of the subjects might result in an "impoverished map" (90) but certainly a more workable one, considering the fact that the same subjects cannot simultaneously occupy both the territory and the map, be present either on the territory or its map, become entangled in the map during its stages of folding and unfolding or assume a different position on the territory than the one originally demarcated on its map. Despite these inevitable paradoxes, Eco retains the concept of a map of the empire which also simulates the empire's totality of subjects and their positions within the empire.

It is evident that Eco's essay is not as much an actual simulation as a theory of one. However it serves its purpose – conceptually at least – as Borges's cartographic premise is invalidated by exposing mutually exclusive contradictions in the way the

map can represent the territory while also highlighting further paradoxes of representation for one-to-one correspondence, in this case both scalar and systemic. Hypothesising about ways of simulating Borges's map-as-empire takes us directly back to the original dilemma faced by Borges's cartographers: if one-to-one fidelity were the goal of any model, and if perfect fidelity were achievable and the map were to be finally created and applied, the empire would have ceased to grow and therefore ceased to be. This would signify "the end of the empire as such" (Eco, "Impossibility of Drawing" 94), consecutively negating the original premise of a map that represents an empire. Perhaps there is a moral in all of this, and Eco's conclusion that "at the moment the map is realised, the empire becomes unreproducible" (93) is unmistakeably Baudrillard's own assertion that "simulation is no longer that of a territory, a referential being or a substance" (*Simulacra* 2). Yet simulation *is* referential, reproducing or creating in part the conditions under study. Borges's story and Eco's postulations might have just interrogated the question of fidelity to the source and whether 1:1 correspondence could still be achieved if a different medium of representation were used.

Eco's essay is remarkable in spite of its inconclusion. In interrogating Borges's story, and invalidating a set of inferences emerging from this story, Eco *effectively simulates the requisite conditions* for the creation of a 1:1 map of the empire through deductive inference, mathematics and logic. By dint of the two sole conditions Borges poses in his sketch – a scale of 1:1 and point-to-point correspondence – Eco and anyone else taking up this task, are prevented from using any simulative medium to test methods of creating the Borgesian map other than argument and theory. Any visualisation of this mathematical problem would need to move beyond the insuperable issue of scaling while having to negotiate the complexities of representing three-dimensional objects on a two-dimension plane, a process known as isometric projection. This means that despite the accuracy of computer-generated models today, Borges's map cannot be virtually reproduced on screen without contradicting its original premises, nor can it be reproduced in actuality without transgressing its source. That is why "On Exactitude in Science" is promising both as a *theoretical* simulation and as allegory, with an attempt to instantiate one resulting in the other … as Borges predicted. Will Self has noted that the brevity of Borges's story is the "entire point" ("Will Self Reads") here, presumably because it is a fragment like the once glorious empire it speaks of, leaving much unsaid and

undescribed, empty space waiting to be re-occupied. It is "a story that is itself a homologue of that which it describes, being a map of a reality that is at once the same size and far, far larger" ("Will Self Reads"). Self could be hinting at a source that always transcends or prescribes its model (reversing Baudrillard), one which precedes its multiple incarnations, and in this he acclaims Borges's ability to create fiction which achieves "the truly veridical" ("Will Self Reads"). In this, Eco was indeed right in claiming that "every 1:1 map always reproduces the territory unfaithfully" and "at the moment the map is realised, the empire becomes unreproducible" (93).

While fictional, both Lem and Borges's stories remain good enough indicators of the paradoxes attached to actual modelling when it aspires to total fidelity, no matter whether scaling proceeds from the micro to the macro level. They also serve as analogues of system design, construction and operability in narrative, allowing us to see what principles of simulation modelling are also amenable to fictional world-building and how these principles sanction the being and behaviour of non-actual referents. Borges's fictional map, for one, could be construed as a semiotic model for narrative simulation – in order to proceed from point A to point B, we 'read' a map, the map therefore having become text and open to an act of reading, representation and interpretation. Correspondences to a real or imaginary topography, embedded in the map, direct us to its use; a pseudo-map, like Tolkien's drawing of Middle-Earth or Eco's ground plan for his labyrinthine library for instance, will not direct us to any actual target and we would be foolish to look for one outside their system of operability, yet both fictional maps still manage to fulfil their referential function once one reads *The Lord of the Rings* or *The Name of the Rose* respectively. We would then be able to determine just how accurate, faithful or 'good' the fictional map is by subjecting this model to a two-tiered validation process not unlike that proposed by Kheir (sec. 2.5), one where the system is judged on its internal consistency and then measured against an external non-fictional reality, the one the reader belongs to.

2.9 Summary

Arguing that simulation is different to representation because the former is an open-ended process permitting modifiable behaviour (Frasca) excludes systemic representational premises for modelling behaviour in the first place. If simulations are conceived of as functional processes, with dynamism and user engagement being essential properties, then such processes are by necessity mimetically analogous to

allow object behaviours to be reconstructed and run within the simulation. A model therefore has a representational function; it is not the referent but stands for the referent or some of its elements.

Models capable of simulation make use of functional representation while those which do not or cannot simulate behaviour only semiotically represent their referent (which is represented as a sign-equivalent). Therefore the distinction here is between a model which enacts a number of behaviours and one which is referential but 'passively' semiotic. Modelling/simulation-as-process implies a presence since it supplements real-world behaviour while simulation-as-semiotics implies an absence (non-behaviour). Any representation which functionally models behaviour must also maintain a number of correspondences between the physical (or source) system and the system model; these correspondences are chosen based on the referential aspect being modelled since a model is never fully identical to its source but is always an abstraction based on design selection. Therefore, choosing which model best simulates the referent means making a conscious choice on how the referent will be re-presented while maintaining a number of fidelity conditions. As critical readings from Lem, Borges and Eco should have demonstrated, complete fidelity of model to its source is neither tractable nor ontologically desirable and certainly not a condition for a 'good' model.

A model refers to, and substitutes for, a source through a series of referential moves (according to Van Fraassen: Z uses X to depict Y as F), even if the source is fictional. This is particularly interesting for fictional narratives which are constructed and enacted along similar principles of representation and referentiality. When the model does not ostensibly represent or refer to an actually existing object, such as pseudoreferents in fiction, the model structure must be such that it lends itself to permissible simulation. In this case, the real-world and its laws sanction the non-actual object which is synthesised through simulation modelling within the narrative in much the same way that simulation permits replicatively valid and predictively valid behaviours (Kheir) in non-fictional models. Simulation must therefore be considered to be the natural and logical extension to mimetic representation.

Chapter 3
Simulation Modelling in Fiction

3.1 Introduction

This chapter concludes Part I of this dissertation by extending the discussion of simulation modelling and representation made in chapter 2 to the modelling of fictional narratives. It assesses claims made by Roman Frigg, Kendall Walton and Marie-Laure Ryan, among others, that model structures share commonalities with narratology and fiction-making in general. This is especially seen in the way models construct frames of reference for target systems through make-believe mechanisms which also serve to validate their truth as fictions. In Frigg's fiction view of modelling, a system only becomes a model when it is deliberately used as such, and as in literature, combines actual and non-actual elements within the model for which the reader extrapolates content and rules. Fictional propositions imposed by a model therefore hold true within the system as long as the reader (or the model designer) accepts to abide by the terms of nondeceptive pretension whereby objects are imagined as possessing certain attributes for the duration of this activity. In so doing they become 'props' (Kendall Walton's term). Walton's pretense theory assumes that props are authorised a function – what is going to serve as a prop and how it is going to be used for the duration of the make-believe scenario. However, since the construction of fictional truths does not qualify as an ordinary circumstance, fiction necessarily places strictures and mandates on the imagination especially in the development of a world as a textual model.

Fictional worlds are more than mimetic narrative constructs; they are foremost approaches to narrative phenomenology and simulation. This means that the textual model adopted must construct its narratives in such a way that its reader feels or experiences the textual world as possible. Marie-Laure Ryan and Richard Gerrig have written about this process of fictive immersion or transportation, which passage from a primary to a secondary world must be a near-instantaneous decoding or conversion of sequence of letters into semantically and meaningfully relevant content. This implies that we must look beyond 'the text as world' metaphor to locate its functional relationship with the real. Even in the case of fiction, we do not explicitly treat narrative as metaphor unless called to do so, and in cases where it is, we still

seek an irreducible mimetic element that enables us to sound out the fictiveness and solidity of its referents. The modelling of a world out of text – one which is written and one which is read into being – therefore needs to be discussed in simulationist terms, for two reasons. The first is made imperative in light of Frigg's declaration that structures are non-referential and non-representational, becoming model systems when they are used as such. This means that the properties and laws of a textual world model must be tacitly agreed upon by a minimum of two parties. Both writer and reader are therefore involved in world construction since a fictional world only comes to exist upon its moment of narration, and consequently, its reading. Kathryn Hume's mimetic model of world-building for instance is based on consensus and reciprocity – shared and unshared individual realities and phenomenologies converge in a joint process of world-making where readers self-identify (or do not) with the fictional world. This process of audience verification and validation also recalls Kheir's verification and validation processes in chapter 2 to minimise differences between the source system and a simulation model's behaviours. A modicum of experienceable reality, or a connection with the familiar and the mundane, provide both a basis for simulation modelling and the construction of fictional worlds, whether these are textual or digital. This is also imperative because secondly, if a textual world is meant to elicit specific behaviour or affect, it requires strategies which sufficiently simulate if not the texture, then at least a mentally intelligible perception of that world. And it goes without saying that some narratives are better equipped than others at achieving narrative simulation.

An objection to the idea of narrative-as-simulation might be the claim that fictional counter-factuality is not the end objective of a simulation and that a simulation does not run on counter-factual rules. I counter this objection by explaining that textual distancing (where the reader 'travels' from the world of origin) does not warrant ontological distancing and that in the simulation of narrative worlds, suspension of disbelief does not imply a suspension of primary reality but merely the heightening of a secondary one. As narratology shows, it is not just desirable but vital for the process of fictional mimesis – and simulation itself – to preserve an irreducible materialist ontology in the form of connections or indices of accessibility with the actual world. These relations have been extensively discussed in the work of Saul Kripke, David Lewis, Thomas Pavel, Marie-Laure Ryan, Umberto Eco and Ruth Ronen (among others) to establish what conditions of necessity and

accessibility are imposed in the creation of alternative, non-actual possible worlds. While simulation is amenable to the modelling of fictional worlds due to analogous systems of operation, it is in the description of pseudoreferents or what Jan Alber and Brian Richardson have termed 'unnatural narratology' that the aesthetics of narrative simulation are tested to its limits. A critical reading of Borges's "The Aleph" and "There Are More Things" serve to foreground the concept of 'simulation as narrative' which will be expounded in Part II as a discussion towards a poetics of narrative simulation in non-digital, literary texts.

3.2 A Fiction View of Modelling

In chapter 2 we established that simulation is a process which involves modelling, a form of scientific representation that is highly mimetic, function-driven and outcome-oriented. To explain what common principles underpin narrative fiction and simulation modelling beyond figurative analogies, we must turn our attention to Roman Frigg's "fiction view of model-systems" ("Fiction and Scientific Representation" 99). Frigg's concept of modelling as fiction will be discussed at some length since it serves a dual purpose: it relates scientific representation to fictional/semi-fictional constructions such as those found in literary texts and it does so precisely by establishing prescriptive rules which require reader involvement not unlike that demanded by dynamic simulations. Frigg's fiction view of models, and one which has Kendall Walton's "prop theory"[25] as its basis, thus indirectly provides further evidence for a mode of simulation that is quite amenable to narratology. Central to Frigg's argument is that model systems are often composed of fictional and non-fictional elements, which come together through an imaginative and creative exercise of pretense. This is significant since traditional belief holds a view of science and fiction existing in diametric opposition, one where "fiction not only seems to play no role [but] seems to detract from [scientific theorisation]" (Frigg, "Fiction in Science" 247).

Yet for Frigg this is hardly the case and he draws attention to "the parallel between certain aspects of science and literary fiction [which] has not gone unnoticed" ("Models and Fiction" 255), citing James Clerk Maxwell, Hans Vaihinger,

[25] Says Walton, "Props are generators of fictional truths, things which, by virtue of their nature or existence, make propositions fictional … But they do not do so entirely on their own … there is a certain convention, understanding, agreement in the game of make-believe …" (37-8).

Nancy Cartwright, Peter Godfrey-Smith and others who have construed scientific modelling in terms of "intellectual construction", as-if philosophy, and "epistemic practices" shared by artistic and imaginative fiction (255). Thus "although … imagined entities are puzzling … much of the time they might be treated as similar to something that we are all familiar with, the imagined objects of literary fiction" (Godfrey-Smith qtd. in Frigg, "Models and Fiction" 256). The connection between conceptual entities in model systems and those in literary fiction cannot however be rendered facile through simple analogy. What do we mean exactly by claiming that scientific modelling is akin to modelling fiction? Is there a shareable or similar system of representation? More importantly, are all forms of modelling reducible to fictional representation? An attempt to answer these questions should help clarify what connections can be drawn between modelling in science and, eventually, simulation modelling in narrative.

Frigg departs from the assumption that scientists adopt model systems for experimental purposes which cannot be called actual. These models, previously discussed in chapter 2, are simplified versions or abstractions of otherwise more complete physical systems, with omitted or neglected properties (Van Fraassen refers to this as "selective resemblance", see 2.7) (33). Thus, they are "hypothetical systems" (Frigg, "Models and Fiction" 252). For Frigg, this "highly stylised and distorted rendering of the system under investigation" (252) and one to which we are indebted when constructing scientific theory is proof enough that an object which does not have spatio-temporal existence but which is neither a mathematical or structural phantasm can be brought to bear on actual targets (252-53). Frigg distinguishes between the "hypothetical system", what we have termed the model, from the "target system", the actual source reality which is being represented or simulated (253). According to Frigg, hypothetical systems or hypothetical entities "would be physical things if they were real" (253), yet they are not, and Frigg insists that neither do these models/entities – proffered *in lieu* of a target system – represent the world per se; they represent only their own structures. Frigg gives the example of data which serves to confirm a model but which is not what the model represents (254). (We can draw parallels here with Pulizzi's argument for a 'historical' timescale, the Anthropocene, rendered from – and *as* – "billions of data points" – see sec. 1.2) (83).

Frigg advances this argument in a paper from 2002 entitled "Models and Representation: Why Structures Are Not Enough", the gist of which is explained here:

> A structure is not about anything in the world, let alone about a particular target system. Those who take model systems to be structures suggest connecting structures to target systems by setting up a morphism between them (the most common morphism is isomorphism …). But a morphism holds between two structures and not between a structure and a part of the world *per se*. ("Models and Fiction" 254)

In other words, a model can only start representing its referent (the target system in Frigg's discourse) once its underlying structure has been "endowed with representative power [by recoursing] to a physical design" ("Models and Representation" 3). But this is not, apparently, what structures can do on their own – a structure must *be made to become* a model. Frigg's concept of a model requires "(at least) a structure, a physical design and a process that hooks up the two" (3). Frigg discounts structuralist model theories where a structure and its attributes have direct correspondence (isomorphism) with the object they model, mainly because structures "are not representations of anything in the world" but "pieces of pure mathematics, devoid of empirical content" (5). Since representation, as we have seen, is based on a substitution-for principle (representing X as Y), it requires "semantic content" (5) in order to stand for something else. Only then will a structure acquire representational status since "structures *per se* do not stand for anything at all [and] do not indicate any real-world system as their object" (5).[26] According to Frigg, structures "become models when someone uses them as such" (18); models are therefore never accidental representations.

We can posit the same rules for literary fiction. Like Frigg's model-systems, which are an "ensemble" of "things that do and … do not exist" ("Fiction in Science" 257), literary plots "are mixtures of existent and non-existent elements" (257) whose design prescribes to the reader how they ought to engage with them, despite not characteristically portraying an actual state of affairs. A model system is introduced in the same way literature is introduced, "by giving a description [through] sentences specifying its features" (Frigg 257) (although in all fairness a good number of model

[26] The use of 'structures' can be perhaps clarified by specifying that Frigg treats scientific modelling as a *conceptual* rather than material process, in which case the assertion that structures on their own have zero semantic or representational value until they become invested as models is true. Models are contained in the head rather than the hands. However, Frigg does not discount the presence and use of material models, which decidedly requires less structuring.

systems are 'described' non-textually through the use of sketches, diagrams, drawings and so on). This description is not intended to denote real persons or objects and may or may not have "counterparts in the real world" (257) yet the reader is aware of this when he engages with the storyworld, or with a model system for that matter. Moreover, the description of a model system, of which a fictional world is an example, "specifies only a handful of essential properties, but it is understood that the system has properties other than the ones mentioned in the description" ("Models and Fiction" 258). Essentially, what Frigg is stating here is that model systems – and by extension, fictional worlds – operate on principles of implicit content ("extra content") (258) which are generated when the reader extrapolates from the model system/narrative itself. (Narrative or genre-models therefore contain self-inscribed or pre-written 'rules' or conditions for their own readability or interpretability, the same as simulations). This extrapolation is also carried out, inevitably, with the target system, and although Frigg has made a case for model systems not being structurally isomorphic to real world counterparts, he concedes that "on every account of representation one has to compare features of the model system with features of the target at some point, even if only to assess how good an approximation the former is of the latter" (258). (This process of model verification and validation was discussed following an analysis of Kheir's simulation diagram in sec. 2.5).

Both model systems and fictional narratives are nevertheless presented (read: 'structured') as descriptions which function as props in games of make-believe (Frigg, "Models and Fiction" 260). This analogy is important to keep in mind as conditions of truth or factuality are waived, according to Christopher New, when one considers the nature of fictional texts as "invented narrative[s], consisting of sentences which the author invites the audience to make-believe are true, or to make-believe are authentic utterances of a real or imaginary utterer" (New 48). To give one over-cited example, we know that there is no actual historical person called Anna Karenina yet an Anna Karenina exists in the world of Leo Tolstoy's titular novel. The Anna Karenina in Tolstoy's novel is therefore "fictionally true" (New 108) while claiming that Anna Karenina was not Alexei Vronksy's lover is fictionally false. As readers, we accept the conditions imposed by the game of make-believe which leads us also to infer fictional truths through logical implicature rather than explicit description when information is deliberately withheld. Thus Tolstoy's description of Anna throwing herself in the path of an oncoming train – "… at the very moment when the midway point between

the wheels drew level, she threw away her red bag, and drawing her head down between her shoulders threw herself forward on her hands under the truck" – logically implies Anna Karenina's suicide, albeit a fictional one (Tolstoy ch. 21 qtd. in New 109). Frigg would term this description an implied fictional truth ("Models and Fiction" 259), not a primary truth, since there is always the possibility that Anna Karenina is rescued just before the train runs her over (she is not); yet the description, unless followed by more detail, leaves us with little room for interpretation.

"Fiction involves nondeceptive pretending to oneself, or make-believe", which form of pretension can be classified as "voluntary imagining" (69-73) explains New. This means that unlike instances of delusion or dream, we remain somewhat in control of the fictional scenario and willingly *accept* the events portrayed (by another), while in the knowledge that they are fictional, true only to the text that has conjured them into being. "Voluntary imagining" is therefore for New "our continuous and collusive engagement in the make-believe activity to which the author invites and seduces us" (78).

Frigg advances a similar theoretical starting point for his fiction view of modelling, basing it on Kendall Walton's pretense theory in which fictional truths are generated by props, prompting readers (or designers of models) to indulge in a consensual 'game' of intentional pretense where they imagine objects as possessing and being capable of certain attributes for the duration of this game ("Models and Fiction" 258-61). For Walton, fiction and fictional propositions are contingent on props as they act as "generators of fictional truths" (37). Thus, for example, to claim that a snow construction represents a fort is to say that the snow fort acts as a fictional prop of a real fort with turrets and a moat. One other condition of a prop is that it is capable of generating fictional truths regardless of people's ability to imagine or not imagine these fictions – as long as this prop is prescribed a function and there is social agreement on what this function is (children may pretend to 'use' the snow fort as the real thing while to a disengaged passerby the snow fort remains a pile of drift) (Walton 38). This is interesting because once again we are drawn to the *functional* aspect of modelling. Props (even within their theatrical context) serve particular functions and are denotative, treated as literal. In Walton's pretense theory, the "principle of generation" (38) is the act of describing what is going to serve as a prop, and how it is going to be used, and by whom, in a game of make-believe. This is in line with my previous discussion on functional representation or simulation modelling which goes

beyond the semiotic. So, if in a game of make-believe a tree stump is taken to represent a bear, the tree stump acts as a prop only for that particular game of make-believe and not for others (tree stumps usually denote themselves but may otherwise be taken to represent something else – a hidden portal for instance – in other pretend scenarios). The potential multi-representability of the tree stump prop in this case however undermines its representational status as a prop whose denotation has been explicitly stipulated and agreed upon. If a tree stump can be a 'bear' in one (private) game, a 'dragon' in another, a 'portal to a fantasy world' in another and so on, then the principle of generation becomes what Walton calls "ad hoc" (51). Frigg adds: "games based on public rules are 'authorized'; games involving ad hoc rules are 'unauthorized'" ("Models and Fiction" 259). Both involve pretense and imagination, the generation of fictional propositions, yet *only in the case of authorised games* does a prop acquire *stable* representational status. (Frigg eventually extrapolates this to mean modelling, whether scientific or, in the case of fictional narratives, the writing of a literary text whose reception depends on sanctioned principles of generation as a prop). Walton links this aspect of fictional pretension to belief, as distinct from the imagination, since although in ordinary circumstances "we are free to imagine as we please", "we are not free to believe as we please" (39). However, the game of make-believe, of constructing fictional truths, does not qualify as an ordinary circumstance and therefore fiction also necessarily places strictures and mandates on the imagination. Says Walton, "anyone who refuses to imagine what was agreed on refuses to 'play the game' or plays it improperly. He breaks a rule" (39). Therefore in Tolstoy's *Anna Karenina*, the *genre* or the literary convention of the novel prescribes the kind of props it utilises – in this case, a train is a train is a train – and we are meant to believe and imagine that Anna Karenina intended to commit suicide and in fact (or in fiction) succeeded. It could not be otherwise.[27]

Belief and the imagination are associated with considerations of truth and falsity in literary fiction, and the way truth statements operate in fiction is seen by Frigg to have correlations with model systems. Frigg argues that "models, like literary fictions, are not *defined* in contrast to truth" ("Models and Fiction" 260); as a matter of fact, "truth in fiction is not a species of truth at all" (261), implying that it occupies a distinct ontological status. If, as we have seen, fictional truths can exist "independently

[27] Walton in fact claims that in a novel such as *Gulliver's Travels* or the play *Macbeth* the nature of the work itself leads the reader or spectator to specific imaginings. Thus, Walton concludes, "the work is a prop" (51).

of people's *actual* imaginings" (262) as long as there are props to sustain them with their own rules of generation, then likewise, model systems can be similarly constructed. This occurs by: i. replacing fictional propositions (such as 'Macbeth is the only person to see a floating dagger') with claims about the model; ii. replacing descriptions of the type of fictional work (text, play, performance, film etc.) with descriptions of the model system (what Frigg calls the hypothetical model), and iii. replacing the principles of generation innate to that particular work with principles assumed to be operational within that model system (262).

While decidedly interesting, Frigg's fiction view of modelling presents various problems for simulation modelling *in general*, especially since it cannot (just) be considered a conceptual form of modelling, which is what Frigg bases most of his arguments on. On the other hand, the fiction view of modelling proves to be perfectly amenable to discussions of *narrative* simulation, which is this study's main concern. Before proceeding further, however, it might be appropriate to explain which of Frigg's claims are problematic, and why. That models or literary fictions "are not *defined* in contrast to truth" ("Models and Fiction" 260) is only partially correct. A model is not constructed as distinct to what it is held to be true (fidelity principle), so much so that a two-tiered process of verification and validation of the model (especially in functionally accurate ones such as simulations) is typically carried out before the model can be called 'good'. (This forms the basis of the arguments raised in chapter 2). Likewise, it is true that in fiction we can definitely "ascribe concrete properties to nonexistent entities" (Frigg 261) (such as those pertaining to unnatural narration or the modelling of pseudoreferents, sec. 3.5) and this is because we are entitled to do so within the operational parameters of make-believe, yet I find it problematic to carry this analogy over to modelling, as Frigg does, especially in a model system which is intended to simulate an actual one. In the main, simulation modelling does not involve imagining *imaginary* properties but imagining that a model has been attributed actual ones and seeing what emerges when these properties are applied and set in motion. Finally, since simulation modelling involves a very particular form of scientific representation we cannot concede Frigg's claim that "a structure is not about anything in the world, let alone about a particular target system" ("Models and Fiction" 254) since the very hypothetical system he proposes as the object of study (the simulation itself) needs to be grounded in laws and behaviours of the actual target system. Therefore, in simulation modelling (at least) it would also

be imprecise to assert that a "hypothetical system [is] distinct from the target system" (254) and while this may be true of the modelling of literary fictions (what is conveyed in fiction may or may not resemble or correspond with an actual state of affairs), it is certainly not the case with simulation modelling. Simulation modelling and fiction modelling part ways in their target outcome since they adopt a different teleology (simulation modelling, for instance, has epistemic functions while the modelling of fictional characters and worlds is not necessarily so, and in general, isn't). But we also need to consider what happens in the case of narrative simulation, which combines aspects of simulation modelling with conditions prevalent in fiction, and one where games of make-believe become structurally complex. The next two sections examine these issues by drawing on various narratological models which conceive of the text-as-world, 'vertical' and 'horizontal' referential levels, the text as reciprocal negotiation between two worlds (author and audience), reader-response theory and possible worlds theory.

3.3 World-Building as Simulation Modelling

Following Roman Frigg's proposition that scientific modelling and fictional representation have rules in common, correlations can also be drawn between simulation modelling and narratology. In 1969 Tzvetan Todorov proposed a "narratology" (qtd. in Meister, "Narratology") that went beyond the study of text-based discourse to an actual scientific theory that would address the logic and *structural* properties of narrative as "a universe of representations" (qtd. in Meister, "Narratology"). This would open up the study of narratives to new modes and disciplines.[28] Out of necessity, in this study I mostly adopt a text-based approach to narratology while explaining how specific structures embedded in narrative attribute it the quality of narrative simulation, as opposed to conventional mimesis. If narrative can be conceived of as a "universe", as Todorov has claimed, then we can theorise about the construction of entire, possible worlds *as textual models*.[29] However, while the construction of fictional worlds is conventionally based on mimeticism[30], in Part

[28] Although narratology did not become a "new science of narrative" (qtd. in Meister, "Narratology") as Todorov intended in 1969 when he published the *Grammaire du Décaméron*, its interdisciplinarity and multimodality cannot be denied.

[29] Other obvious narrative modes such as film and digital games also permit this, the latter being the most convincing due to their immersive and interactive nature.

[30] Studies which discuss world-making or world-representation as literary, ludic, aesthetic, social or political mimesis include Erich Auerbach's well-known *Mimesis*; Kendall Walton's *Mimesis as Make-*

II of this study I argue that some fiction ventures beyond mimesis to acquire the status of text-based simulation, with narratives that either simulate cognitive processes in real-time or simulate actual reader behaviours beyond the phenomenological.

What makes a fictional world a 'complete' world, one which is sufficiently cross-referential to sustain belief in its constructs? Michael Heim describes a world's "totality" in terms of "a *felt* totality or whole" (qtd. in Ryan, *Narrative as Virtual Reality* 91; my emphasis); "not a collection of things but an active usage that relates things together [in a] total environment or surround space" (91). While Heim uses this concept of a total world for virtual realism, specifying the interoperability of the fictional world's constituents (X acts on Y) as a form of causality, his concept can be reduced to one phenomenological imperative: affect. This condition is also present in textual worlds. A fictional world, whether a visual and interactive one or one which simply relies on cognitive immersion, must construct its narrative/s in such a way that its user/reader feels or *experiences* the game/text as *possible* (sec. 3.4). This is why apart from the interconnectedness of objects and individuals and their habitable environment, Ryan has added phenomenological requisites to the structuring of complete fictional worlds, such as the "intelligible totality for external observers" and "field of activity for its members" (91).

Fictional worlds are more than mimetic narrative constructs; they are approaches to narrative phenomenology. For Ryan, this means experiencing "the text as world", of being "immersed" in the textual world (90), while for Richard Gerrig experiencing the narrative world is akin to being "transported" (10) to a secondary world, making some aspects of the reader's "world of origin [temporarily] inaccessible" (11). Similarly, what Victor Nell has called "reading entrancement" or being absorbed or "lost in a book" (qtd. in Ryan, *Narrative* 96) implies an almost effortless passage from physical reality to fictive reality, provided that the narrative is structured in such a way that it does not place increasing demands on a reader's consciousness during the largely unconscious decoding of the information presented. These approaches to world-building focus on the reader's experiencing of the fictional world through a very active make-believe process which sufficiently simulates if not the texture then at least a mentally intelligible perception of that

Believe; Stephen Halliwell's *The Aesthetics of Mimesis*; Arne Melberg's *Theories of Mimesis*; Gunter Gebauer and Christoph Wulf's *Mimesis*, and Kathryn Hume's *Fantasy and Mimesis*.

world. At this point the question moves from the ontological to the phenomenological; it is not "whether the created world is as real as the physical world, but whether the created world is real enough for [the reader] to suspend [their] disbelief for a period of time" (Pimentel and Teixeira qtd. in Ryan, *Narrative* 89). Certainly, this is no mean feat for literary fiction to accomplish, considering that the world-as-text is a linguistic construct which requires the reader to decode or convert a sequence of letters into semantically relevant content near-instantaneously.

Modelling a textual world goes beyond mimetic representation; if it is meant to elicit behaviour or affect, it requires simulationist strategies which often go unnoticed. Ryan explains that the

> … idea of a textual world presupposes that the reader constructs in imagination a set of language-independent objects, using as a guide … textual declarations, but building this always incomplete image into a more vivid representation through the import of information provided by internalized cognitive models, inferential mechanisms, real-life experience, and cultural knowledge, including knowledge derived from other texts. (*Narrative* 91)

"Constructs"; "objects"; "declarations"; "representation"; 'import of information"; "internalized models"; "inferential mechanisms"; "real-life" – Ryan's description of linguistic structures which generate virtual scenarios and characters recalls a discourse of simulation modelling where virtual objects are imputed properties and rules based on external real-life targets. But curiously, while Ryan seems to downplay the idea of the text-as-world by treating it as metaphor (90-93) the modelling of successful microcosmia out of text – one which is written, but more significantly, one which is *read*[31] – needs to be discussed in nothing less than simulationist terms. This is rendered more imperative in light of Frigg's declaration that structures are non-referential, becoming meaningful model systems only when they are used as such (3.2). Similar to Walton's make-believe scenarios involving props whose function must be "authorised", the properties of a textual world model must be tacitly agreed upon by a minimum of two parties. Both author and reader are involved in the act of

[31] Narrative simulation is eventually an end-process that is triggered through the act of reading similar to the execution of computer code.

world-construction since a fictional world only comes to 'exist' upon its moment of narration (and consequently, its moment of reception).[32]

How does a fictional world's structure become both referential and meaningful? Ryan argues that a textual world "entails a referential or 'vertical' conception of meaning" where "language is meant to be traversed toward its referents" (92). This goes against the poststructuralist view that signification exists solely as a set of "horizontal relations between the terms of a language system" (92) and assumes a referential base, a primary world or an actual reality, from which signification emanates. In other words, textual worlds need to primarily subordinate language use from the semiotic to the purely semantic *during the reading process*, for as Sven Birkerts has argued, "when we are reading a novel we don't, obviously, recall the preceding sentences and paragraphs. In fact we generally don't remember the language at all, unless it's dialogue" (qtd. in Ryan, *Narrative* 92). A fictional world may be constructed out of text but it is *read into being*. The act of reading "is a conversion, a turning of codes into contents" (92) claims Birkerts, much like the systematic attribution of representational value to structures in Frigg's model-systems or the rendering of abstract digital inputs into meaningful and complex visual outputs in a computer simulation. In turn, it can be assumed that any linguistic or fictional construct that suppresses or delays the decoding process gradually diminishes the reader's suspension of disbelief so necessary for the reading-simulation to run.

A number of assumptions are being made here. Ryan's assertion that "language is meant to be traversed towards its referents" holds true only of mimetic texts "devoted to the representation of states of affairs involving individual existents situated in time and space" but not for "universals, abstract ideas, and atemporal categories" (92). 'Vertical referentiality' is possible for referents which ostensibly exist in the primary world but certainly not possible when abstract ideas are introduced in the fictional world, to which we can add impossible referents or pseudoreferents which owe their ontology to language. We can also question whether fantastic other-worlds or surreal representations of this world are less believable models if their description impedes vertical referentiality. In contrast, we may also want to assess whether fictional worlds which depend on high mimeticism can escape their language-mesh altogether, a situation which draws attention to

[32] In what can be compared to a dry run or testing of the writing process, the fictional world can be assumed to be self-narrated at first – the author of a work doubles also as a first critical reader in the same manner that the first critical gaze cast upon a work of art is the artist's.

'horizontal signification' when a text becomes overly concerned with form (how content is being represented; see chapter 5).

We are faced with two constraints here: the linguistic structure that permits the system model to cohere (the world-as-text) and the source system which it is meant to emulate (the world). Both are unavoidable in textual world-building and interdependent – the fictional world only exists because of its linguistic composition, as text. Thus we can see how Ryan's concept of 'vertical referentiality' starts breaking down in instances where mimeticism cannot be sustained linguistically or indefinitely, especially in the description of textual worlds which are possible but nonactual, such as Stanislaw Lem's pseudo-medieval cyber-worlds, or the downright impossible, as in most of Borges's fiction. I quote briefly as one example Borges's description of "The Aleph" from his titular short story, a singular place "where, without admixture or confusion, all the places of the world, seen from every angle, coexist" (*Collected Fictions* 281). Naturally the narrator's curiosity is sufficiently piqued to see this physical oddity with his own eyes, discovered in a cellar in Calle Garay, but before proceeding to describe The Aleph the narrative makes a sudden swerve into paralepsis:

> I come now to the ineffable center of my tale; it is here that a writer's hopelessness begins. Every language is an alphabet of symbols the employment of which assumes a past shared by its interlocutors. How can one transmit to others the infinite Aleph, which my timorous memory can scarcely contain? In a similar situation, mystics have employed a wealth of emblems: to signify the deity, a Persian mystic speaks of a bird that somehow is all birds; Alain de Lille speaks of a sphere whose center is everywhere and circumference nowhere … (It is not for nothing that I call to mind these inconceivable analogies; they bear a relation to the Aleph.) … What my eyes saw was *simultaneous*; what I shall write is *successive*, because language is successive. (282-83)

How indeed can one attempt to translate the sublime or ineffable into text, without resorting to rhetoric, analogy or metaphor in an attempt to thwart narrative paralysis when linguistic or visual representation fail? More problematically, how can a narrative about a spatio-dimensional impossibility attempt to simulate a plausible description through vertical traversal from text to referent when language is found to be insufficient and the referent inexistent? In a case of the "supranarratable"[33] such

[33] Robyn Warhol calls the "supranarratable" anything "which is not susceptible to narration" or "those events that defy narrative"; also termed "unnarratable" (223).

as Borges's mystical Aleph, we need to concede that the process of narration entails a lengthier "conversion from code to content", to cite Birkerts again (qtd. in Ryan, *Narrative* 92), which conversion is structurally problematic. Meaning is generated 'horizontally' and therefore semiotically due to the constraints of the narrative medium. The Aleph, perceived as an all-at-once reality, cannot be *described* all-at-once and remains a fictional construct within a linguistic ontology.[34] The richness and singularity of description that follows is therefore unavoidable, as the narrative alternates between mimesis and metaphysics in an attempt to capture some essence of the unexperienceable:

> Under the step, toward the right, I saw a small iridescent sphere of almost unbearable brightness … The Aleph was probably two or three centimeters in diameter, but universal space was contained inside it, with no diminution in size. Each thing (the glass surface of a mirror, let us say) was infinite things … I saw the populous sea, saw dawn and dusk, saw the multitudes of the Americas, saw a silvery spiderweb at the center of a black pyramid, saw a broken labyrinth (it was London) … saw a woman in Inverness whom I shall never forget, saw her violent hair, her haughty body, saw a cancer in her breast, saw a circle of dry soil within a sidewalk where there had once been a tree … saw the circulation of my dark blood, saw the coils and springs of love and the alterations of death, saw the Aleph from everywhere at once, saw the earth in the Aleph, and the Aleph once more in the earth and the earth in the Aleph, saw my face and my viscera, saw your face, and I felt dizzy, and I wept … (Borges, *Collected Fictions* 283-4)

In its poetic beauty, "The Aleph" would present a problematic "relation to a 'world'" (*Narrative* 95) for Ryan because of its deliberate "sense of alienation from the textual world, [one which does] not allow a world to solidify in the reader's mind" (95) but rather flits as a series of disparate images with few connections. Narrative has been subordinated to description and thought to sense-impression; we become aware of the transparency of artifice in world-construction when the act of reading deconstructs the very storyworld which is in the process of textual construction. In this manner, "The Aleph" would not fit Ryan's category of the text as world. In its self-reflexivity, its insistence on treating content as code, its ambitious narration of the "supranarratable" (Warhol 223) and its general playfulness, Borges's story becomes a textual 'game' (another metaphor adopted by Ryan). Ryan's 'neat' distinction

[34] According to Joe Moran, "[t]he word "sentence" comes from the Latin sentire, to feel. A sentence must be felt by the reader … A line of words should unfold in space and time, not reveal itself all at once, for the simple reason that it cannot be read all at once" ("How to Write").

between these two metaphors, the "text as game" and the "text as world" (*Narrative* 192) (see Table 1 below) is intended to distinguish poststructuralist narratives from realist narratives. However, there are many instances of fictional worlds (such as those present in Umberto Eco's *The Name of the Rose* or *Foucault's Pendulum*) which employ both a high degree of mimeticism and linguistic playfulness, combining the readerly pleasures of textual immersion with the intellectual challenges of semiotics.

Feature Comparison for the Metaphors "The Text as Game" and "The Text as World"

	Game	World
Function of language	Cube, matrix, toolbox	Mirror (virtual image), picture
Substance of language	Opaque, visible	Transparent
Meaning	Relational	Referential
	Horizontal	Vertical
	Fluid, emergent	Textual information needs to
	Entirely contained in text ("Il n'y a pas de hors-texte")	be supplemented by imported knowledge
Reader's attitude	Reflexive	Nonreflexive
	Lucid	Willing suspension of disbelief
	Refusing illusion	Accepting illusion
Type of activity	Surf the surface	Exploration
	Construction, permutation, transformation	Voyeurism
Form	Form as exoskeleton	
	Emphasis on arbitrary formal constraints	Organic unity of form and content
Role of chance	Ambiguous:	Negative (words express how
	Positive (words take initiative)	things are in fictional
	Negative (signs must be overdetermined)	world)
Conception of space	Space occupied by text:	Space represented by text:
	Figures, arrangement on page, network of accessibility relations between units	Environment, landscape, geography
Requirements	Specialized "literary" competence	General linguistic and cultural competence
		Basic life experience
Critical analogy (Barthes)	"Writerly"	"Readerly"
Computer analogy (Turkle)	Macintosh operating system	IBM PC (MS-DOS) operating system

Table 1: Ryan's "text as game" (structuralist) versus "text as world" (mimetic) concepts
Source: Ryan, *Narrative as Virtual Reality* 192

While it is true that Ryan treats "the text as world [as] only one possible conceptualization among many others",[35] we must look beyond the metaphor to

[35] Other analogies cited by Ryan are the text as network (George Landow) or as machinic assemblage (Gilles Deleuze and Félix Guattari). Ryan's own metaphors are intended to provide a form of foundational poetics for texts which are interactive (texts as games) and texts which are immersive (more conventional textual worlds) (Ryan, *Narrative* 90).

locate the model and its functional relationship with the real. Simulation is not analogy but surrogacy. If we respond to a fictional text we do so precisely because we "imagine it as a physical, autonomous reality furnished with palpable objects and populated by flesh and blood individuals" (Ryan, *Narrative* 92). "How could a world be imagined otherwise?" (92) adds Ryan. How indeed. We do not explicitly treat narrative as metaphor, and in cases where it is, we still seek an irreducible mimetic element that enables us to sound out the fictiveness and solidity of its referents – a *principle of minimal reality*. In Heim's words again, a fictional world must have "a felt totality" (qtd. in Ryan, *Narrative* 91). Fictional worlds are therefore "existentially centred around a base we call home" (91). The 'homeliness' or *familiarity* of fictive experience which grounds it to a 'felt' reality, and any reactions it invites, are well-documented: from Viktor Shklovsky's *ostraneine* (defamiliarisation) to Sigmund Freud's *unheimlich* (the uncanny; the unhomely). Literature is meant to open a 'window onto the world', allowing us to gain insight into the very world that generated it, thus the baseline for world-building is "home", the familiar, "the node from which we link to other places and other things, [the] thread weaving the multitude of things into a world" (Heim qtd. in Ryan 91). Ryan concurs with Heim by stating that "the most immersive texts are [in fact] the most familiar ones" (96). The notion of 'home' also correlates with what Kathryn Hume refers to as "consensus reality" (23), that which "immediately refers us both to the world of the author and that of the audience" (23), in other words the real or actual world which is the basis of all forms of simulation modelling.

Consider Hume's diagram (Fig. 4 on p. 105) and reproduced in various studies on literary realism. For Hume, the work of fiction results from the reciprocal influence and mediation occurring between "world-1" and "world-2" but although "world-1 is everything outside the author that impinges upon him" (9) this is not necessarily *the* world shared by the reader:

> These worlds of experience, world-1 and world-2, differ even if the artist and reader are contemporaries; world-2 indeed differs for each member of the audience. If artist and audience are separated by time, language, religion, culture, or class, the amount of shared reality may be small. (Hume 9)

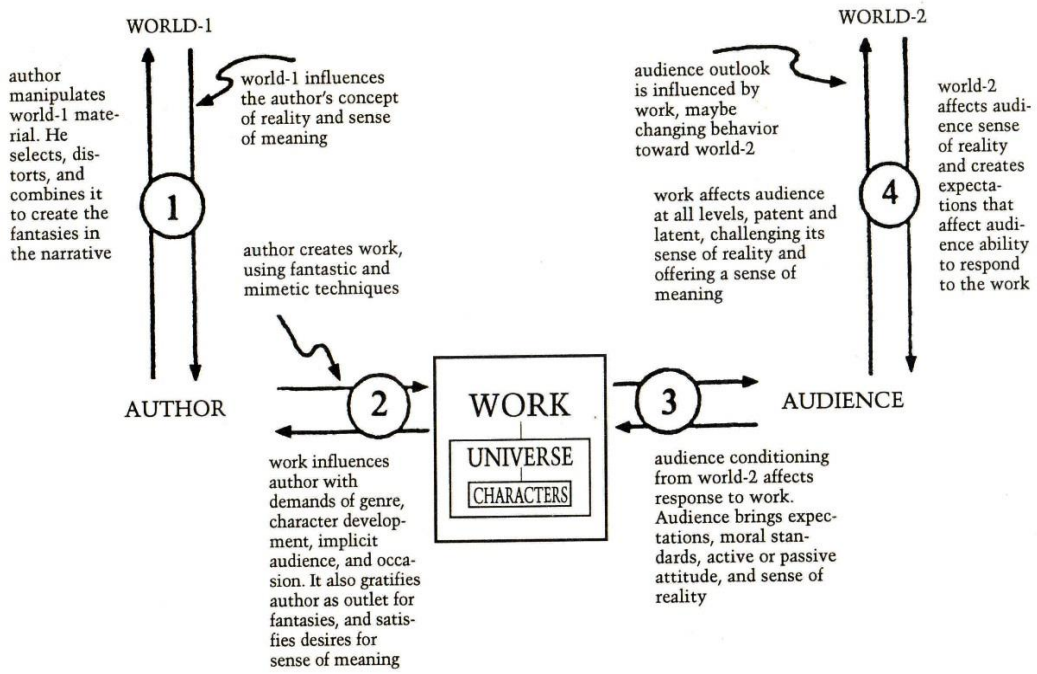

Figure 4: World-reflection: real world phenomenological process giving rise to mimetic fictional world
Source: Hume, *Fantasy and Mimesis* 10

Hume's model of mimetic world-building is based on reciprocity – shared and unshared individual realities and shared and unshared individual phenomenologies (experiences and sensations of both real and fictive worlds). The model suggests a bi-directional and intersecting process of creation: (i) the writer draws on shared/unshared reality for experience and imagination; (ii) crafts his fictional world complete with life-like or fantastic characters, settings or plots by recoursing to structures, both fantastic and mimetic, that use consensus reality as a referential base; (iii) readers self-identify (or don't) with the fictional world, which has both vestiges of world-1 (the author's) and world-2 (their own); (iv) readers' reactions to the fictional world prompts discussion and critique and (v) the fictional world influences generic trends in fiction writing, thus opening up the mimetic-reflexive process again. From Hume's diagram one can infer that what links author and audience is the text, which she calls "work", implying a joint authorship. However, this is inexact. Base reality is missing from the model. This serves both as the writer's point of departure in creating the work in world-1 but also the readers' benchmark for assessing and self-identifying with this work in world-2. Hume's model appears to *separate* writer and audience by having them occupy, influence and be influenced by their respective worlds, as if the world of the text, or the work itself, were the

livable domain of the audience rather than its *affective* domain. From Hume's annotation to the diagram we read that "world-2 affects audience sense of reality and creates expectations that affect audience ability to respond to the work" (10). This is not wholly correct. It is the source for the modelled world which is occupied by, and phenomenologically influences, both writer and reader. This is the (mostly) shared reality from which stem both the writer's and reader's knowledge, emotions and expectations of the fictional world. This connection is not displayed in Hume's diagram, leading to the unfortunate conclusion that major divergences seem to exist between worlds-1 and 2, when in reality these only serve as metaphorical labels which have been used by Hume to represent different personal, historical or political *realities* (or instances of the same world) rather than different worlds.

Hume's concept of world-construction emphasises reciprocity (what I termed joint authorship) but (her model at least) underplays the significance of a dominant and common non-fictional world for the sake of social relativism (what is represented as worlds-1 and 2 in her diagram). This is curious as she still bases her argument that "literature is the product of two impulses" (20) on "consensus reality" (20). Mimesis is "*vraisemblance* to the world we know" (21) while fantasy "is any departure from consensus reality, an impulse native to literature and manifested in innumerable variations, from monster to metaphor" (21). Therefore world-construction as a form of simulation modelling must take into account what aspects of the world are to be modelled, but the author must also assume *a priori* what aspects will diverge – or depart, to use Hume's word – from the dominant, and *to what extent*.[36] But for this to occur, a dominant must be acknowledged. Palmer calls this the "source domain, the real world in which the text is being processed by the reader" (*Fictional Minds* 34), as opposed to the "target domain, the storyworld that constitutes the output of the reader's processing" (34). This clear distinction between a source domain and a target domain does not imply that features are not shareable or common to both; in fact Palmer explains that access to the fictional storyworld occurs when readers process and negotiate knowledge from *both domains*. "The system of textual features that triggers various kinds of reader-held real-world knowledge … projects the reader from source domain to target domain" (34) according to Palmer.

[36] Conventionally, if we regard literature as the product of both mimetic and fantastic impulses, as Hume does, any convergence or divergence from the core of consensus reality is responsible for the various genres and sub-genres that are to be located along the entire spectrum.

Access to fictional worlds is therefore reader-centric. Palmer explains how based on reader-response theory, current narratology links access to the narrative world to the act of reading. The implication is therefore that storyworlds are essentially *performative acts*; they must be read or cognitively experienced in order to come-into being (Doležel qtd. in Palmer, *Fictional Minds* 34-35), a concept initially expounded by Gérard Genette who linked every narrative to a narratee (that is, a text only becomes a narrative in the presence of a narratee).[37] In a revisitation of *Narrative Discourse*, Genette made the role of the narratee central to the mechanics of narrative once it *speaks* to the reader:

> In the most unobtrusive narrative, someone is speaking to me, is telling me a story, is inviting me to listen to it as he tells it, and this invitation – confiding or urging – constitutes an undeniable stance of narrating, and therefore a narrator … [Thus] "The door of Henry's lunchroom opened" – presupposes a narratee capable … of accepting the fictive familiarity of "Henry", the existence of the lunchroom, and the singleness of its door and thus … of *entering* into the fiction … (*Narrative Discourse Revisited* 101)

Consequently, Genette has dismissed notions of "narrative without a narrator, the utterance without an uttering" as instances of "pure illusion and, as such, 'unfalsifiable'" (101). As a corollary, we can add Shlomith Rimmon-Kenan's admission of an implied narratee, "the agent which is at the very least implicitly addressed by the narrator … even when the narrator becomes his own narratee" (90). At this stage, we can group Palmer's concept of source and target domain, Hume's notions of world-1 and world-2 author-audience reciprocity and the role of the reader-as-narratee in Genette to propose a valid text-as-world model (to borrow Ryan's phrase) which is fully consistent with simulation modelling and which treats it as a fully-fledged system rather than metaphor (see Figure 5 further down).

Hume's mimetic model might have its minor shortcomings; however it still bears obvious similarities to simulation modelling in most respects, mostly in situating a reality external to the simulated world as its source (worlds-1 and 2); in devising a medium (the work) for users (the writer and audience) to engage with and manipulate; in suggesting an individual phenomenology (audience affect) and finally in validating personal experience (epistemology). The last two are perhaps the most

[37] In the absence of a direct narratee, the author replaces that narratee since the act of writing a text for someone indirectly results from writing the text for oneself; the author is a text's first narratee.

crucial aspects of this model. For a simulation to matter – how we engage with it, what it can do and what we can learn from it – we demand credibility from the model. This is possible only after we have assessed the model in terms of its functional relations to the source domain.

In section 2.5 I discussed Kheir's diagram of the simulation process and how properties of the physical system (reality) are modelled through a structure (system and computerised models) while recoursing to validation and verification processes. In this way, the desired match between "observed behaviour" and "predicted behaviour" is obtained (Kheir 5). The role of the model-designer here is to ensure that the data being generated by the system model corresponds to that acquired from the physical system to permit accurate replication. (Kheir's model implies a pre-test design and implementation phase where users are absent). Hume's model suggests a similar practice, starting with the author's work being mediated through his own perceptions and experiences of the external world before this fictional universe is made available for its audience. However, while Kheir's model mostly assumes an epistemological approach to validate system behaviours, Hume's model is mostly phenomenological since it takes audience response and affect into account. Thus, in Kheir we find that an interplay of verification and validation processes is necessary to ensure that "the computerized model represents the system's model within specified limits of accuracy" (6). Until this is achieved, the model is "modified to reduce the differences between model and system behaviors" (6). In Hume's mimetic model, this process of verification and validation is implicit in the audience's reception (or rejection) of the work, which might also lead them to changing their behaviour towards World-2 (Hume 10). In the final analysis, both Hume and Kheir's models assume that faithful modelling/simulation of target behaviour or phenomena, whether rendered through text or digital medium, depends on a constant interplay between source-user-target systems, lending more credence to the idea that Ryan's "text-as-world" can be construed in simulationist rather than figurative terms.

An objection may be made to my idea of narrative-as-simulation model, the argument being that counter-factuality is not the end objective of a simulation and neither does a simulation run on counter-factual rules. But while it is true that certain liberties may be, and frequently are, exercised by narratives, this cannot absolutely be the case in simulation modelling, where accuracy and credibility are *sine qua nons*. Thus, the argument might run, total immersion in a fictional world is possible only by

removing oneself and one's experiences from the non-fictional world of external reality – a willing suspension of disbelief in the fictional world which is facilitated by transportation (Gerrig's term). In this manner, the fictional and non-fictional world are kept distinct domains with distinct entities and rules of behaviour. However, as we have seen, this argument is not entirely correct. Even if the reader (or "traveler" in Gerrig's words) "goes some distance from his or her world of origin" (13) this certainly does not imply that textual distancing warrants complete ontological distancing. According to a "principle of minimal departure" ("Fiction" 406) articulated by Ryan in 1980, "we reconstrue the world of fiction … as being the closest possible to the reality we know [making] only those adjustments which we cannot avoid" (406). (Extreme variations and deviations are permissible only in the case of specific narrative genres or works where the internal laws of the fictional world hold sway). Therefore, in the simulation of narrative worlds, suspension of disbelief does not imply a suspension of primary reality but merely the *heightening of a secondary one*. One does not preclude the other. Indeed, as narratology shows, it is not just desirable but vital for the process of fictional mimesis – and simulation itself – to preserve an awareness of and an anchorage to the real. A simulation-type model for fictional world construction is thereby being offered below (Figure 5) by assimilating some core concepts of narratology explored so far in this section.

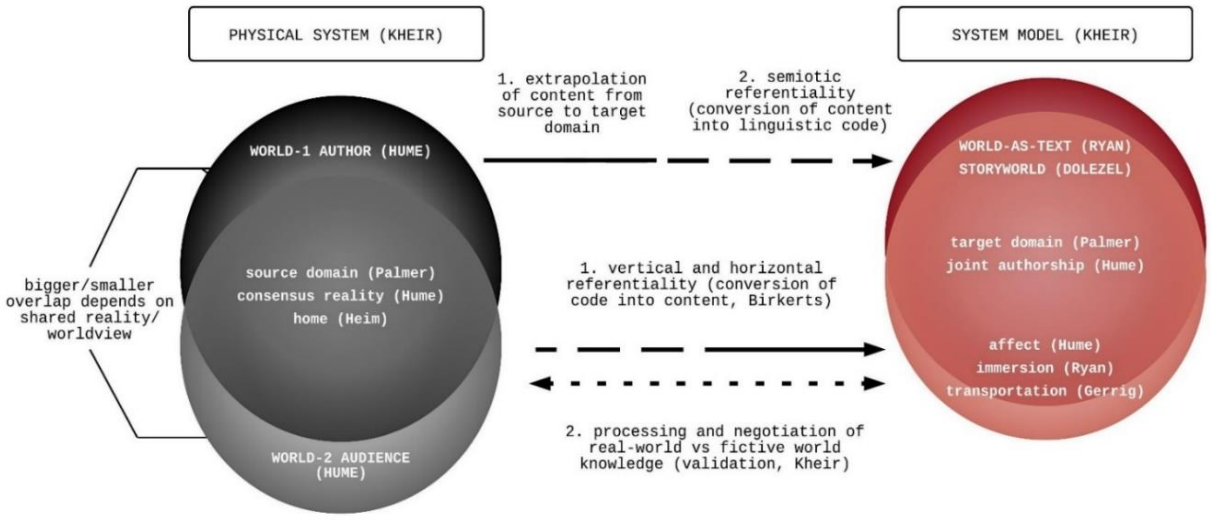

Figure 5: Simulation-type model for the construction of a fictional world

The proposed model integrates elements from simulation modelling with narratology to demonstrate areas of permeation and overlap between two representational systems:

1. The *physical system* and *system model* are terms used by Kheir to denote the source and target systems in a simulation model. Similar to the construction of a simulation model, the construction of a fictional world entails extrapolation of content (properties, attributes, laws, reference) from the physical system to the system model. A first and irreducible materialist ontology on which behaviours are modelled and compared is therefore also present in fictional world-construction. Palmer's narratological terms for these two distinct domains are the *source* and *target domain*, both indistinguishable from any scientific discourse on modelling or simulation.[38]

2. The *source domain* is essentially distinguished by its referential physicality, although it does encompass idiosyncratic worldviews, personal experience and highly individual realities. Hume treats this domain from the perspective of two world-views (*World-1* the author's, *World-2* the audience's) and acknowledges that these views overlap. I have not only preserved this overlap but accentuated it since an irreducible materialist ontology – a *principle of minimal reality* – which enables us to sound out the fictiveness and solidity of all referents is necessary. For the sake of clarity, the source domain therefore encompasses much more than individual realities but is a (mostly) shared and therefore *consensus reality* (Hume). Cross-referencing of properties between source and target systems therefore requires a departure from consensus reality or a departure from the familiar (the concept of *home* according to Heim).

3. This departure occurs as a parallel and inverse process. The construction of a simulation model entails a process of substitution of content to code which maintains a valid relational status between the source and target referents. Similarly, both author and audience maintain this relational status of referentiality in the construction of a fictional world through the conversion of content to linguistic code (Birkerts). This referential dissolution from referent to sign and from sign to (virtual)

[38] Also refer to ft. 1 in the introduction for different usages of the terms 'source' and 'target' in Text World Theory, and possible and fictional worlds theory respectively.

referent is denoted by straight and broken lines in the diagram above and occurs as a near-simultaneous and *inverse* process in the performative act of reading (physical referent in source domain ⇢ linguistic code (system of signs) ⇢ virtual, textual referent in target domain). While this process is assumed to be natural or quasi-instantaneous, this only applies to instances where reference is *vertical* and not *horizontal* (direct from sign to referent rather than indirect, from sign to sign, as distinguished by Ryan).

4. Depending on the complexity of the fictional world, its constituents and its narrative(s), approximation and relatability become conscious processes akin to verification and validation in simulation modelling, as proposed by Kheir. Knowledge, rules and laws pertaining to the fictional world are counter-checked against consensus reality until the audience is sufficiently convinced by the internal consistency of the fictional world.

5. Finally, the audience's active participation as narratees (*performative act* for Genette; *transportation* for Gerrig; *willing suspension of disbelief* for Coleridge) solidifies the construction of the *storyworld* (Doležel). If the textual world can be read into (imaginative) being, then its ontology becomes a shared responsibility. The extent of this joint authorship – how much of the textual world is 'written' by the author and how much is 'rewritten' (reimagined) by his audience – is denoted by the overlap where the audience's *immersion* (Ryan) allows for full phenomenological response (or *affect* in Hume) to this world. In simulationist terms this effectively means that the user is the final gauge of a system's strength or correctness.

While these rules are generically applicable to the construction of *any* type of fictional world, narratives which adopt simulationist strategies require a greater degree of audience participation and a discernible amplification of the reality principle in their construction. In this manner, the "accessibility relation" (Ryan, *Narrative* 100) of the target domain to the source is hardly questioned. Put otherwise, narrative simulations can be said to describe possible worlds in fiction in the most possible of terms, even if the target outcome is non-actual. This is achievable purely on the basis of their cross-referentiality. Ruth Ronen has made the observation that possible worlds theory "legitimize[s] an interest in referential problems and in everything that concerns the relations between literature and the actual world" (20).

These inter-relationships, or accessibility relations, which are found in fictional world models are investigated next to determine what makes one construction more possible than another.

3.4 Accessibility Relations and Possible Worlds

While the amenability of simulation modelling to world-construction is no longer questioned, "to what extent, and under what conditions, a simulation reliably mimics the physical system of interest" (Winsberg 115) is simulation's project today. It is also narrative's. Simulation is only too naturally absorbed by a growing and permeable discourse on possible and impossible entities and joins disciplines as diverse as modal logic, epistemology, aesthetics, linguistics, the natural sciences and literary theory, all of which fall squarely within possible worlds theory (Ronen 5).

Ronen has attributed the concept of possible worlds to the metaphysics of Leibnitz (5) with Ryan observing how the foundations of an actual theory were laid by the analytical philosophers Saul Kripke, David Lewis, Jaakko Hintikka, Alvin Plantinga and Nicholas Rescher in the mid-twentieth century ("Possible Worlds"). This was the result of questioning the semantic and ontological validity of counterfactual statements and propositional attitudes built on modal conditions, the logic of what might have been. Such conditional modes could be expressed by the operators 'If *x* had done/were to do *y*, then *z* would/would not have happened' (Ryan, "Possible Worlds"). Possible worlds theory therefore entertains – and examines – the notion that reality is "the sum of the imaginable rather than … the sum of what exists physically", allowing for "a plurality of distinct worlds" (Kripke qtd. in Ryan, "Possible Worlds"). This set of elements in the possible worlds' universe exists in contradistinction to a central element at the centre of the system. According to Kripke, this central element exists necessarily and is the 'actual' or 'real' world, while the other elements are "alternative or non-actual possible worlds" whose "boundaries of the possible" depend entirely on "relation[s] of accessibility" with the actual world (qtd. in Ryan, "Possible Worlds"). Similarly, Rescher privileges the ontological status of the actual world over other possible worlds in that only this world possesses an autonomous existence (an absolute materialist or physicalist view); other possible worlds are a result of mental activity such as hypothesising, foretelling, dreaming, imagining and storytelling (Rescher qtd. in Ryan, "Possible Worlds"). Possible worlds theory as inspired by Kripke (and revised by Ryan)

(*Narrative* 100-5) is thus hierarchical and 'geocentric' (since the actual world is assumed to be the world from which we formed our propositional attitudes in the first place), while its focus on the ontological and modal properties of what constitutes an actual from a non-actual world and a possible from an impossible one found fertile ground for discussing the status of fictional worlds from the 1970s onwards.

More specifically, Ronen has investigated the application of referentiality in possible worlds through concepts such as "necessity and possibility … world, world-set and transworld relations … world constituents, and to modes of existence (nonexistence, incomplete being, and so on)" (5). Seen this way, the structures of approximation and divergence that exist between physical and fictional systems and which belong both to simulation and narrative models are also subsumed within possible worlds theory. Not incidentally, Jean-Marie Schaeffer and Roger Hughes have drawn attention to this unavoidable association between simulation and possible worlds theory in narratology. Schaeffer has asserted that "problems investigated by the possible worlds school of narratology need to be placed in a wider context [relating] fiction-making and narrative to phenomena such as play, make-believe, impersonation, simulation and the use of counterfactual scenarios in reasoning" (qtd. in Ryan, "Possible Worlds"). Hughes makes the inverse claim that because computer simulations have become a "new mode of scientific activity", they can "reveal information about actual, possible, or impossible worlds" (qtd. in Winsberg 115).

It is often reported that the products of simulation are virtual entities modelled on an actual world. Then again, simulation *actualises* the virtual within the parameters of permissibility and credibility, both crucial constants in fiction.[39] In Ronen's authoritative work on possible worlds theory, the criteria of credibility and permissibility are expressed as "necessity and possibility" (5). These concepts are also treated as aesthetic principles in Aristotle's *Poetics*, where the poet's function is "not to relate what has happened, but what may happen … according to the law of probability or necessity" (Butcher 14). The latter principle is noted again when Aristotle puts preferment on the notion of "probable impossibilities" rather than "improbable possibilities" (35), and again on his insistence that anything "irrational"

[39] For instance, Ryan defines VR – virtual reality – as "an interactive system [which] offers to the user a matrix of actualizable possibilities" (*Narrative* 13).

can be rendered acceptable once "an air of likelihood [has been] imparted to it" (35). In this respect, Aristotle conceded that the poet or the artist could construct imaginary worlds which were self-governing, borrowing rules from the actual world but be "sufficiently consistent to afford the reader [in our case] a sense of what is and isn't possible in the textual world as well as an appreciation of the imaginative, narrative, and artistic 'necessity' of what ends up being actualized" (Ryan, *Narrative* 44).

The degree of (semi)autonomy which a fictional world can be said to display is however contested, not the least because any claim to a possible world ontology – where "there are other ways things could have been [and] that there exist other possible states of affairs" (Ronen 21) – must first take into account an existent, actual world ontology, itself subject to persistent polemic.[40] Ronen discusses two views of realism which validate the (semi)autonomy of possible alternative worlds, and one which invalidates them altogether. The first, *modal realism*, re-defines *actuality* in terms of Lewis's concept of *indexicality*; "'actual' does not refer to the world we inhabit or to a specific notion of what reality is. 'Actual' is rather an indexical term: the inhabitants of each world see their universe as the actual one" (Lewis qtd. in Ronen 22). Or as Ryan puts it, "the actual world is the world from which I speak … while the nonactual possible worlds are those at which I look from the outside. These worlds are actual from the point of view of their inhabitants" (*Narrative* 101). This being said, hardly anyone would argue that the perspective adopted by an 'inhabitant' of a nonactual possible world could only be one that has been *externally* inserted and attributed to this inhabitant by its actual creator, whether this nonactual possible world inheres in text or *in silico*.[41] This view of modal realism as proposed by Lewis therefore still admits the existence of the actual world, against which possible worlds "with their own laws and with an actuality of their own" exist in parallel (qtd. in Ronen 22). This parallelism can be seen in terms of transitive and asymmetric relations existing between the "world of the telling" and the "world of the told" (Pier, "Metalepsis"), with the latter being actualised only through the process of the former

[40] Beyond metaphysics and epistemology (is reality completely accessible to the human mind?), Ryan notes how the polemic extends to postmodernism since "the idea of a world enjoying special status is easily interpreted as hegemonism, logocentrism, negative valorization of the periphery, and a rigid hierarchical organization based on power relations" (*Narrative* 100).

[41] A qualification might be necessary here, and one made by Ryan herself. "Fictional stories differ from counterfactual statements in that they are told from the point of view of an APW [alternative possible world] which *readers* [my emphasis] regard as the actual world in make-believe" ("Possible Worlds").

(the world of the told is narrated-into-being by an external teller, but the teller is not narrated into being, unless he too is a fictional construct).[42]

Ronen conceives of parallelism as a world disconnected (parallel to, but not part of) the actual world, by which she means that *fictional worlds are distinct from possible worlds*. Whereas "possible worlds [branch out from] a range of possibilities that emerge from an actual state of affairs" (Ronen 8), hence "ramification" (8), the modal structure of fiction does not "relate what could have or could not have occurred in actuality, but rather, what did occur and what could have occurred in fiction" (9). In other words, while the actual world is innately assumed to serve as the model for the construction of fictional storyworlds, it need not prescribe how these fictional storyworlds imitate this reality; "on the contrary … texts are free to construct fictional worlds that differ from AW [actual world]" (Ryan, "Possible Worlds"). For Ronen, a world of fiction therefore possesses its own 'autonomy', one which is somewhat independent (parallel to) and non-inherent in any other.

Thomas Pavel makes a similar observation with regard to a text's autonomy when he claims that readers experience a "logical switch" (175), first through the "abandonment of [their] ontological perspective" (175) and second by "adopt[ing] a new ontological perspective, under which a proposition *p* is true if it is *true-in-Q*" (175). This means that "in creating what is objectively an APW [alternative/non-actual possible world], the literary text establishes for the reader a new actual world which imposes its own laws on the surrounding system, thereby defining its own horizon of possibilities" (Ryan, "Possible Worlds"). The 'ontological switch' described by Pavel is necessary if the reader is to become immersed in this world, and "under optimum reception conditions, the work Q posits a new 'actual' world G_Q' and a new relation R_Q' of alternativeness" (Pavel 175). In such manner, Pavel writes, "one can say that literary worlds are autonomous" (175) and while "a comparison between art and reality is [not] illegitimate … any such comparison is logically secondary to the exploration of the unique ontological perspective posited by the work" (175).

Ronen and Pavel's conceptualisation of a fictional world *which is considered actual within its own ontology* however would seek to deny both the source and process of its production (the act of writing within the world of the teller) and its

[42] Genette identifies this moment of extradiegetic intrusion by a narrator into the diegetic universe of the narration, or the inverse, as metalepsis (*Narrative Discourse Revisited* 234-35). Likewise, Brian McHale refers to this free movement across borders between the real world and the fictional possible world as "semipermeability" (*Postmodernist Fiction* 34-5).

assimilation and re-production (the act of reading, without which it remains untold). Ryan emphasises this interoperability between the actual and the possible: "readers imagine fictional worlds as the closest possible to AW, and they only make changes that are mandated by the text … if a fiction mentions a winged horse, readers will imagine a creature that looks like real world horses … except for the … wings" ("Possible Worlds"). Alternative possible worlds remain *alternatives to* an actual world. These strictures should therefore be enough to impose definite relations of necessity and accessibility from one (actual) world to an (alternative, non-actual) fictional other and are interpretive rules which are not merely text-bound but extend beyond the world of the text. Ryan has called this "the principle of minimal departure" (sec. 3.3), Walton terms it "the reality principle" (144-50) and I have postulated a similar narratological condition by explaining that without the "sustaining presence of realism" (Aquilina 124-29) the process of reading would encounter problems with referential anchoring points.

Given full consideration, Ronen's distinction between possible and fictional worlds goes against world-construction as a mimetic and/or simulation-based process since it nullifies the possibility of any inter-relationship or nexus that exists between the source and target domains (3.2). In fact, conceding the full autonomy of the fictional domain would render *both notions of source and target domains redundant*. But as we have established, at least for narrative simulation, this concept of parallelism as upheld by Lewis, Ronen or Pavel fails to apply. Rather, we must look at a less radical view of realism called *moderate realism*, where "possible worlds necessarily exist within the confines of the actual world and are viewed as components of the actual world [which] includes both its actual elements and non-actual possibilities" (Ronen 22). According to this view, a fictional construct could be considered a simulated product within the actual world which grants it phenomenological validity (it can be experienced, narrated and imagined) and therefore is reified as a possible but non-actual construction. Ronen asserts that moderate realism does not rationally allow for "possibilities [which inhabit] a space causally disconnected from our world" (22), and therefore world-construction is an act of modelling (as demonstrated in Figure 5).

The third approach, that of *anti-realism*, denies altogether the ontological pertinence of possible worlds by refusing them any kind of actuality since "there is no way to qualify the reality of *the actual* or *the real* in relation to which other worlds

present a variety of alternate possibilities" (Ronen 23). This refutation of a source-world ontology which is more actual than others is even more radical than modal realism since while a modal realist like Lewis "sees all worlds as equally real and concrete" (qtd. in Ronen 24), anti-realists such as Nelson Goodman "see all worlds as versions subject to radical relativism" (qtd. in Ronen 24) – what is real and actual is questioned at source. Again, as with modal realism, anti-realism is not logically amenable to the simulation of fictional worlds, especially since it precludes any possibility of accessibility relations existing between fiction and reality, the distance between which constitutes the possibility status of a fictional world.

A discussion of a world's possibility must therefore take into account its relationship to a more 'solid' other, one considered to be "the actualized center of the system of worlds" (Ronen 26). For Ryan, this forms the basis of possible worlds theory, where "one well-designated element … functions as the center of the system [and] is commonly interpreted as 'the actual world' [with] the satellites as merely possible worlds" (*Narrative* 99). Additionally, these possible worlds can be viewed "not so much as alternatives to the real world but as worlds connected with it" (Castañeda qtd. in Ronen 26). Far from a parallel autonomy, this connection implies a minimal dependency or anchorage of the possible world onto the actual world (sec. 3.2). Writes Ryan: "for a world to be possible it must be linked to the centre by … accessibility relation" (*Narrative* 99), with possibility and impossibility being indices related to "logical laws [such as] the principles of noncontradiction, [the] excluded middle [and] the physical laws that obtain in real life" (100). To these, Ronen adds other referential parameters such as "the identity of properties, the inventory of objects furnishing the world, chronological compatibility … world species … and language" (69).

Brian McHale clarifies the correspondence between actuality and possibility by explaining that fictional narratives are still governed by a logical modality that places "semantic constraints" (*Postmodernist Fiction* 33) on the narrative world – if "propositions about the real world fall under the modality of necessity … by contrast [propositions in fiction] … are governed by the modality of possibility [requiring] 'suspension of belief as well as of disbelief" (33). Such suspension can only be exerted when one determines what accessibility relations exist between a world w1 (and its actual state of affairs) and its similarity to world w2 (with proximate/non-proximate state of affairs). It is worth recalling here Tolman's principle of similitude and his

proposition that "structurally similar objects … display the same behaviour in structurally similar circumstances" (qtd. in Van Fraassen 51) (sec. 2.7). Walton proposes the same corollary of "implication" (144) when he mentions that "the basic strategy which the Reality Principle attempts to codify is that of making fictional worlds as much like the real one as the core of primary fictional truth permits" (144-45), thus "depressing piano keys is understood to have the same effect in fictional worlds that it has in the real one, so long as nothing in the directly generated fictional truths indicates otherwise" (145). For Lewis, "two worlds are similar if moving from one to the other entails no change in the laws of probability or in the logic of the world" (qtd. in Ronen 63). Lewis felt that the transposition of what is logically necessary in the here-and-now onto as-yet unrealised state of affairs was quite self-obvious; this way one could infer truth propositions about possible worlds "by relying on their similarity or closeness to the state of affairs actually realized" (qtd. in Ronen 63). Such transposition of properties is also a matter of convenience. McHale reminds us of Eco's conviction that if fictional possible worlds strike as similar in some aspect to the real world it is "because no world can be described exhaustively; instead of trying to futilely describe a world 'from scratch' it is much more feasible simply to 'borrow' entities and properties from the ready-made world of reality (McHale, *Postmodernist Fiction* 34-5). This act of borrowing also applies to structures by "manipulating the first world's entities and their properties [to] generate the structure of the second world" (35), and to the way we can intuitively make assumptions about the fictional world and its fictional inhabitants. As McHale asserts, paraphrasing Eco, "a second world is accessible if it can be conceived by inhabitants of the first world" (35).

Accessibility relations are therefore applicable both to the modelling of fictional worlds and to simulation modelling, specifically when rule-setting is transposed and extrapolated from source to model. Thus according to Ronen "a world is accessible only if all the propositions composing it are either true or false" (65) (but not having propositions which are both true and false at the same time, according to the law of the excluded middle); so "if in a world w1 a proposition p is true, whereas p is indeterminate ('either true or false') in world w2, w2 cannot then entertain definite accessibility relations with w1" (Ronen 65). In fact, Eco excludes fictional worlds from the scenario of possible worlds if they violate the law of the excluded middle; for Eco, there cannot be "impossible worlds" which are also "full-fledged self-

sustaining worlds" (McHale, *Postmodernist Fiction* 33). Ryan makes a similar point when she claims that "the worlds of fantastic tales are remote [from the actual world] because they are governed by different laws … but they [remain] possible, because they respect the laws of logic" ("Impossible Worlds and Aesthetic Illusion" 131). But, by the same token, "an impossible world would be a world that is not connected in any way to the actual world" (Ryan 131) since not only does it transgress its laws but it refutes them completely. Thus, it is technically not a world (not in the manner of the fictional constructs we have considered so far, at least). Eco has considered fictions with impossible or contradictory constructions, such as characters which are both dead and not dead and a world which exists and does not exist, such as in Muriel Spark's *The Hothouse by the East River* (McHale, *Postmodernist Fiction* 34) to have a specific metatextual intent. Such fictions are intended to produce "a sense of logical uneasiness and of narrative discomfort [to] *undermine* the world of our encyclopedia rather than build up another self-sustaining world" (Eco qtd. in McHale 33). For Eco, impossible worlds with indeterminate propositions bear no accessible or logical relation with an actual centre, thus they function as "anti-worlds rather than worlds proper" (McHale 33). Such impossible worlds are also excluded from Ryan's model.

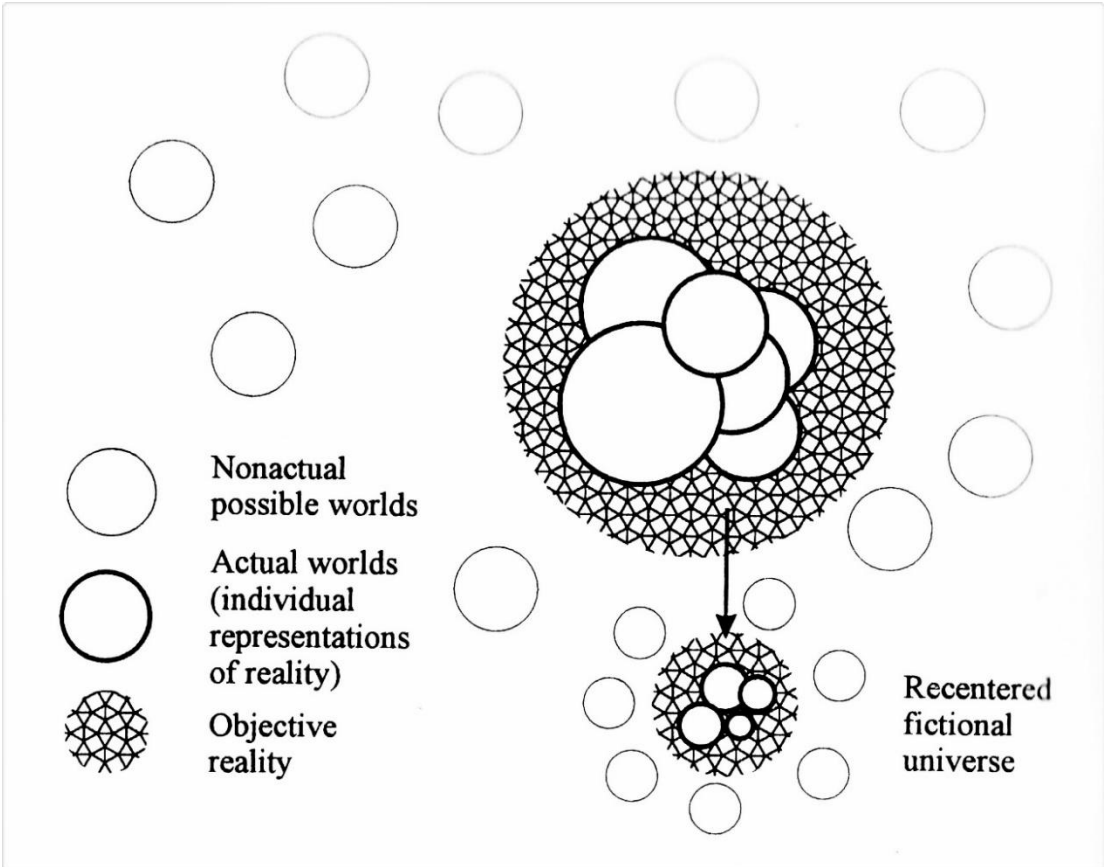

Figure 6: Marie-Laure Ryan's recenterable possible-worlds model
Source: Marie-Laure Ryan, *Narrative as Virtual Reality* 102

Ryan's "recenterable possible-worlds model" (*Narrative* 102) upholds the legitimacy of a central actual world independent of the human mind but also one which reconciles it with the possibility of mind-dependent constructions such as imagining, dreaming, wishing, hypothesising and writing. Thus, rather than reducing the distinction between actual and non-actual ontological states to an absolute materialism or physicalism which would have difficulties accommodating the latter, or adopting a "naïve realism" which "postulate[s] a singular actual world" (*Narrative* 100) or "a unique center [which] ignores the cultural and historical relativity of perceptions of reality" (100), Ryan adopts Lewis's model of indexicality to "relativize the ontological system" (*Narrative* 101). Ryan's model allows for a variety of actual and non-actual "world versions" (101) which are not hierarchical and "without sacrificing the idea of an absolutely existing, mind-independent reality" (101). As in Hume's diagram of world-reflection where world-1 and world-2 differ for the author and reader respectively when the amount of reality they share is undercut by factors such as temporal, cultural or linguistic displacement (3.4), Ryan's model accounts for individual representations of the actual centre whose "boundaries overlap because they reflect the same physical reality" (*Narrative* 101) but which retain their individualised differences. Further away and not superposed on the actual individualised centre lie a variety of worlds which are held to be possible but are not actual, standing "at various distances from our personal center, depending on how difficult it would be to enact them, or on what type of accessibility relations link them to the center" (Ryan, *Narrative* 102). (Their relative untenability is denoted by their thinner outline).

Ryan's recenterable model therefore allows us to entertain the notion of textual worlds as possible worlds while differentiating between generic ontologies, which to some extent are hierarchical and ideological. For instance, realist novels would exist in closer proximity to the centre than novels of the fantastic since their "actualization does not require a modification of physical laws" (102), while a twenty-first century reader of *Macbeth* would place its storyworld further from the centre than a contemporary of Shakespeare's, whose belief in witches would have been rife in Jacobean England. Impossible worlds, while tenuously sustained by the human mind, do not feature in Ryan's model even though in a description of the possible worlds universe she refers to them as "cluster[ing] at the periphery of the system,

conceptually part of it" (*Narrative* 100) as they necessarily exist in contradistinction to what is possible, "yet unreachable" (100).

For Ryan, the concept of "recentering" revolves around immersion and a centre on which cluster semi-subjective world views. In the case of counterfactual propositions, "consciousness remains anchored in its native reality and possible worlds are contemplated from the outside" (*Narrative* 103) while in fictional scenarios "consciousness relocates itself to another world and … reorganizes the entire universe of being around this virtual reality" (103). Ryan's recentering, which appears to be based on Pavel's "logical switch" ("Possible Worlds" 175), allows nonactual fictional worlds to be experienced as actual during immersive reading by "reproduc[ing] the structure of the primary system" (Ryan *Narrative* 104), or switching from a "native reality" (104) (one the reader already finds himself immersed in) to a new one. Recentering is therefore the unfamiliar refamiliarised through "textual authority" (104). This model, according to Ronen, works as long as we uphold a view of the actual world as "a stable ontology" (69) and not one which is mainly constructed on the basis of "ideologically determined encyclopedias" (69). A stable ontological "reference world" (69) therefore determines how accessible or inaccessible a fictional world is, permitting an overlap of properties which can be conceived of as similar, although to speak of similarity in the modelling of fictional possible worlds is to open up again the argument for representational difference (see Van Fraassen's argument for resemblance always being selective in which properties to model, sec. 2.6). Ronen warns as much, saying that to speak of similarity between actual and possible worlds is problematic since "the structure of a world is a result not only of the entities included in the set [of entities composing a world] but also of the relative position and relations holding those entities together" (68). Ronen's argument here recalls Frigg's claim (sec. 3.2) of an inexact morphism that exists between a structure and a part of the actual world; structures can only model the world once they have been attributed representational power and cannot do it themselves; they require human agency. "A model for accessibility" (64), Ronen reminds us, "can represent reflexive relations, and/or symmetrical relations, and/or relations of transitivity, which means that the world [against] which accessibility is measured changes according to the logical model for accessibility posited *in a given context*" (64; my emphasis). However, as I have attempted to argue in this chapter, not conceding a relatively stable first ontology which is – to an extent – human

independent, goes against all principles of representation, modelling or world construction. While I need not stress enough the importance of indices such as accessibility and correspondence in the creation of realistic simulation models, it is in the modelling of pseudoreferents or the construction of unnatural narratives that the necessity of a central referential system is most keenly felt. Ryan's recenterable possible-worlds model has illustrated the versatility of world invention while retaining an orientating centre. In like manner, we must concede that the modelling or simulation of what *does or can not exist*, similar to what exists, must occur as a deviation *from*, or as an alternative *to* an actual world or stable system.

3.5 Modelling Pseudoreferents: Borges's "There Are More Things"

"In fiction, anything is possible" (215) William Ashline reminds us, an often-repeated truism for "events and circumstances whose realization in the actual world is practically impossible [but which] nevertheless [become] possible in the realm of fiction" (215). We could also reconstrue this truism thus: 'fiction is that in which it is possible to say anything'. (Borges, for one, understood this well and this assertion was put to the test in an analysis of "The Aleph" earlier). This 'anythingness' permitted by fictional writing should not be seen as posing a direct challenge to the primary world since the actual world never comes "under erasure"[43], unlike its fictional equivalent. Both writer and reader who inhabit the primary world know this. Yet if fiction practically allows us to write about *anything* – anything here being the sum total of what actually exists but also what is possible and impossible in fiction – accessibility relations and referentiality may become somewhat strained when the state of affairs being modelled have no direct correlation or bear no resemblance to the source world (sec. 3.4). In section 2.2, I briefly explored Jeff Rothenberg's claim that a pseudo-model remains a permissible model although it need not represent anything actual in the world – as long as it has self-validating structures. In fiction, the versatility of language also permits the modelling of *impossible* pseudoreferents which deliberately subvert structures of logical implicature and dispense with most accessibility relations, except for language itself. Contrary to implausible or fantastic

[43] Brian McHale discusses *sous-rature* worlds (after Derrida's practice of striking out select verbal signs) as fictional worlds whose ontological instability – existing one moment, dissolving the next – deliberately frustrate the possibility of sequential or logical narrative readings. "First one state of affairs is projected … Then that state of affairs is recalled or rescinded … Finally the erased state of affairs is replayed" (*Postmodernist Fiction* 99).

pseudoreferents which are non-actual but still quite possible in their fictional world of origin, impossible referents and impossible worlds lie *outside both actual and possible worlds*, resisting classification[44] and challenging established mimetic models of narratology. Yet, despite their ontic indeterminacy (Ingarden qtd. in McHale, *Postmodernist Fiction* 31), impossible worlds remain stubbornly persistent in literature and cannot be simply ignored. Ryan, who like Eco abolished impossible worlds from her recenterable possible-worlds model of 2001, revised her position twelve years later by admitting that while logic treated the phrase 'impossible world' as an oxymoron, "readers of literary fiction have a broader sense of what is a world than logicians [do] and … do not treat inconsistencies as an excuse for giving up the attempt to build mental models of texts" ("Impossible Worlds" 132). Mimeticism might therefore present a more-or-less complete picture of a world, a world with a "felt totality" (Michael Heim's term, 3.3), yet it cannot be conversely said that anti-mimeticism *refutes* the process of world-modelling – it only *frustrates* its comprehension and imagining. Ryan's conviction is therefore that impossible worlds "challenge readers to devise new strategies for making sense of them, even if meaning does not arise from the vision of fully imaginable situations" ("Impossible Worlds" 132). This feeling has been shared by Monika Fludernik who argues that real-world parameters in narratology do not stand in the way of the "non-natural" ("Natural Narratology" 256) and it is only when narratives resist easy naturalisation on the basis of mimeticism that "we stop short and start to take the non-natural make-up seriously" (256).

While various typologies of impossible fictions deserve to be discussed at further length, especially in the way strategies of the unnatural/impossible are simulated through text, this chapter concludes with a re-affirmation of the content-to-code conversion and process of self-validation involved in simulating a fictional entity (see Figure 5 in sec. 3.3), in this case focusing on a pseudoreferent. By way of illustration we can discuss the unnatural setting of Borges's Lovecraftian tale, "There Are More Things", in which the anonymous narrator receives news of having inherited the Red House, an ugly structure ill-suited to the sultriness of the

[44] Recent work in narratology however has seen the emergence of a compelling poetics of unnatural narratives, unnatural storyworlds, unnatural minds, unnatural topographies and unnatural temporalities. See Jan Alber et al.'s *Unnatural Narratives – Unnatural Narratology*; Jan Alber et al.'s *A Poetics of the Unnatural Narrative*; Jan Alber, *Unnatural Narrative: Impossible Worlds in Fiction and Drama*; Brian Richardson's *Unnatural Narrative: Theory, History, and Practice*, and *Unnatural Voices: Extreme Narration in Modern and Contemporary Fiction*.

Argentinian plains. He learns that the previous occupant had engaged the services of one Alexander Muir who was tasked with making several alterations to the house and which job he "indignantly refused to carry out" (*Collected Fictions* 438).

It is the unusual conversions as well as the build-up of uncanny but *earthly* activity that surrounds the Red House that insidiously introduce the fantastical elements in this story by nature of gradation, to the point where they become irrefutable. Employing H. P. Lovecraft's style of insinuating cosmic horror before disclosing its enormity, Borges hints early on that we must accept "those facts of ugliness" (438) in the same manner that "one accepts all those incompatible things that only by reason of their coexistence are called 'the universe'" (438). Having thus prepared us for the ugliness of incongruity, Borges makes us share in the narrator's curiosity when he is forced to investigate why the previous owner had dumped all furniture, books and household items upon claiming the property; or why work on refurnishing the house had occurred at night behind closed doors, not to mention why all trees around the property had been felled down (no reason is given for this). Odd behaviour is accompanied by ominous declarations such as "[a]bomination takes many forms" (439), followed by surreal dreams of a "stone amphitheater" (440) without doors or windows but a "series of narrow vertical slits" (440).

As is demanded by the conventions of the genre, one of which is the necessity of foregrounding cosmic horror through the insinuation of laws or properties which uncomfortably coexist within our material world, Borges introduces – or rather models – *atmosphere* in two ways. *Indirectly*, he suggests a distorted and fantastic structure, not unlike Escher's impossible vaults, stairways and platforms, by visualising the dream-labyrinth "in the style of Piranesi" (440), a surrealist influence on Escher's work. *Directly*, the narrator compounds the surreality of his dream-vision by informing us that inside the house "the floor tiles had been taken up" (441), a "sweetish, nauseating odor filled the house" (441) and a "stone ramp" gave access to "one large ruinous room" (441) where everything lay scattered and in parts, his mind unable to re-assemble the original layout. Lovecraft's works assault human reason by conflating the congruous and the incongruous, suggesting that occasionally, inter-dimensional entities may very well be merging with our plane. Likewise, in "There Are More Things", Borges exploits spatiality and perception by modelling the reader's understanding of what is and *may* be possible through phenomenological inputs:

> In order truly to see a thing, one must first understand it. An armchair implies the human body, its joints and members; scissors, the act of cutting … None of the insensate forms I saw that night corresponded to the human figure or any conceivable use. They inspired horror and revulsion. In one corner I discovered a vertical ladder that rose to the floor above. The wide iron rungs, no more than ten in all, were spaced irregularly; that ladder, which implied hands and feet, was comprehensible, and somehow it relieved me. (441)

Fiction permits a privileged ontology of impossible referents directly through their description, something that is otherwise not achievable in the world external to the text. As Patricia Waugh has written, "*Descriptions* of objects in fiction are simultaneously *creations* of that object. (*Descriptions* of objects in the context of the material world are determined by the existence of the object outside the description)" (88). Borges however understood that the conventions of the fantastic tale required less obvious means. The impossible referent in Borges is not instantiated; rather, it is deferred until the reader is phenomenologically or cognitively prepared to perceive it. Seeing, in this case, is secondary to believing, the Lovecraftian/Borgesian implication being that we are not prepared to witness the cosmic horrors that shuffle on this world (hence the allusion to Hamlet's words to Horatio in the story title). The narrator's relief at seeing forms which suggest a human form are short-lived when upstairs he comes across "a long, U-shaped piece of furniture like an operating table, very high, with circular openings at the extremes" (Borges, *Collected Fictions* 442). Simile here is not used for approximation but rather the contrary – to distance the reader from the table's real function: "It occurred to me that this might be the bed used by the resident of the house" (442).

The impossible referent in Borges's Lovecraftian tale is therefore carefully constructed through pathetic fallacy, innuendo and impossible anatomy, all of which are strategically brought to bear on our imagination. The story's greater technical merits are slightly overshadowed when Borges, perhaps unsure whether his "resident" is discernible enough as a non-human anomaly, decides to validate its "monstrous anatomy" (442) further by guiding our view "obliquely" (442) to its shape, one that brings "to [his] lips the word *amphisbæna*" (442). Having modelled the phenomenology of his pseudoreferent – where we should look, what we should see and what we should think – Borges's monstrous resident is given shape, identity (that of a serpent with a head on either end of its body) and *texture*: "I conjectured that it hadn't locked the front door and the gate because it hadn't known how. My feet

were just touching the next to last rung when I heard something coming up the ramp – something heavy and slow and plural" (442).

Phenomenology and an odd syntagmatic association in the final sentence rescue the story's ending from becoming too revealing. The unnatural entity's arrival is modelled through syntagmatic dissonance, with the adjectives "heavy and slow" (442) (suggesting movement) being coupled with "plural" (442), a quantitative category. The final effect is disturbing due to semantic incongruity, which in turn relies on reader affect. An organism that is both one and many, of anomalous anatomy and composition and with a sluggish but rippling movement is insinuated into our consciousness as an after-image in lieu of an actual referent which is never shown.

Literary fiction like Borges's "The Aleph" and "There Are More Things" sever accessibility relations by introducing impossible pseudoreferents which place serious demands on the preservation of "aesthetic illusion" (Ryan, "Impossible Worlds" 131), or the power of imaginative immersion in a fictional secondary world. However, despite their indeterminate ontic nature, pseudoreferents can still be sufficiently modelled to be entertained by a human mind willing to grapple with a text which serves as a "construction kit" (146). What Ryan calls the "metatextual stance" (147), a performative reading of texts as language-games, does not "exhaust[t] the possibilities of literary meaning" (147) and certainly does not exhaust its means of production (if nothing else, it places additional challenges to their simulation as narrative). Thus, the litmus test for a structurally sound and consistent possible worlds model – whether it is Ryan's recenterable model, Hume's world-reflection model or my own simulation-model – ironically is not the modelling of actual world referents but that of impossible ones.

3.6 Summary

Correlations can be drawn between simulation modelling and narratology. This is evident in the way models construct frames of reference for target systems through make-believe mechanisms which also validate their truth as fictions – a mechanism readily seen in narratology as a form of textual modelling. Frigg's fiction view of modelling explains how a system only becomes a model when it is deliberately used as such, combining actual and non-actual elements the reader extrapolates content and rules for. This theory is based on Walton's pretense theory in which make-believe scenarios are generated on the basis of props, complete with agreed-upon functional

aspects. Similarly, the properties and laws of a textual world model must be tacitly agreed upon by two parties – the writer and the reader – both of whom are involved in world construction (Hume).

The modelling of a textual world – one which is written and one which is read into being – can be essentially discussed in simulationist terms. Fictional worlds are more than mimetic narrative constructs; they are foremost approaches to narrative phenomenology and simulation. The textual model adopted must construct its narratives in a way that its reader feels or experiences the textual world as possible, and if specific behaviour or affect is to be elicited, the model requires strategies which sufficiently simulate if not the texture, then at least a mentally intelligible perception, of that world. A base or consensus reality present in a world considered actual to both reader and writer, whether minimally or maximally resorted to (Ryan), provides sufficient referential anchorage for all forms of simulation modelling, including the textual. While reader immersion (Ryan) or transportation (Gerrig) is typically the desired outcome of most fictions, textual distancing does not warrant ontological distancing, therefore in the simulation of narrative worlds, suspension of disbelief does not imply a suspension of primary reality but merely the heightening of a secondary one.

Simulation is not analogy but surrogacy. If we respond to a fictional world, we do so precisely because we base our assumptions about that fictional reality by looking for an irreducible mimetic element that enables us to sound out the fictiveness and solidity of its referents (model credibility), and this is done by negotiating knowledge from a source to a target domain. Ironically, it is in the modelling of pseudoreferents or the construction of unnatural or impossible narratives that the necessity of a central referential system is most keenly felt. Alternative possible worlds therefore remain alternatives-to an actual world, while the simulation of what does or cannot exist, similar to what exists, occurs as a deviation from, or as an alternative to, an actual world or stable system. In simulationist terms, this effectively means that the reader/user is the final gauge of a (narrative) system's strength or correctness by evaluating relations of necessity and accessibility from one (actual) world to a (alternative, non-actual) fictional other.

Part II

Simulation-as-Narrative

For literature can say anything, accept anything, receive anything, suffer anything, and simulate everything; it can even feign a trap …

Jacques Derrida, *Demeure* (29)

To construct an environment is, of course, to anticipate and structure the user's interaction with it and in this sense construct the user as well as the interface. When the simulated environment takes literary and narrative form, potent possibilities arise …

N. Katherine Hayles, *Writing Machines* (48)

… Literature functions more like simulations than do other discursive forms, because like computer simulations … literary texts create imaginary worlds populated by creatures that we can (mis)take for beings like ourselves.

N. Katherine Hayles, *My Mother Was a Computer* (6)

Chapter 4
Simulating Fictional Minds

4.1 Introduction

In chapter 3, section 3.1, I cited Ashline's assertion that "in fiction, anything is possible" (215) to foreground literature's potential to model actual, non-actual and impossible referents, together with sufficient conditions for their ontological durability within the reading process. Recognising literature's versatility, Derrida makes further assumptions about its simulative – and simulacral – properties in *Demeure*. "Demeure", translated as "abode" or "home", is adopted by Derrida as a metaphor for literature which "does not remain at home, *abidingly* [à demeure]", nor "maintain[s] itself abidingly [*à demeure*]" (28). Whilst recognising, at least, the "essentially stability of a place" (28) implicit in "demeure" (recall Heim's argument for a 'felt' reality in fiction that necessarily extends from a base reality, or home; see sec. 3.3), Derrida nonetheless perceives in literature a precarious non-existence due to its "unstable function" (28). If "literature can say anything, accept anything, receive anything, suffer anything and simulate everything" (29), as Derrida asserts, literature is therefore intrinsically antinomic. However, while this "unconditional right to say anything", this "disobedience" (28), precludes literature from abiding anywhere or permanently, hence its instability, the former aspect ironically also confers it with the power to be anything it desires. Thus,

> one can read the same text – which thus never exists 'in itself' – as a testimony that is said to be serious and authentic, or as an archive, or as a document, or as a symptom – or as a work of literary fiction […] that simulates all the positions that we have just enumerated. (29)

For Derrida, inherent in literature-as-simulation is ultimately the power to deceive its reader. Literature "can even feign a trap, the way modern armies know how to set false traps [which] pass themselves off as real traps and trick the machines designed to detect simulations under even the most sophisticated camouflage" (29). Speaking of literary fiction's accomplishments in this manner, Derrida would therefore appear to be conjuring up the spectre of ambivalence once again (see introduction and chapter 1) by conflating simulation with the simulacral. Literature, he says quite

ambiguously, is "what presents itself as fiction, simulation, or simulacra, which is not all literature" (29).

The epigraph from Derrida's *Demeure*, prefacing Part II, serves both as a cautionary reminder of the contradictory semantics of simulation discussed in Part I while serving to proclaim literature's more "ecstatic process" (Derrida 29) – achieving the simulable. With regard to both contexts, I should have opened up the scope of simulation sufficiently in Part I to situate it within a *pragmatic* discourse where simulation can be theorised structurally and phenomenologically. This means that simulation can be studied as a complex system of modelling action and behaviours which are then validated against real-world behaviours and outcomes in a feedback loop. I have supported the claim, also made by other writers, that simulation should be considered *a priori* as a process (*to simulate*), which process must be perceived as a causal and interconnected totality. More relevantly, I have also departed from standard mimetic assumptions about simulation (again, a consequence of defining simulation through a restrictive and debatable aesthetics) to argue for a process that is generative rather than replicative, a matter of poiesis therefore. The constructive and generative aspect of simulation will be argued more fully in the subsequent chapters that comprise Part II of this study with accompanying select readings. This is an attempt to demonstrate that (some) fictional entities, states-of-being and states-of-mind are more than mimetic narrative constructs but are in fact approaches to narrative phenomenology and functional simulation (see sec. 3.1 and 3.6).

Further to this, I have discussed how simulation's *epistemic shift* and its corollary, the *epistemic fallacy*, render semantic (definitional) approaches to simulation problematic and irrepressibly futile. Simulation cannot be considered as a method of obtaining or furthering knowledge while also being used to refer to the generation of false copies or deceptive impressions (its long-standing usage of the term), that is, not unless we are talking about two distinct methods or discourses. (This did not stop Derrida, for one, from claiming that literature is at once both a form of simulation and a simulacrum; able to impersonate any genre of writing and deceiving the reader in the process). And yet, the same word which is currently employed in the scientific domain to describe the use of representational model systems has traditionally been disparagingly used to describe the production of mimetic copies which do not further knowledge in any way, but rather the opposite.

Pursuing simulation *semantically* therefore fails to account for its conflicting and concurrent definitions. The epistemic shift also becomes noticeable when simulation is re-contextualised and moved from a discourse of aesthetics, ontology and politics to address matters of epistemology or heuristics. In attempting to situate or liberate simulation from the equally problematic concept of imitation, (often loosely interpreted as copying or duplicating), we face simulation's burden of ambivalence: we ask, how can we further our knowledge of phenomena or events by creating synthetically 'less true' or 'non-real' versions of them?

An understanding of simulation's long-standing etymological associations with imitation and deceit make the epistemic shift more pronounced in contemporary studies of simulation and its uses. Debates on the postmodern condition, for instance, have tended to focus on simulacra – signs void of actual significance – and their gradual erosion and displacement of all referentials. Fredric Jameson, citing Sartre, has called this notion of simulation "the *derealization* of the whole surrounding world of everyday reality" (34). But if simulation refers to the replication of real phenomena this would be at odds with the concept of 'derealisation', yet both definitions remain problematically attached to the same word. This is quite evident in narratives, whether literary or filmic, where the employment of simulation *in* narrative is typically thematic and subordinates scientific definitions of simulation to postmodernist concerns with simulacra. It is also not incidental that generically (but not exclusively) most of these works tend to be science-fiction or dystopian narratives[45] where simulation is intentionally employed to create states of (mass) deception or promote a culture which valorises and embodies the virtual. In such narratives of simulation, attempts to uncouple the term 'simulation' from 'simulacra' becomes quite impossible since focus tends to be placed on the simulated product and its gradual transposition from "authentic copy" to the "completely fake" (Eco, "Travels in Hyperreality" 6-7).

Since one of language's semantic functions is that the meaning of a word changes according to its contextual use (a matter of pragmatics therefore), we should

[45] Much of the work of Philip K. Dick has simulation, virtual realities, drug-induced hallucination, imposturing and the superimposition of illusory reality as its premise. Notable examples are *The Simulacra*, *The Penultimate Truth*, *The Man in the High Castle*, *Time Out of Joint* and *Ubik*. The works of William Gibson, Richard Powers, Christopher Priest, Iain M. Banks, Stanislaw Lem, Ray Bradbury and Rod Serling are also of contribution to the genre. Some works which obviate the simulative process but focus on simulacra are Julian Barnes's *England, England*, Don DeLillo's *White Noise* and *Underworld* and John Fowles's *The Magus*.

question rather what beliefs or suppositions underlie the choice of one definition over another and what event triggers such choices. I thus argue that if we had to shift our attention from product to process and view simulation as *praxis* – a process of enacting or recreating behaviours – then we would not be bound by specific semantic associations (the same problem haunts realism, with all its antinomic possibilities; see sec. 4.2). Ryan in fact makes the dichotomy between simulacra and simulation quite clear, and while her concept of simulation occurs mainly in terms of computer or digital virtuality, her argument is still applicable to other modalities of simulation, including narrative:

> Computer simulations differ from [postmodernist] conception[s] of the simulacrum on several essential points: they are processes and not objects; they possess a function [which] has nothing to do with deception; they are not supposed to re-present what is but to explore what could be; and they are usually produced for the sake of their heuristic value with respect to what they simulate. To simulate, in this case, is to test a model of the world. (*Narrative* 63)

Ryan's vision of simulation is one which is re-presentative, heuristic and teleologic: simulation models actual or imaginary processes, from which actual knowledge and self-discovery arise, even if what is being modelled is an imaginary and non-actual world (and hence narrative's propensity for simulation-modelling of its fictions).

Richard Walsh has differentiated "fictionality" from fiction on similar pragmatic lines, situating fictionality not within a particular narrative product or discursive act but rather as a rhetorical mode which "function[s] directly as part of the pragmatics of serious communication" (*Rhetoric* 1). Fictionality, therefore, does not necessarily inhere in works of fiction only – it is contingent on contextual purpose and reader-response and is therefore a pragmatic and rhetorical activity, a process. Walsh gives as an example the representation of thoughts, typically associated with mind-representation. While this is characteristic of fictionality, mind-representation may be absent in a work of fiction while present in a work of nonfiction, such as biography (45). Walsh concludes that fictionality "is the product of a narrative's frame of representation" (45) and the "distinction between fiction and nonfiction rests upon the rhetorical use to which a narrative is put, which is to say, the kind of interpretive response it invites in being presented as one or the other" (45). Walsh's "frame for representation" which invites an "interpretive response" is analogous to simulation's

pragmatic process of modelling, and one which, I argue, can be extended to narrative and reader-response theory.

The discussion that ensues in the following chapters of this dissertation concerns simulationist strategies as narrative (simulation *qua* narrative) rather than the employment of tropes of simulation in a specific fictional category (simulation as a sub-genre of fiction). I will argue that a number of narratives make use of, and exhibit to a certain extent, simulationist strategies beyond traditional mimesis to construct and 'authenticate' behaviours or properties which obtain in the source world outside the text. I am deliberately excluding filmic, digital or ludic media from my discussion (unless otherwise necessary), first because considerable scholarship on simulation has tended to attach itself to the latter two, and secondly because despite obvious formal constraints which curtail simulation when applied to non-digital or non-interactive text-based narratives, I believe that some aspects of simulation modelling are still evinced by texts which display hypermimetic and poietic properties – even if such narratives would not be ordinarily considered simulations at all.

One important clarification needs to be made before proceeding further with this argument: Ryan conceives of *simulation as narrative* (or "simulation narrative" in McMahan's citation) (532) quite differently and more exclusively from my understanding and application of the term. Ryan situates simulation and narrative at the intersection of *virtuality*, more precisely a "VR system" where events are generated "from a prospective point of view, without knowledge of their outcome. The user lives the story as she writes it through her actions ..." (*Narrative* 65). For Ryan, simulation narrative is therefore a virtual reality system which, as explained by McMahan, "produces a story, or narrative trace, as it runs …" (533).

Ryan's understanding of narrative simulation as a computer-generated system primarily recalls Frasca's emphasis on differentiating simulation from representation (sec. 2.3 and sec. 2.4) on the basis of the user's input and manipulation of the simulation medium's internal rules, something that textual narratives and representation are incapable of doing. Ryan, Frasca and more recently Walsh ("Emergent Narrative") seem to agree that non-ludic and non-digital narratives do not react to an external stimulus; they lack open-endedness, unpredictability and user manipulability. If textual narrative is considered as *written*, for Ryan and Frasca simulation narrative is *writeable*, that is, various narrative threads can be opened up

and altered by the reader during the storytelling process. Or in McMahan's words, narrative simulation systems have the

> power of producing many stories because of unreliability built into the system: either as a result of the Artificial Intelligence built into it, or by being connected to a fluctuating variable in the real world, or because of the unpredictable reactions of other players. Examples of simulation narratives range from *Eliza*, the dialogue system programmed … in 1966 to simulate a therapy session … to board wargames, to modern simulation games. (533)

Common to both Ryan and Frasca's definitions of simulation is the way they reduce simulated narratives to software while excluding the possibility of non-interactive and non-digital texts from being simulative or poietic. However, this need not be the case. Katherine Hayles has been exceptionally vocal about literature's own claim to simulation, perceiving it to "function more like simulations than […] other discursive forms, because like computer simulations … literary texts create imaginary worlds populated by creatures that we can (mis)take for beings like ourselves" (*My Mother Was a Computer*, 6). However, beyond the simulation of non-actual and pseudoreferents, literature provides more "potent possibilities" than these (Hayles, *Writing Machines* 48).

Some of these possibilities reside in experimental fiction, for instance, which "radically tests the predominant norms of realism" (Map Literary) with its "unfettered improvisation … accidental composition … free invention … extreme conceptualism and extreme materiality" (Bray et al. 1), thereby introducing new strategies for narrating, understanding and navigating through the (textual) world – and not without considerable effort. Experimental narratives like James Joyce's *Finnegans Wake*, Julio Cortázar's *Hopscotch*, Alejandro Zambra's *Multiple Choice*, Walter Abish's *Alphabetical Africa*, Ronald Sukenick's *The Endless Short Story*, Georges Perec's *Life: A User's Manual*, Raymond Queneau's *Exercises in Style*, Italo Calvino's *The Castle of Crossed Destinies*, John Barth's *Lost in the Funhouse* and Mark Z. Danielewski's *House of Leaves* – to name a few of the best exemplars – all fulfill Ryan and Frasca's criteria for forking narrative paths, open-endedness, unpredictability of outcome and reader manipulation (to a certain extent) but are otherwise not new media, electronic literature or digital game narratives.

Experimental fiction which conforms to Roland Barthes's concept of the *writerly* text (*S/Z* 4) tends to fulfil, in its own circumscribed way, Ryan and Frasca's

requisites for user engagement and user modelling. The simulation user helps generate and drive forward the narrative or change the storyworld by "writ[ing] it through her actions, in the real time of a continuously moving present" (Ryan, *Narrative* 65) while simulation narratives demand of the reader a more pronounced active *writerly* role, as producer rather than passive consumer of text. This is also what Hayles envisaged by conceiving of literary and narrative works that construct their own conditions for reader interaction as "simulated environment[s]" (*Writing Machines* 48). The second epigraph prefacing Part II of this dissertation, in fact, anticipates an argument I make in chapter 5 in relation to the constructed nature of both text and reader, where the reader is modelled through their "interaction with [the simulated environment] and in this sense [narrative simulation serves to] construct the user as well as the interface" (Hayles, *Writing Machines* 48).

While certainly far from discussing what could possibly become a poetics of narrative simulation, in the chapters that follow I make a number of formal assumptions which shall be suitably addressed with select textual references and their analysis while also drawing attention to points of convergence with, and emergence from, mimetic representation and realism. Specifically, I argue that:

1. Simulation-as-narrative is a form of modelling of behaviours within the textual world but also with a high capacity for, and dependence on, reader affect. I do not particularly consider affectivity from the cultural, historical or political aspects of the "embodied life" (Schaefer 1) here but view it instead as a 'first response' to a simulated textual stimulus. Affectivity in narrative simulation is a form of 'embodied perception' or 'embodied cognition' marked by the "cognitive turn" present in reception theories such as those by Wolfgang Iser and Roland Barthes (Jahn, "Cognitive Narratology" 67), laying down structural rules for reading and thus modelling the reader. Furthermore, while all narratives require some form of affective predisposition from their readers towards the narrative situation, affect becomes a functional and mechanical necessity for narrative simulation, rather than its by-product. It is therefore reader-centric, with the reader enacting or cognitively modelling such narratives through the act of reading (or *mental re-writing* of the text). Content-to-code validation (sec. 3.3) occurs in the laboratory of the mind and amidst the pages of a book.

2. In the same manner that fictionality is not merely the construction of fictions but their communication, mediation and negotiation (Walsh's rhetorical model), narrative simulation is a pragmatic and interpretive act which draws on various levels of reader cognitive states, engagement and "experientiality" (Fludernik, *'Natural' Narratology* 9)[46], as the reader inter-mediates between source and target worlds and actual and possible events. The strength of narrative performativity is co-extensive with narrative affectivity – we are less likely to engage with texts which do not sufficiently recreate, let alone generate, credible states of affect or qualia (see sec. 4.2).

3. Because simulation naturally privileges process over product, interactivity over passivity, openness over closure and the writeable versus the written, only narratives which embody a number of these features can be considered simulative, and then again, to various extents.

4. Ergodic[47] and exogenous strategies generate new and divergent readings made possible through revisitation of simulation narratives. Texts which require narrative revisitation – an extradiegetic loop where the reader is forced to emerge from and be re-immersed in the narrative to evaluate its semiotic structures – provide a level of open-endedness and emergent possibilities that are typical of more complex simulations. And finally,

5. Narrative simulation moves along a mimetic continuum (sec. 4.2 and conclusion), from the mimetic to the "synthetic" (Phelan's term) (2-3) and finally hypermimetic re-presentation (or simulation). Hypermimesis – a heightening of a second reality – is necessary in textual narratives which place considerably more demands on the reader to obtain full immersion and credibility of the fictional storyworld, or the reification of an experience, as is typically expected of interactive, audio-visual media.

The sections in this chapter that follow provide a narratology of simulation that exemplify a number of these modalities, but more specifically (1), (2) and (5). Here, I

[46] "The quasi-mimetic evocation of 'real-life experience'. Experientiality can be aligned with actantial frames, but it also correlates with the evocation of consciousness or with the representation of a speaker role" (Fludernik, *'Natural' Narratology* 9).
[47] "In ergodic literature, nontrivial effort is required to allow the reader to traverse the text" (Aarseth 1).

attempt to put two of Hayles's claims, both prefacing Part II, to task. These are that "when the simulated environment takes literary and narrative form, potent possibilities arise" (*Writing Machines* 48), especially when the simulated fictional world is "populated by creatures that we can (mis)take for beings like ourselves" (*My Mother Was a Computer* 6). The latter would imply a degree of literary "immundation" (Fludernik, *'Natural' Narratology* 5) or "experiential immersion" (Wolf qtd. in Caracciolo 9) typical of interactive digital media, yet achievable in non-interactive narratives if select behaviours or properties that obtain in text-exterior sources can be sufficiently modelled and 'authenticated' though narrative simulation and hypermimesis. The latter mode, a precondition for functional simulation in narratives, heightens and prolongs object phenomenology for the sake of reader immundation, especially in the narration of unnatural events, suprasensible phenomena or mental states, with the latter being particularly amenable to narrative simulation. Assuming that fictional minds are analogs of actual minds, a similar cognitive heuristic can be thus adopted to represent a mind in action, but for this to occur, we must consider fictional mental states as possible and exemplifying (some of) the real-world behaviours we are familiar with. This illusion thus requires a granularity of experience and a degree of authenticity that can only be constructed through narrative simulation and the use of hypermimetic strategies.

4.2 Mimetic Reconfigurations as Narrative Simulation: Joyce's *A Portrait of the Artist as a Young Man*, *Finnegans Wake* and "The Dead"

In chapter IV of *A Portrait of the Artist as a Young Man*, Stephen Dedalus has his first encounter with "mortal beauty", presented by James Joyce as a quasi-religious epiphany:

> A girl stood before him in midstream: alone and still, gazing out to sea. She seemed like one whom magic had changed into the likeness of a strange and beautiful seabird. Her long slender bare legs were delicate as a crane's and pure save where an emerald trail of seaweed had fashioned itself as a sign upon the flesh. Her thighs, fuller and softhued as ivory, were bared almost to the hips where the white fringes of her drawers were like feathering of soft white down. Her slate-blue skirts were kilted boldly about her waist and dovetailed behind her. Her bosom was as a bird's, soft and slight, slight and soft as the breast of some dark-plumaged dove. But her long fair hair was girlish: and girlish, and touched with the wonder of mortal beauty, her face. (150)

In what is a defining moment in Stephen's aesthetic awakening, the wading girl appears almost preternatural, nymph-like yet in possession of an unmistakable and sensuous physicality. This duality is mimetically represented through analogy – one which assimilates the grace and litheness of the girl's body with that of a "strange and beautiful seabird" (Joyce, *Portrait* 150). A figurative assemblage follows: "long legs … delicate as a crane's"; "drawers … like feathering of soft white down"; "slate-blue skirts … dovetailed behind her"; "her bosom was … slight and soft as the breast of some dark-plumaged dove" (150). Joyce transmutes the girl's physical properties such that she becomes a natural extension of the watery environment she counterposes, a veritable *genius loci*.

As readers we readily accept this mimetic substitution-for mechanism, to the point where the elaborate simile ("she seemed like one whom magic had changed") becomes almost redundant. This representational act is considered to be a plausible 'structure' (to use Roman Frigg's term), and while we are aware that the wading girl is not a bird and neither has she changed into one, various ornithological impressions readily insinuate themselves in the mind (in Stephen Dedalus's at least). These common properties however do not inhere in other similar freshwater-frequenting species like trout or dragonflies, and are therefore not suggested, nor are they ever latent in any reading of this passage. Realism is therefore preserved not thwarted since Stephen's nymph is foremostly corporeal and tangible, not fantastical. Descriptions of her feminine qualities are denotative and of non-negotiable value (we cannot imagine this girl looking or being otherwise), while the use of chromatic imagery gives her a certain material solidity; "an emerald trail of seaweed" catches against her "flesh"; her thighs glisten white as "ivory"; "the white fringes of her drawers" and "her slate-blue skirts" are "kilted boldly about her waist" (Joyce, *Portrait* 150). Thus on a first mimetic level, Joyce's wading girl becomes like any other voyeuristic aesthetic subject: she is chanced upon in her private moment; she draws the (predominantly) male gaze; she is secretly fetishised or revered; time stands still; the girl, conscious of being observed, slowly returns the gaze; the reverie is broken; time resumes. This is mimesis at its most unassuming and at its most natural, performing what it performs best – what Goethe called achieving "the beautiful exterior" of things (*äußere schöne Seite*) (qtd. in Halliwell 4).

Yet a separate level of mimetic modelling supersedes the denotative. In Goethe's aesthetics, "art should be 'above' but not 'outside' or 'beyond' nature" (qtd.

in Halliwell 3). "The finest art must make contact with something more than the surfaces of nature" (3), Stephen Halliwell reminds us, and it does so "by working *through* the representation of natural phenomena" (3). While presented as immobile, we are reminded that Joyce's wading girl is animate. A rise and fall in meter, characteristic of iambic feet, is introduced in the penultimate sentence with the monosyllabic words, "soft and slight, slight and soft" (*Portrait* 150). The unstressed-to-stressed foot ("soft and slight") rises to enact the girl's gentle rhythmic breathing and with it, the slightest observable swelling of her chest. As she exhales, the converse occurs through anaphoric inversion: the relaxation of the diaphragm accompanies the lowering of the breast, and with it, a change in meter ("slight and soft"). Thus, the rises and cadences of effortless breathing are mimetically reconstructed through versification, with adjustment to the text's formal structure becoming more nuanced but in a way that enriches, rather than impairs, the reading effect. In addition, this level of mimetic detail is not restricted to the girl's perceptible breathing. Joyce's description of the wading girl – and Stephen's vision – privileges "ocularisation"[48] over other forms of perception and this is achieved through a number of focalisation techniques which have much in common with cinematography, chief of which are consonant narration, close-up and bottom-up perspective. What Dorrit Cohn has called "consonant narration" (qtd. in Herman, *Basic Elements* 183) is adopted by Joyce to merge the omniscient third-person narrator's presentation of events with Stephen's vantage-point, a deictic shift (Jahn, "Focalization" 102). This move is quite adroit, occurring just after the coda of the first two sentences and the rest of the passage. As readers we gaze upon the gazing subject and *past him*: "A girl stood before him in midstream: alone and still, gazing out to sea" (*Portrait* 150). A perspectival switch occurs from a "zero" position of focalisation – Genette's term for a perspectival mode which is not anchored or localized (Herman, *Basic Elements* 186)– to an "internal" (186) mode of focalisation where our viewpoint (and the narrator's) – merge with Stephen's as he looks upon the girl. While the use of the past simple removes us from the immediacy of the experience, situating us heterodiegetically *outside* the narrative ("She seemed like one", we are told) (*Portrait* 150) a sequence of close-ups of the girl from a bottom-up perspective (her legs, her thighs, her hips, her waist, her chest, her hair, her face) provides vicarious spectation. We are forced

[48] William Nelles has coined various terms to qualify the type of focalisation based on its method of perception. Hence "ocularisation" for sight, "auricularisation" for sound, "gustativisation" for taste, "olfactivisation" for smell and "tactivilisation" for touch (qtd. in Jahn, "Focalization" 99).

to look through Stephen's eyes as they travel up her body. Similar to the 'panning' movement of a camera (which it mimics) as it sweeps laterally or vertically across the screen, this inversion of traditional top-down perspective achieves two things: the sudden appearance of the girl forces Stephen to look awkwardly and desirously at her semi-nakedness from the hips down while the epiphanic moment is deliberately suspended until the girl turns her face to look into Stephen's own. "Mortal beauty" (*Portrait* 150), both sublime and earthly for Joyce, requires full aesthetic contemplation – it would therefore only have been appropriate for the inexperienced Stephen to chance and gaze upon it last.

This excerpt from *A Portrait of the Artist as a Young Man* is an example of how various mimetic strategies come together in a text to accord it an "air of reality" (James qtd. in Villanueva 19) or worldly authenticity. On this Henry James was adamant, claiming that "the only reason for the existence of a novel is that it does attempt to represent life" (19) and that one would "not write a good novel unless [they] possess[ed] the sense of reality" (19). However, what this air of reality is or how it can be narrated and experienced tends to be as nebulous as the critical history that emerged since Plato and Aristotle's first divergences on the subject.[49] Plato considered the relationship between artistic representation and the represented world to be essentially simulacral; it might appeal to the senses through verisimilitude or make-belief strategies but ultimately had no veracity and did not lead to the truth but only to illusion. Aristotle, realising that mimesis was not merely attached to the creation of copies, was less dismissive. Mimetic potential extended beyond product since "the 'worldlike' properties of artistic representation – its depiction … of things which *could* be the case" (Halliwell 152) resulted in the "production of objects that possess a distinctive, though not wholly autonomous, rationale of their own" (152). Aesthetic imitation, achieved through a "harmonized integration of parts into an organic whole" (Hutcheon 41), results in the construction of something new: mimesis-as-poiesis.

It is not hard to see why more recent critical literary tradition tends to privilege Aristotelian organicism over Platonic mimesis. In his *Poetics*, Aristotle develops an analysis of poetic creation to explain how drama is to be produced and aesthetically received. Similarly, literature is seen to emerge from a number of concatenated causes: the efficient cause (the author), the material cause (language),

[49] In *Republic* Book III and X, *Sophist* 235a–236c and *Poetics* respectively.

the formal cause (mimetic content) and the final cause (effect on readers) (Herman, "Histories" 28). Subjecting these components to an imitation-validation-creation process, Aristotelian mimesis vindicates fictional heterocosmic realities as self-contained systems, constructed in and through language (Hutcheon 90).

The Platonic and Aristotelian legacy has resulted in two contrasting views of mimetic representation or realism, as it is often called in the language of art and literature. This dichotomy is explained by Halliwell in terms of mimetic representation which places "central emphasis on the 'outward-looking' relationship between the artistic work or performance and reality" (23), and one which "gives priority to the internal organization and fictive properties of the mimetic object or act itself" (23). Both positions however come with their own ontological and semiotic complexities, especially if naively seen in terms of either "a world that precedes the text" (Villanueva 13) (thus the text is always inferior to the world somehow) or one where a fictional world is "autonomously created within it" (13) (thus the text is auto-sufficient and auto-referential). That one position does not logically exclude the other can be seen in the passage just cited, which foregrounds its fictional properties for the sake of *created* effect (the girl breathing and Stephen's eye path) yet remains mimetically grounded in an observable material and historical reality (note Joyce's specific reference to the girl's undergarments as "drawers") (*Portrait* 150). Despite the transparency of the aesthetic technique at play here, this is disregarded for the richer aesthetic experience imparted through mimetic naturalism, a mental pay-off, and while the reader follows Joyce's figural cues, he does not imagine, for any single moment, that the girl is indeed a bird or shaped like one. The text's overly mimetic qualities in fact do not confer on it a non-mimetic or anti-mimetic reading, despite the fact that it remains an aesthetic illusion, a work of fiction.

Obviously, one could propose an alternative scenario, where an event or phenomenon *that has no actual natural correspondence between the storyworld and the external world* is nonetheless presented as real for the reader to experience cognitively. Again, mimesis will still be responsible for imparting its suprasensible qualities.

Let us momentarily consider another extract from Joyce, this time from *Dubliners*. In the closing section of "The Dead", the social and psychological realism that otherwise pervades the story is deconstructed in the final sentence when Gabriel

Conroy, haunted by his wife's revelation of a past romance, experiences the transcendent:

> A few light taps upon the pane made him turn to the window. It had begun to snow again. He watched sleepily the flakes, silver and dark, falling obliquely against the lamplight. The time had come for him to set out on his journey westward. Yes, the newspapers were right: snow was general all over Ireland. It was falling on every part of the dark central plain, on the treeless hills, falling softly upon the Bog of Allen, and, farther westward, softly falling into the dark mutinous Shannon waves. It was falling, too, upon every part of the lonely churchyard on the hill where Michael Furey lay buried. It lay thickly drifted on the crooked crosses and headstones, on the spears of the little gate, on the barren thorns. His soul swooned slowly as he heard the snow falling faintly through the universe and faintly falling, like the descent of their last end, upon all the living and the dead. (412).

Particular to this narrative is Fludernik's notion of "immundation" or "the inescapable embodiment in the natural" (*'Natural' Narratology* 5) whereby Gabriel Conroy's "engagement with his environment operates … as a fundamental cognitive frame" of reference (5) even if the feeling of immundation – of being-in-the-world – is subverted at the end when the metaphysical 'irrupts' into the physical and Gabriel experiences reality in its overwhelming and impossible totality.[50] This disruption also causes a momentary heuristic short-circuiting for the reader since the susprasensible experience which Gabriel has at the end is clearly non-natural but otherwise still mimetically possible (otherwise we would not be discussing the story's ending in the first place).

How is the suprasensible rendered mimetically 'probable', to use Aristotle's term? (*Poetics* 14). "Narrative", Herman tells us, "is a cognitive and communicative strategy for navigating the gap, in everyday experience, between what [is] expected and what actually takes place" (*Basic Elements* 20). In this particular case however we must account for what cannot be ontologically experienced in a state of live consciousness, that of simultaneously being-inside-and-*outside*-the-world. Such event can only plausibly 'occur' because the reader's phenomenological *reaction* to Gabriel Conroy's experience is somehow made concordant with Gabriel's own – in a state of immersion (sec. 3.4) our mind sufficiently simulates this fictional possibility and a 'shared' material experience eventually develops into a 'shared' mental one (sec. 1.5 and sec. 4.4). Immundation in the closing section of "The Dead" therefore

[50] As in the case of Borges's narrator in "The Aleph", discussed in section 3.3.

works also on the reader, acting both as a mimetic frame to orient the reader *externally* to naturally experienced real-world behaviours (physical realism) but also as a textual mimetic frame that orients the reader *internally* to the narrative's stretched logical possibilities and fictional-world behaviours as experienced by the fictional mind. A succession of framing and reframing of phenomenological inputs through formal realism are necessarily presented to the reader for absorption; what Werner Wolf calls "aesthetic illusion" (144), that "pleasurable mental state … induced by the perception of concrete representational artifacts, texts or performances" (144).[51] The point being made here is that in being presented with behaviours which have little to no correspondence or accessibility relations with the text-exterior world, then these must be replaced by constructed, self-sufficient and coherent text-interior ones. Our discussion of possible world structures in sections 3.3 and 3.4 has shown that there can be both text-exterior and text-interior behaviours (and typically a lot more text-exterior accessibility relations than text-interior ones) but there cannot be neither, for one simple reason: a text is written to be read *in* a reality external to it, an irreducible first ontology or source world.

In "The Dead", what is expected from the text-exterior world is framed as situational embodiment; in this case Gabriel's cognitive processes and sense-perceptions. He wistfully gazes through the glass of a hotel window in Dublin while "the air of the room chill[s] his shoulders" (Joyce, *Dubliners* 412). He is aware of his wife lying asleep in bed under the sheets. An added mimetic dimension to this situational embodiment is provided next in the form of *qualia*, "a term used by philosophers of mind to refer to the sense of what's it like for someone or something to have a particular experience" (Herman, *Basic Elements* 144). "A few light taps upon the pane [make Gabriel] turn to the window" (Joyce, *Dubliners* 412), followed by the narrator's description that "[i]t had begun to snow again" (412). This is an essential diegetic cue in the narrative. Snowfall reminds Gabriel of his impending wintry "journey westward" (412) after a night of warm family festivities but it also helps the reader validate the textual world's realist conventions through implied causal relations. The room feels cold *because*, we are told (later), "it had begun to snow again" (412), only the two propositions are not communicated sequentially but are left for us to infer asynchronously by 'navigating the gap' between what is expected

[51] See also section 3.3 for associated concepts: Coleridge's "willing suspension of disbelief for the moment"; "recentering" and "immersion" in Ryan; "transportation" in Gerrig.

and what naturally takes place, as it were. This *hetero-referentiality* in the storyworld therefore allows "a transition [to] occur from the perceptions normally experienced in everyday life to aesthetic reception" (Wolf 150) through the premises of "consistency" and "probability" (150). On a parallel reading, snowfall also symbolically exteriorises Gabriel's inner dread of "wither[ing] dismally with age" (Joyce, *Dubliners* 412) and "becoming [a] shade" (412) once he has learnt of his wife's secret love for Michael Furey, romantically departed "into that other world in the full glory of … passion" and youth (412). Thus the mimetic is used to announce the thematic, although as Phelan has suggested in his discussion of fictional characters, the latter is a functional appropriation of the other, and therefore semiotically representational (10-13).

Narrative simulation however does not trade in the symbolic and the thematic since they do not offer a stable referential framework but only draw attention to their semiotic status as culturally or ideologically-marked signs. When the transparency of correspondence (Frye qtd. in Villanueva 15) between the text and external phenomena is neither observed nor tacitly agreed to (since readers' interpretation of the poetic qualities of a text tends to vary) – in short, when the cross-validation of real-world behaviours (sec. 2.5, sec. 3.2 and sec. 3.3) is obviated for the sake of the figurative – texts cease to simulate anything if not their own metafictionality.

Thus, we have no reason to treat the narrator's description of falling snow as primarily symbolic. Such a consideration would completely distance us from Gabriel's immundation, our attention now having been deviated to learning how something could be actually representing something else rather than what it would ordinarily represent. In this case, a semiotic consideration of the represented world would erode its realism but not its mimeticism – we would remain aware of the intrinsic properties of snow, but now it would be discussed on completely different terms or made to behave non-naturally. Thus, pervasive symbolism not only re-contextualises realism but re-dimensionalises the reader's ontology. A number of logical switches (Pavel 175) (sec. 3.4) are made when we abandon our present ontological perspective to assume another (something is possible or true in the fictional world), only for us to be asked to abandon this perspective again and adopt another when we realise that the text is forcing us to reconsider the associations we have created between the first and second ontologies since they do not necessarily correspond. Thus, aesthetic illusion is completely suspended; real-world

referentiality has been called into question or rendered inaccessible. In Wolf's words, if realist works "provide a simulation of real-life experience" (145) this is because "aesthetic illusion always has a quasi-experiential quality about it and sometimes, in addition, a referential dimension: the tendency to credit illusionist representation with having indeed taken place in the real world" (145). The "quasi-experiential" environment in this passage is carefully rendered through Joyce's use of qualia – sensations which ironically are used in scene-setting and character depiction to give a material solidity and sense of immundation in the fictional world, privileging literal realism over the figurative. Because once we accept that Gabriel can literally hear the "few light taps [of snow] upon the pane" (Joyce, *Dubliners* 412) we are totally unprepared (unequipped?) for the following experience – "His soul swooned slowly, as he heard the snow falling faintly through the universe …" (412).

From a figurative context, this line would not surprise us and therefore there would be little to be gained in terms of aesthetic illusion since it would be treated as metaphor. But Joyce's tendency to evoke the epiphanic in his work requires a mimetic re-enaction of the experience and therefore a form of cognitive simulation that somehow captures the essence of the experienceable through qualia. Gabriel's sensation of *hearing* snow "falling faintly through the universe" is not presented symbolically here but literally, as a form of synaesthesia which models Gabriel's overly-stimulated senses and his heightened state of consciousness.

How does Joyce shift from Gabriel's experience of the natural to the non-natural epiphanic moment? In this particular passage, apperception[52] is primarily auricular – Gabriel's attention is drawn to the light tapping against the window – yet this auditory sensibility is very peculiarly presented, first in lieu for what Gabriel *cannot see* beyond his view from the window and then as a surrogate for omniscience. The deictic or ontological switch which would otherwise distance the reader from Gabriel's experience is suggested *gradually* and modelled through an interior consciousness that eventually widens to encompass an omniscient frame of reference – an external focalisation not limited by temporal or spatial dimensions (Rimmon-Kenan 80) and seemingly neither by any specific form of apperception. Although ocularisation should logically stop at the point where we are told that "He watched

[52] This term has come to be used instead of more limiting connotations linked to Genette's first conception of focalisation in terms of sight and the visual (who sees? what can be seen?). Genette revised focalisation to mean 'who perceives', yet this definition fails to account for psychological and interpretive ways of looking at the world (Jahn, "Focalization" 14).

sleepily the flakes, silver and dark, falling obliquely against the lamplight" (Joyce, *Dubliners* 412) it appears to extend well beyond Gabriel's limited vantage point. Gabriel appears to be more than just aware of snow falling all over Ireland; what follows is the epistemological impossibility of omniscience from a human being's perspective: "[snow] was falling on every part of the dark central plain, on the treeless hills, falling softly upon the Bog of Allen … upon every part of the lonely churchyard on the hill where Michael Furey lay buried [and] upon all the living and the dead" (412). This shift in focalisation from an internal to a 'zero' perspective is however blurred and rendered natural "without any noticeable breaks in the narration or any unconventional narrative techniques" (Schmidt 224) through the simple inclusion of a natural referential frame – the newspaper report. "Yes, the newspapers were right: snow was general all over Ireland" (Joyce, *Dubliners* 412) we are informed, following which, inference is automatic – most of Ireland lies beneath thick drifts of snow whether Gabriel can actually see this or not. This blending of the perceptible with the imperceptible, or the collapse of the latter into the former, possesses the quality of film narrative, where focalisation acceptably "shifts all around its diegetic world" (Fulton qtd. in Schmidt 224).

This merging of an internal to a zero perspective is however not what particularly constitutes the experience of the non-natural. Once the deictic shift has been seamlessly modelled and accepted, Joyce suggests that Gabriel's single consciousness has also merged with a higher consciousness, one where accessibility relations and correspondences with a text-exterior reality necessarily break down and qualia are mimetically insufficient. The passage now becomes an example of what Darío Villanueva calls "immanent realism" (40), where in the absence of a tangible external reference "everything is centered on the author and his relation with the text" (40). This transcendental experience requires a transcendence of language itself, one where mimesis is foregrounded intrasententially through non-correlational properties. The descriptions of Gabriel's soul swoon[ing] slowly" (Joyce, *Dubliners* 412) and his ability to "hea[r] the snow falling faintly through the universe" (412) present a problem since while they both mimetically represent an altered state of consciousness (through an altered semantics) and not being intended to be interpreted figuratively, they nonetheless strain the limits of aesthetic illusion such that the final (unintended) effect is poetic. The use of auricular focalisation – earlier serving as a referential anchoring point to the real – now forces us to question the

earlier phenomenology since it now results in an impossible logic (hearing snow "falling faintly through the universe"). The transgression of ontological boundaries, unnoticeable earlier through the referential frame of the newspaper report, is effaced through the introduction of synaesthesia, drawing attention to the sense-perception's synthetic qualities and consequently, all the preceding narrative. This constitutes what I believe to be unavoidable (and unintentional) metalepsis, a term used by Genette to describe "a deviant referential operation [resulting in] a violation of semantic thresholds of representation that involves the beholder in an ontological transgression of universes" (Pier 190).

The possibility of narrative metalepsis in the closing line of "The Dead" is proof that an intelligible text-interior reality *can be produced* through its own semiotic code, a position advocated by structuralists such as Roland Barthes and Michael Riffaterre, or constructivists such as Nelson Goodman and Jerome Bruner who have either criticised realist fiction of being "already a copy of a model articulated by codes and conventions" (Villanueva 43) or made the more radical claim that the real is constructed and mediated by an individual and collective consciousness (Villanueva 32).

For Barthes the problem of trying to define 'the real', let alone represent it, is irreducible outside textual self-signification. "The reality effect" or *effet de reel* (qtd. in Potolsky 99) achieved through realist descriptions remains a product of convention and therefore relies on a concept of 'the real' rather than reality itself, which always resists meaning. This is also to say that any attempt at defining or representing the real has already transformed it through ideology, or in Matthew Potolsky's words, "[t]he real is 'what is there' before human thought or action takes hold of it" (99). Similarly, Riffaterre has explained that "[t]he mimetic text is not composed of words referring to things [Wittgenstein's semantics of realism and reality] but words referring to systems of signs that are ready-made textual units" (qtd. in Villanueva 31). Barthes's and Riffaterre's idea is therefore of textual immanence rather than a blatantly illusory principle of transparent correspondence that Frye, among others, considered to exist between the realist text and external phenomena which preceded it. The fallacy of subscribing to this world-reflection theory is well-described by Catherine Belsey:

> The claim that a literary form reflects the world is simply tautological. If by 'the world' we understand the world we experience, the world differentiated

> by language, then the claim that realism reflects the world means that realism reflects the world constructed in language. This is a tautology. If texts link concepts through a system of signs which signify by means of their relationship to each other rather than to entities in the world, and if literature is a signifying practice, all it can reflect is the order inscribed in particular discourses, not the nature of the world. (39)

If reality can only be mediated and understood through language or cultural convention it is therefore relative, "determined by the normal system of representation of a given culture or person at a given time" (Goodman, *Languages of Art* qtd. in Villanueva 42). The lines of this argument are acceptable, even within traditional mimeticism, as it does not imply that there is no exterior source world or reality but simply raises the possibility of *versions* of this world being represented or imagined through signifying practices, the more complex of which remains language. For instance, responses to Eric Auerbach's historicist work on *Mimesis: The Representation of Reality in Western Literature* have shown how expansive, divergent and divisive notions to the real have been across the ages, prompting us to ask 'whose real?' or 'which real?' is being represented. Pam Morris has suggested that realism as a term is therefore historical, to be "confined to the specific period of the nineteenth century … in which the possibility of observational truth about the world was unquestioned" (6) while Joseph Peter Stern has rebutted belief that realism is naively unaware of its own representational issues (realism does not impart life, or a slice of it, nor does it reflect reality) calling it "philosophically incurious" (qtd. in Shaw 14) and while "aware of cultural differences over time … simply supposes that, at any one time, there exists only one reality" (14). Again, Stern's argument would hold true for a nineteenth-century view of the novel as a way of world-making but certainly not in the digital virtuality of contemporary times where previously-held assumptions of a unified reality have all but collapsed and everyday reality appears "profoundly unknowable and even plural" (McClure 27).

Why then would realism still matter today and how is it relevant? Harry Shaw is convinced that "realism doesn't trade in 'transparent' representation, because it doesn't need to and doesn't want to" (39). The self-referential structures of language itself waive the assumption that representation requires "a putative 'world prior to language'" (39) while realism is interested in reader engagement foremost, "not in some sort of illusion of 'direct' contact with the world" (39). This linguistic turn therefore appears to have been significantly responsible for a mimetic or referential

turn in realism itself. As Ian Watt noted in *The Rise of the Novel*, where previously language used to be employed as "a purely referential medium" (qtd. in Shaw 42), the turning point resulted in language now being employed as a "self-referential" medium to provide "a source of interest in its own right" (qtd. in Shaw 42). Which is all well and good, only that the "narcissistic" (Hutcheon 34) quality of these narratives (Linda Hutcheon's term for self-conscious, playful fiction) requires that this new mode of "language-begetting-language *as fiction*" (34) is *actualised*, and not without some difficulty for the reader, who now finds himself sharing the writer's interpretative responsibility "in the process of concretizing the text he is reading" (34), thus effectively becoming a co-producer.

We already see traces of linguistic self-reflexivity in Joyce's *A Portrait of the Artist as a Young Man*, which opens with Joyce simulating the earliest recollections of Stephen Dedalus through infant vocalisation ('baby language') to take us back to his infancy: "Once upon a time and a very good time it was there was a moocow coming down along the road and this moocow that was down along the road met a nicens little boy name baby tuckoo …" (3). Language becomes less abstract and more concrete in the rest of the novel to denote Stephen's development from childhood to youth and gradually becoming more complex to account for his inner conflicts and artistic sensibilities. Linguistic self-reflexivity is however not foregrounded at the expense of the mimetic and this is achieved by placing the text's metafictional structures under restraint, invoking them only where necessary (here for instance being deployed mimetically through quasi-onomatopoeia to recreate baby cooing sounds and nothing further). In this respect, there is little in the formal structure of language which is auto-referential in *A Portrait of the Artist as a Young Man* and *language-play is mostly functional*, requiring little decoding from the reader. We can still "identify the products being imitated – characters, actions, settings" (Hutcheon 38), albeit with increased engagement, but otherwise this passage requires little active deconstruction of its codes.

The same cannot be said of *Finnegans Wake*, Joyce's final and most experimental work. Considered by scholars to be "the real forbear" (Hutcheon 34) of linguistically irreducible novels, *Finnegans Wake* is autoreferential to the point of impenetrability, prompting critic Lee Spinks to call it "the least read major work of Western literature" (127). It is not hard to see why, starting with the opening of the novel itself:

> riverrun, past Eve and Adam's, from swerve of shore to bend of bay, brings us by a commodious vicus of recirculation back to Howth Castle and Environs.
>
> Sir Tristram, violer d'amores, fr'over the short sea, had passencore rearrived from North America on this side the scraggy isthmus of Europe Minor to wielderfight his penisolate war: nor had topsawyer's rocks by the stream Oconee exaggerated themselse to LaurensCounty's Gorgios while they went doubling their mumper all the time: nor avoice from afire bellowsed mishe mishe to tauftauf thuartpeatrick: not yet, though venison after, had a kidscad buttended a bland old Isaac: not yet, though all's fair in vanessy, were sosie sesthers wroth with twone nathanjoe. (Joyce, *Finnegans Wake* 3)

Finnegans Wake is written in a narrative style that William Irwin Thompson has described as being syntactically "appropriate[e], like a river [,with] a swollen rush of words that swallows the flotsam and jetsam of experience in its stream" (79-81) but also proving lexicologically impossible and notoriously difficult to decode. Close reading reveals use of multilingual punning ("violer d'amores", "passencore"); portmanteau words ("riverrun"; "wielderfight"); allusion ("Eve and Adam"; "Howth Castle"; "Sir Tristram"; "Isaac"; "vanessy"); idiosyncratic neologism ("penisolate"; kidscad") and general 'gibberish' that requires reading as active and painstaking deconstruction if some sort of meaning is to be extracted. But then again, meaning does not seem to be the point in *Finnegans Wake*. "The greatest distortions of language occur in Joyce's use of the word" (82) writes Thompson, and they are deliberate exercises in simulating a Freudian consciousness as an analog of "the dream or the river – the flowing continuum of the mind" (80). Stream of consciousness however has precursors other than *Finnegans Wake*. Joyce had earlier used it in *A Portrait of the Artist as a Young Man* and more heavily in *Ulysses*; Virginia Woolf in *To the Lighthouse* and *Mrs. Dalloway*; William Faulkner in *As I Lay Dying*. It became synonymous with the modernists' attempt to represent interiority, with a psychological realism unfettered by traditional mimesis, to emphasise the "random, associative, illogical, and seemingly ungrammatical free flow of thought" (Palmer, "Stream of Consciousness" 571), at times "controlled and directed" (571), a form of internal monologue, at others non-conscious and non-verbal. In *Finnegan's Wake*, stream of consciousness is novel and out of control, a deliberate attempt to view reality "from the perspective of the thinking mind" (Thompson 80), locating action continuously *within* the actual stream of thought rather than diverting it to the outside world when the mind would react to its events. The result is a disorienting, dizzying linguistic syncretism that attempts to articulate and *impose* thought onto

writing by dispensing with the restrictions of written text such as linearity, syntax, orthography and structure. Narrative is reduced purely to its *graphique*, writing for itself. Joyce's "writing is not about something" declared Samuel Beckett; "it is that something itself" (qtd. in Stevenson 320).

If the universal 'language' of dreams is abstract, unrestrained and symbolic then *Finnegans Wake* has to extract and elevate this language from a subconscious level to a conscious level of perception and intelligibility, in the process divesting it of its symbolism and actualising it as verbal code. Joyce was aware that such a task required a linguistic readjustment, one that traditional prose and English morphology could not do it justice. He wrote: "I'd like a language which is above all languages … I cannot express myself in English without enclosing myself in a tradition" (Thompson 79). This adjustment is achieved through extensive syntactical enjambment (typical of poetry) and "polymorphemic fusion" (Thompson 83), a "double and simultaneous function of the word" (83) intended to "achieve a chain reaction of meaning" (83) through its syntagmatic, fusionary relations. Polymorphemic associations both underlie the versatility of linguistic possibility but also provided Joyce with a textual medium that could simulate simultaneous happenings through description (84). The result is a dizzying array of critical intertextual and interpretive possibilities, necessitating not close reading but deconstruction, as illustrated by William York Tindall's seminal guide to reading this novel (and necessarily quoted at length):

> Locally, "vicus" (Latin for lane or vicinity) is the Vico Road along the shore of Dublin Bay. Historically, "vicus" is Giambattista Vico, the philosopher of "recirculation." "Commodius" is more difficult. Possibly a reference to Commodus … "commodious" is probably a reference to commode or chamber pot, a suitable container for "riverrun." … A commode is a jordan (a rivery word) and the first name of Bruno is Giordano … Sir Tristram is not only Tristan who comes from Armorica (Brittany) to get Isolde in "Europe Minor" (Ireland), but Sir Almeric Tristram St. Lawrence, Earl of Howth, who … presided over Howth Castle and environs. "Passencore," not yet in French, view with German "wielderfight" (*wiederfechten*) … But the radiant word is "penisolate," which carries Wellington's Peninsular War, the Wellington Monument, the lonely penis, and the lonely pen. (30-31)

Finnegans Wake may very well have presented "for the first time in fiction … a truly omniscient point of view" (Thompson 80) but in so doing it leads us to question the limits – and liberties – of narrative simulation and the simulable. I find Thompson's

claim that "the dream [of *Finnegans Wake*] permits a suspension of disbelief [because] anything can happen and does" (81) to be very unlikely. Extreme auto-representation comes at the expense of the reader considering the narrative *as text* first, rather than as something else. Suspension of disbelief is nullified when traditional mimetic structures are obviated since the more transparent a text's formal structure is, the more likely it will persistently draw attention to its status as construct and possibly nothing beyond that, leading to what has been seen as "a dangerous reductionism" (Orr qtd. in Villanueva 45) demanding a recuperation of, or "return of the referent" (Brooks qtd. in Villanueva 46). Hutcheon has also questioned at which point auto-representation risks becoming anti-representation (34). Narratives unhinged from experiential reality but also from direct linguistic referentiality itself (as in *Finnegans Wake*) stymie the meaning-generating processes associated with uninvolved and involved reading. It would therefore seem that anti-representation *not* anti-mimesis would signify the end of the novel – the novel rendered meaningless as opposed to one which simply disavows realist conventions (such as texts of the fantastic, magical realism or unnatural narratives, all of which make use of an anti-mimetic mode to a great or lesser extent; see sec. 4.4).

Contemporary narrative theory has all but dismantled long-held assumptions that mimesis allows direct translation of real events and behaviour through its representational strategies. The arguments are various: reality remains forever outside the sphere of representation (thus unrepresentable); any mimetic act remains a second-hand, fictional experience subject to re-mediation; remediation of natural phenomena reduces them to "correlatives of linguistic or pictorial shape" (Fludernik, *'Natural' Narratology* 7); mimesis ultimately remains a "product of an illusion generated and engineered by the narrative to evoke that which cannot be imitated or reproduced [directly]" (7).

Regardless of such arguments, novelists have certainly not stopped trying to represent the real (or the non-real) even though the mimetic strategies employed tend to displace the referential for the functional. In all three passages cited from Joyce's fiction, the demand for a "truer picture of life" (Fludernik, '*Natural' Narratology* 131) required a slight-to-significant "stretching [of the] natural frames" (131) but also a reader prepared to accept this as per convention. Thus while *Finnegans Wake* is highly unconventional due to its mimetic inaccessibility, in *A Portrait of the Artist as a Young Man* this mimetic 'stretching' is just enough for the

perceptive reader to look past the girl-seabird analogy (overtly artificial but dismissible as she is rendered figural) to appreciate her otherwise animate nature (less-overtly artificial but more natural and plausible). *Belief* in the fictional object is preserved through an observance of 'natural' phenomenology – or in simulationist terms, a fictional modelling of actual behaviours – but this must be a *shared* belief since the mimetic process does not stop short at the author but involves the reader directly. Hume explained this in terms of consensus and reciprocity, with shared and unshared world-1 (author's) and world-2 (reader's) experiences (3.3), while for Paul Ricoeur mimesis is a three-staged dynamic and circular process where the reader is responsible for completing the mimetic cycle. Thus "prefiguration" (mimesis I) (qtd. in Erll 91) is the 'before' state to any creative act; a cultural, temporal "lived world" (91) while "configuration" (mimesis II) is the emplotment of "extra-literary elements" (91) (the real and the imaginary) by the author into story. Finally, in the "refiguration" phase (mimesis III) (91) the act of reading actualises the story as narrative, this becoming once again "part of the symbolic order of a cultural formation [which is] the source of narrative pre-understanding on the level of mimesis I" (91). Thus, the hermeneutic circle closes not with the production of the text but its opening up by the reader.

Reality represented remains a peopled reality. The construction of fiction does not conceive of a 'real' which is unmediated by human consciousness or unshaped by human action. Consciousness *of* the world is also a consciousness *in* the world – and certainly, unless proven otherwise, co-extensive with it. It is tautological that fiction does not arise spontaneously in a vacuum – it is an intentional poietic action, whether crafted or imagined – but one may debate the extent to which fiction (is allowed to) depart from this peopled reality. Realism is after all a representational choice which determines convention and genre, and while fiction certainly has no obligation towards naturalness, verity, fact or referentiality and may actually renounce them, it cannot escape them altogether (sec. 3.3), certainly not at the expense of becoming 'unreadable', outside the frame of human intelligibility. This directly places upon us, as observers, readers or audiences of the 'depicted real', the obligation to "accredit" (Furst qtd. in Fludernik, *'Natural' Narratology* 24) the realistic representation and decide whether it corresponds with *our* notion of what constitutes the real (sec. 3.4), and whether trans-temporally, trans-historically, trans-culturally and trans-cognitively, this depicted reality would have been considered on the same terms in

another day and age, and by other minds. Such accreditation of course does not imply the absence of a consensus reality; in fact, as was discussed in chapter 3, a world of shareable experiences which reality can be reduced to is the basis for all forms of modelling and representation, but it serves as an index or orienting system so that we can interpret (and hence model) source reality better *on its own terms* while distinguishing it from merely *stylised* individual subjective impressions of it (X is real according to Y under circumstances Z).

What is the trade-off for successful mimesis? The augmentation or heightening of a secondary reality with the intention to achieve a fictional effect places specific demands and constraints on the exercise of language which is in turn rendered an interpretive and cognitive act. Literary fiction is simulated and re-enacted in the theatre of the mind, *through* language not in spite of it, since as Ryan remind us, "language does not offer input to the senses [therefore] all sensory data must be simulated by the imagination" (*Narrative* 10). This leads us to suppose then that the extent to which mimesis resorts to transparent artifice depends not only on which reality effect it wishes to model but also on the level and *type* of reader involvement required (partial or full immersion, passive or active cognitive engagement, constructive or deconstructive reading, ergodic or non-ergodic interaction).

The readings that follow present a two-fold attempt on my part; first to show the various formal modes narrative simulation can occupy, from the cognitive-phenomenological to the ergodic-experiential, and second, to demonstrate that at the heart of narrative simulation there lies an irrepressible mimetic impulse. I wish to show that the higher the formal demands placed on narrative simulation to model a source system and some of its behaviours the more functional and synthetic its mimetic structures must be. I call this *hypermimesis*, a term distant from Eco or Baudrillard's use of the hyperreal as a semiotic marker of simulacra (see introduction and sec. 1.2). In semiotic simulation the mimetic impulse is the end in itself (to imitate for the sake of imitation) while in functional simulation, mimesis becomes a process-driven requirement. The hypermimetic is therefore the next obvious extension to the mimetic, with narrative simulation being synonymous with hypermimetic strategies that push beyond the conventions of traditional realism to generate reader affect.

4.3 "Atoms Falling Upon the Mind": Natural Phenomenology in McEwan's *Atonement*, Cunningham's *The Hours* and Woolf's "Kew Gardens"

"Habitualization devours work, clothes, furniture, one's wife, and the fear of war" (12) wrote Viktor Shklovsky in 1917. "And art exists that one may recover the sensation of life; it exists to make one feel things, to make the stone *stony*" (12). Shklovsky's invite is aesthetic but also phenomenological: habitualization leads to an "automatism of perception" (12) which renders everyday objects familiar but 'unseen' – the solution, for Shklovsky, is to "make objects 'unfamiliar', to make forms difficult, to increase the difficulty and length of perception because the process of perception is an aesthetic end in itself and must be prolonged" (12).

Shklovsky's defamiliarisation (*ostranenie*) (Schmid, "Defamiliarisation" 98) advances a particular opportunity for narrative simulation. It may seem to suggest an anti-mimetic stance – "*Art is a way of experiencing the artfulness of an object; the object is not important*" (Shklovsky 12) – however it advocates the primacy of sensation at the expense of entrenched assumption. The object is unimportant because it is inconsequential for Shklovsky's aesthetic, not irreferential. Sensations and perceptions are attached to objects after all (one has a perception *of* X or Y) and as we have seen in section 4.2, namely in Joyce's *Portrait of the Artist as a Young Man* and "The Dead", objects and environments provide a particular and obvious space for phenomenological immundation. In fact, Georg Lukács observed that "realist novels contain so many objects because history does" (Shaw 45), therefore objects (and the sensations they impart) are an "inevitable" (49) component of mimetic systems.

Shklovsky's aesthetic theory is a vindication of functional mimesis, or mimesis-as-process even if defamiliarisation would appear to run counter to the validation or accreditation processes necessary to achieve narrative simulation (sec. 4.2, sec. 3.3 and sec. 3.4). But by defamiliarisation Shklovsky did not mean rendering an object or experience unnatural, and certainly his is no anti-mimetic theory. His claim that "the object is not important" (12) is not to be interpreted literally but formally. The object remains unimportant as long as *perception and sensation of that object precede it* (but not in the way Baudrillard and the postmodernists envisaged the simulacrum to precede the real). Only through art can one recapture the aura of the object lost through habitualisation from years of looking but not 'seeing'. "And art exists that one may recover the *sensation* of life; it exists to make one *feel things*" writes Shklovsky (12; my emphasis). He could almost have been writing about qualia,

"the qualitative, experiential, or felt properties of mental states" (Levin qtd. in Herman, *Basic Elements* 145), or simply put, "*the way things seem to us*" (Dennett qtd. in Herman, *Basic Elements* 145). Making one 'feel' things is the essence of capturing qualia and imparting them as recognisable or identifiable states of mind. In a medium which must recourse to linguistic description in order to instantiate the narrated object, this is achieved through mimesis. Therefore, Shklovsky was right to focus on the prolongation of perception. In seeking to make the stone 'stony', effectively it is not the fictional referent which is being modelled *but the reader's perception of it through hypermimesis*.

In *Atonement*, the young Briony Tallis gives an uncluttered if somewhat oversimplified description of the mimetic process:

> By means of inking symbols onto a page she [could] send thoughts and feelings from her mind to her reader's … Reading a sentence and understanding it were the same thing … There was no gap during which the symbols were unravelled. You saw the word *castle*, and it was there, seen from some distance, with woods in high summer spread before it, the air bluish and soft with smoke rising from the blacksmith's forge, and a cobbled road twisting always into the green shade. (McEwan 37)

Assuming that the writer and the reader are capable of having the same thoughts or share the same feelings about an event, something that Searle found to be quite impossible (see sec. 4.4) due to the irreducible subjectivity of consciousness (qtd. in Herman, *Basic Elements* 153-55), Briony's thinking process also assumes a form of mimesis that uncomplicatedly trades in physical referentiality – the description of an object or a series of objects that exists *out there* – and gives the process the vestige of telepathy. In a way the analogy with telepathy holds true since the reproduction of qualia – what it's like for someone to feel something – requires having some form of *a priori* experience of these mental states, and in the case of extremely subjective experiences, by simulating the qualia through convergent and empathic mind-reading processes (sec. 1.5 and sec. 4.4). In the process of evoking consciousness through writing, both author and reader thus engage in a form of telepathy where thoughts are created and mediated verbally by means of inked symbols on a page in each other's absence. However, while this process tends to be much easier for physical objects which ostensibly possess an ontology of direct reference, it is not the case for these objects' *affective* quality, where referentiality is horizontal and encoded in a system of signs requiring, as Birkerts has argued, a conversion of codes into

contents (qtd. in Ryan, *Narrative* 92) (sec. 3.3). In the passage just cited we therefore see traditional mimesis at work, one where language traverses vertically and directly towards its referent (Ryan, *Narrative* 92) with only the merest attempt at generating qualia ("the air [is] bluish and soft with smoke" writes Briony, as she imagines the castle scene set in "high summer" with an active "blacksmith's forge" nearby) (McEwan 37).

The power of mimetic description however should not be confused with the hypermimetic, which attempts to model behaviours *at least* at an infrastructural level of narrative simulation. In chapter 2, I made the claim that *models capable of simulation are functional representations of X while those not capable of simulation are just semiotic representations of X.* This emerged from a discussion of simulation-as-process versus simulation-as-product, the argument having been spurred by several definitions of simulation as a dynamic process but more specifically by Frasca's claim that simulation is not representation, essentially because while the former allows user manipulation of its own rules to generate an unprescribed output, the latter is pre-written and closed. Simulation then "maintains to somebody some of the behaviors of the original system" (Frasca 223) by using a suitable analog, while manipulation "modif[ies] the behavior of the system in a way that is similar to the behavior of the actual [source object]" (223). Ignoring the cited text's metafictional recursion, in Ian McEwan's mimetic description of a castle we see very little modelling beyond fictive reference – a castle, its environs and their expected characteristics are described for the reader to visualise through conventional association; in any case, *the description's prescriptive stance on physical referentiality does not allow for additional phenomenological inputs which can be cognitively enacted by the reader's mind*. It is this latter quality that qualifies narrative simulation, making it hypermimetic rather than merely mimetic. Engagement, a more context-appropriate term preferred to the more limiting use of Frasca's 'manipulation' in this case, is missing in the passage cited from *Atonement* simply because there is no need for any process to unravel or a behaviour to be enacted – there is no need for reader perception or sensation to be modelled by the text. (The opposite, of course, holds true in the excerpts from Joyce's *A Portrait of the Artist as a Young Man*, "The Dead" or *Finnegans Wake*, which are all hypermimetic to varying degrees). Hypermimesis, therefore, is a more functional, performative, extendable form of mimesis permitting a level of narrative simulation when conventional mimesis comes short.

Let us now consider an alternative passage from *Atonement*, the 'fountain scene' in chapter 2 where following Robbie and Cecilia's awkward tussle over control of the Meissen vase, the upper section comes apart. The process is beautifully simulated through McEwan's knowledge of optics, fluid mechanics and his recreation of qualia:

> With a sound like a dry twig snapping, a section of the lip of the vase came away in his hand, and split into two triangular pieces which dropped into the water and tumbled to the bottom in a synchronous, see-sawing motion, and lay there, several inches apart, writhing in the broken light. (29)

What is being modelled here is not a character's mental process but the reader's own engagement with object phenomenology, a form of experientiality which although fictional *is not presented as such* nor is it mentally *reconstituted as such*. What Wolf calls "experiential immersion" ("Aesthetic Illusion" qtd. in Caracciolo 9) is considerably heightened through McEwan's precise description of the *behaviour* of the pieces of Meissen porcelain as they tumble to the bottom of the fountain and how they are perceived by the human eye through the refractory media of water and bright natural light. This Shklovskian prolonging of the perceptual process through hypermimetic detail presents a series of optical phenomena for the reader to draw natural inferences from, which phenomena are to be mentally sanctioned after the what-it-feels-like simulation is complete. This cognitive effect would otherwise be lost if hypermimesis were not resorted to. A simulationist reading of the passage thus gives us the following:

First inference. "With a sound like a dry twig snapping" (McEwan 29) - use of onomatopoeia conveys the sensation of brittleness; we are told elsewhere that the Meissen vase is a family heirloom from the Great War, hence the datedness of the object but this sense-impression also highlights the particularly fragile and inelastic composition of the porcelain, such that "a section of the lip of the vase [comes] away" and "split[s] into two triangular pieces" (29). This damage is commensurate with force being applied oppositely (Cecilia and Robbie tugging on the vase) rather than directly.

Second inference. "Tumbled to the bottom in a synchronous, see-sawing motion" (29) – correlational inference from the first; simulates fluid mechanics. If the

porcelain is brittle and bone dry then it would naturally demonstrate greater inertia against water. It would not sink but rather tumble down gracefully. Objects moving in a body of water tend to spiral or swirl to the bottom but this is not the case with symmetrical objects. The "two triangular pieces" (29) tumble to the bottom in a Galilean dynamic ("synchronous") while their "see-sawing motion" is typical of fluid mechanics, in this case motion in a stagnant body of water of a certain viscosity and depth (the fountain).

Third inference. "Lay there, several inches apart, writhing in the broken light" (29) – correlational inference from context provided by McEwan that events portrayed occur in unambiguous "morning sunlight" (19) and the heat of a summer day; simulates optics. The duration of description models the process it hypermimetically represents, from which we can infer that the broken pieces' journey to the bottom of the fountain is not lengthy despite their "see-sawing motion". Cognitively we can ascertain that the fountain is not particularly deep (but deep enough for Cecilia to fully immerse herself in, "leaving her hair fanned out across the surface") (30), allowing the bright summer sun to illuminate the bottom, where the two pieces have now come at rest "several inches apart" (29), clearly visible to Robbie and Cecilia (and the reader). The pieces however appear to be still in motion, "writhing in the broken light" (29). McEwan's knowledge of light propagation in a body of water allows him to model this phenomenological impression in the reader's mind in the absence of an actual referent. Light appears to be "broken" and the pieces "writh[e]" because of the refraction of light in water. To any external observer, and *under non-fictional but phenomenologically similar circumstances* therefore, these objects would still correctly appear to be shimmering and moving under water, an optical illusion.

Non-physical natural behaviours, especially of intangible phenomena such as light, sound, fluid, and gaseous states are notoriously difficult to capture on photographic film or in art, unlike solids (or 'objects'), let alone recreate through text – a non-visual medium. The same applies to gustation and olfaction, senses which remain highly unrepresentable within all media due to their intrinsically subjective and neurochemical nature. The attempt to represent these behaviours and qualia is not recent, nor are they confined to modernism, although attention to phenomenology is characteristic of modernist writing. Peter Stoicheff notes that the Greek concept of *aletheia*, synonymous with "unveiling", provided "the cultural

intersection between poetry and light, truth and sight, understanding and appearance [leading to that] early stage in the evolution of what we now call 'literature'" ("Relationships Between Light and Literature"), while the emergence of artificial light in the mid-19th century necessitated a new literary mimesis to account for new material conditions of lighting. It is not the scope of this study however to trace literary attempts that have incorporated mimetic strategies for rendering such phenomenologies, whether natural or artificial. Beyond isolate cases, non-physical phenomena have been consciously or unconsciously deployed to serve a symbolic or aesthetic function through literary devices such as pathetic fallacy or mise-en-scène, rather than functionally enact the process of reader immundation through hypermimetic or simulationist approaches.

Virginia Woolf understood only too well why this immundation, or "embodied perception" (Sultzbach 82), was necessary and how it could be attained. In her much-quoted essay on "Modern Fiction", Woolf makes a case for a new realism, one outwardly informed by phenomenology as it impresses chaotically upon a roving consciousness:

> Examine for a moment an ordinary mind on an ordinary day. The mind receives a myriad of impressions - trivial, fantastic, evanescent, or engraved with the sharpness of steel. From all sides they come, an incessant shower of innumerable atoms … Let us record the atoms as they fall upon the mind in the order in which they fall, let us trace the pattern, however disconnected and incoherent in appearance, which each sight or incident scores upon the consciousness. (160)

Woolf then was aware that central to the depiction of qualia ("the atoms [falling] on the mind") (160) was the reader as the main percipient and sense-maker of events because, in a real Berkelian sense, fictional objects attain 'material' existence not upon their verbalisation (the act of writing) but their moment of apperception (their mental reconstruction through qualia). For Woolf, phenomenology gives rise to sensations and thoughts and the writer's duty was to "record" (160) them *tale quale*, but in the necessary detail to allow perceptual embodiment of the fictional experience – a way of grasping and feeling the stoniness of the stone with one's mind. One finds an unerring attention to detail in Woolf's observation of a flower-bed in "Kew Gardens" for instance, characteristic of hypermimesis:

> From the oval-shaped flower-bed there rose perhaps a hundred stalks spreading into heart-shaped or tongue-shaped leaves half way up and unfurling at the tip red or blue or yellow petals marked with spots of colour raised upon the surface; and from the red, blue or yellow gloom of the throat emerged a straight bar, rough with gold dust and slightly clubbed at the end. (84)

Kelly Elizabeth Sultzbach has observed that this opening dissolves in "dramatic shifts in scale" (94) as eventually narrative focalisation "unexpectedly skew[s] as the action of human characters is presented from the point-of-view of a snail … attempting to … make its way through an oval flowerbed" (94). Once we become aware of such a deictic shift later on in the story we can readily understand the *necessity* of highlighting detail in miniature, such as Woolf's description of a flower's stigma, pollinated ("a straight bar, rough with gold dust and slightly clubbed at the end") ("Kew Gardens" 84), which otherwise is impossible to take note of with the naked eye unless the plant itself is under study. The hypermimetic is a necessity which goes beyond the aesthetic; rather here it serves the purpose of what Maurice Merleau-Ponty called "ecophenomenology" (qtd. in Sultzbach 96), the ability to "acquire a certain style of seeing [and] a new use of one's own body" (qtd. in Sultzbach 96) by developing an awareness embodied in the natural environment. Organic life with colours and textures imperceptible to the human eye at a higher elevation are therefore proffered up-close for identification. The modelling of human (zooified) perception continues as the reader is made to see what the visitors at the botanical gardens are seemingly oblivious to as they "straggl[e] past the flower-bed" (Woolf, "Kew Gardens" 84):

> The petals were voluminous enough to be stirred by the summer breeze, and when they moved, the red, blue, and yellow lights passed one over the other, staining an inch of the brown earth beneath with a spot of the most intricate colour. The light fell either upon the smooth grey back of a pebble, or the shell of a snail with its brown circular veins, or, falling into a raindrop, it expanded … the light now settled upon the flesh of a leaf, revealing the branching thread of fibre beneath the surface, and again it moved on and spread its illumination in the vast green spaces beneath the dome of the heart-shaped and tongue-shaped leaves. (84)

As in the 'fountain scene' in *Atonement*, the properties of natural light are exploited to make visible an organic world generally unnoticeable to the naked (or indifferent) eye. "The pattern of dappled light," writes Sultzbach, "illuminates the tissue of living

matter" (95). This happens *at ground-level*, the underlighting of the flower-bed resulting in a kaleidoscope of colours and hues (petals stirred by the breeze), but also in umbration (shadow falling over the soil), dispersion (light refracted in the raindrop) and the eventual trapping of light by chloroplasts, those "vast green spaces beneath the dome of the heart-shaped and tongue-shaped leaves" (Woolf, "Kew Gardens" 84). This is mimesis at its most intimate and introspective, bearing "an awareness of multiple animate beings within thick, sensory layers of earthly flesh" (Sultzbach 82), whether human, vegetal or snail.

The modelling of aesthetic illusion – or sensory embodiment in this case – appears to be phenomenological first, semantic second. While language makes qualia immanent in "Kew Gardens", Woolf's writing appeals foremost to the reader's sensibilities, "uniting images, light, and associations that require the reader to integrate 'the first visual data into a fresh sensory entity'" (Merleau-Ponty qtd. in Sultzbach 96). Palmer has made a case for "non-verbal consciousness" (*Fictional Minds* 97-104) that appears to precede and exist independently of human language, with cognitive scientists such as Steven Pinker and Daniel Dennett highlighting aspects of human phenomenology where the linguistic element is mostly absent. In Dennett's "brief tour of the phenomenological garden … he picks out the following items: experiences of the 'external' world such as sights, sounds, smells, slippery and scratchy feelings, feelings of heat and cold, and of the positions of our limbs" (qtd. in Palmer, *Fictional Minds* 98-99) and a number of other sensations linked to affect, "ranging from bodily pains, tickles and sensations of hunger and thirst, through intermediate emotional storms …." (Dennett qtd. in Palmer 99) – but language is absent from the bodily sensorium.

However, as powerful and immediate these 'felt states' are in actual life, once they cross over to the medium of fiction they must be modelled and assimilated through hypermimetic language. In cases where the object's behaviours cannot be effectively modelled through narrative simulation alone – and they usually are not – the narrative must guarantee a vivid and continuous 'filmic' re-enactment in the mind, a near-instantaneous mental model which 'plays back' what is being read, often to the point of insistence.[53] In this case, what is effectively being modelled is reader apperception through inferential second-hand phenomenological inputs. Note

[53] For instance, this is what we see in Part One, chapter 1 of *Perfume*, a novel that attempts to simulate olfactory qualia by recreating eighteenth-century France with all its stenches, odours and smells (Süskind 3-7).

Woolf's insistence on a muting and dispersal of colour at the end of "Kew Gardens", a contrast to the chromatic intensity and sharpness present at the beginning:

> Thus one couple after another with much the same irregular and aimless movement passed the flower-bed and were enveloped in layer after layer of green blue vapour, in which at first their bodies had substance and a dash of colour, but later both substance and colour dissolved in the green-blue atmosphere. … Yellow and black, pink and snow white, shapes of all these colours, men, women, and children were spotted for a second upon the horizon, and then, seeing the breadth of yellow that lay upon the grass, they wavered and sought shade beneath the trees, dissolving like drops of water in the yellow and green atmosphere, staining it faintly with red and blue. (89)

Light again provides the main phenomenological input however the chromatic effect achieved is now closer to impressionism. The attention to detail present in the close-up of the flower-beds now concedes ground to broader brushstrokes where colours are blended to achieve a deliberate opacity. Focus and detail are sacrificed to suggest depth and distance, and essences transcend substances. As the couples pass by out of the shelled reflector's visual field, their shape and "dash of colour" (89) become little more than blots of "green blue vapour" (89) dissolving into "yellow and green" (89) and "red and blue" (89) stains, "destabil[ising] the reader's sense of scale [to] suggest that there is life worth recording not only from our own perspective, but also from the viewpoint of insects and snails" (Sultzbach 97).

The passages excerpted from *Atonement* and "Kew Gardens" prompt readers to project "a dense constellation of raw feels, whether they are explicitly mentioned or merely implied" (Herman, *Basic Elements* 148). In some instances, these raw feels or qualia are directly characterised, in others they require a modelling of the reader's consciousness by cuing him "to adopt a particular interpretive stance" (*Basic Elements* 148) through hypermimetic strategies. In both passages, the optical phenomena are diversely modelled to account for depth, distance or medium. This is a conscious attempt by McEwan and Woolf to 'embody' perception by not limiting description to sight, or what is observed, but to *construct ways of seeing*, the act of observing itself. *Esse est percipi* – as a matter of fact, the object is secondary only to the impressions it leaves on the reader's mind and while it may 'appear' at the moment of its inscription it only acquires 'materiality' through the re-configurative process of reading brought about by literary mimesis and experientiality.

"Experientiality", Fludernik informs us, "correlates with the evocation of consciousness" (*'Natural' Narratology* 9), either human or anthropomorphic[54] and "since humans are conscious thinking beings (narrative) experientiality always implies – and sometimes emphatically foregrounds – the protagonist's consciousness" (Fludernik, *'Natural' Narratology* 22). What we somehow find in both excerpts however is still a form of disembodied or 'detached' phenomenology, synonymous with a consciousness *of*, rather than a consciousness i*n*, the experiential world. Presumably this is what Fludernik means when she speaks of experientiality also being "aligned with actantial frames … or with the representation of a speaker role" (*'Natural' Narratology* 9). In the excerpts cited, these aspects of immundation are significantly absent.

My final analysis for section 4.3 bridges this disembodied phenomenology (seeing objects move or being situated in space) with actual embodiment, a consciousness of oneself or one's own body being situated and moving in (narrative) space through proprioception. Using Michael Cunningham's opening sequence in *The Hours,* I move from a simulationist reading of a body in motion and the physics of water flow to the examination of 'impossible' sentience, the modelling of a non-natural phenomenology (discussed more fully in sec. 4.4). The inseparability of phenomenology from an embedded consciousness therefore cannot be downplayed; Herman sees consciousness, in its full expression of "qualia or states of felt, [and] subjective (or first-person) awareness" (*Basic Elements* 145), as intrinsic to narrative, dependent on it to the point that "we cannot even have a notion of the felt quality of experience without narrative" (145).

The Hours opens with a narrative dramatisation of Virginia Woolf's preparations for suicide in 1941. Having written her final lines to her husband Leonard and her sister Vanessa, Woolf steps into the river with a sizeable stone in one pocket of her coat.

> She is borne quickly along by the current. She appears to be flying, a fantastic figure, arms outstretched, hair streaming, the tail of the fur coat billowing behind. She floats, heavily, through shafts of brown, granular light. She does not travel far. Her feet (the shoes are gone) strike the bottom occasionally, and

[54] Woolf's "Kew Gardens" is one example of an anthropomorphic experientiality. Non-human narrators range from woodworms, rats, dogs, rabbits and monkeys (Julian Barnes, *A History of the World in 10½ Chapters*; Andrzej Zaniewski, *Rat*; Garth Stein, *The Art of Racing in the Rain*; Richard Adams, *Watership Down*; Jan Lauwereyn, *Monkey Business*) to objects, such as a coin, the colour red, crack cocaine, a portrait and a bowl (Orhan Pamuk's *My Name is Red*; James Hannahaham's *Delicious Foods*; Willem Jan Otten, *The Portrait*; Tibor Fischer, *The Collector Collector*) respectively.

> when they do they summon up a sluggish cloud of muck, filled with the black silhouettes of leaf skeletons, that stands all but stationary in the water after she has passed along out of sight. Stripes of green-black weed catch in her hair and the fur of her coat, and for a while her eyes are blindfolded by a thick swatch of weed, which finally loosens itself and floats, twisting and untwisting and twisting again. (Cunningham 7)

Functional simulation, we have argued, requires *development* of a system's behaviour over time (sec. 2.3 and sec. 2.7) while *a number of* behaviours from the original system must be maintained when modelled through a different system (Frasca 223). Much has been written about narrative and non-narrative temporality following Genette's discussion of 'anachronies' (*Narrative Discourse Revisited* 21-32) but in terms of the narrative simulation modelled above, the concepts of temporal order, duration and frequency are secondary to Newtonian motion. Thus the modelling of the *behaviours* of a body in motion *as narrative*, in this case Virginia Woolf's inert body as "she is borne quickly by the current" (Cunningham 7), prioritises mobility, progression and velocity as *physical passage* over any other consciousness of the passage of time.

Hypermimesis is again resorted to, investing the experience with understated scientific authenticity masquerading as rich sensory qualia. Virginia's body is swiftly carried by strong river currents, her "hair streaming", "the tail of the fur coat billowing behind", "arms outstretched", "flying" (7) onwards in one unstoppable, continuous movement. Motion in flowing water is unrestrained unless a physical body encounters resistance or an opposing force that causes the moving body to decelerate or come to a complete stop (Newton's law of inertia). The current, however forceful, has its ebbs and flows, as would be consistent with any river's variable depth, its meanders and the presence of submerged matter in its waters. This river is not different, and Virginia's body behaves analogously. "She floats, heavily, through shafts of brown, granular light" (7). The oxymoron is less figurative and more simulative, consistent with the dynamics of submersion. Although weighted, Virginia's coat, earlier described as being "too heavy for the weather" (Cunningham 3), would present hydrodynamic drag, pulling her up to the surface like a parachute, thus giving the sensation of "float[ing]" (7). Eventually her "heavy" (7) body submerges, weighed down with the stone in her pocket, her feet scraping the bottom.

Once again, a number of causal inferences are framed for the reader to

consider. Reading McEwan, we have seen the particular behaviour of light as it traverses a still body of water – now we are invited to make similar assumptions based on *a moving body of water*. This would explain the "shafts of brown, granular light" (Cunningham 7), suggesting deep and scattered illumination of the river bed but with the added phenomenological richness of texture – the water's turbidity. "Brown, granular light" (7) highlights the presence of suspended particulates, either already present in the river but also possibly dislodged by Virginia's body as it is transported by the current. A simulationist reading of this passage from *The Hours* however cannot draw inferences *outside* the system being modelled (in this case, hydrodynamics and bodies in motion) *before* it has first understood the system of relationships *within*. Cunningham points out that her "shoes are gone" (7), presumably dislodged when Virginia's "feet strike the bottom occasionally" (7) but also to stress the force of undertow. The same movement disturbs the river biotope. Where her feet drag across the silty bed, "they summon up a sluggish cloud of muck" (7), responsible for the dullness and granularity of the water. Remnants of dead plant matter arise out of the depths, pale, white, fragile, cellular ("the black silhouettes of leaf skeletons") (7), disturbed by the wake left by Virginia's body as it continues its journey underwater. Some of the river biotope gets caught against her face, her hair, her coat, the "stripes of green-black weed" (7) undulating ("twisting and untwisting and twisting again") (7) as it too, having come loose, is carried by the undercurrent. Hypermimesis reminds us that motion is being simulated; that *a simulation itself has been set in motion*.

> She comes to rest, eventually, against one of the pilings of the bridge at Southease. The current presses her, worries her, but she is firmly positioned at the base of the squat, square column, with her back to the river and her face against the stone. She curls there with one arm folded against her chest and the other afloat over the rise of her hip. (Cunningham 7-8)

"Eventually" (7) is but the merest of deictic reminders that this event is unfolding over (unspecified) time, yet it remains secondary to the phenomenology of motion. In an eternal battle between water and stone, kinesis and stasis, Virginia's body comes to rest, unceremoniously, against the "base of the squat, square" (8) submerged foundation of Southease bridge. Even so, the force of the river current is such that it firmly lodges her into place, pressing "her face against the stone" (8). Lest we forget what is actually being simulated here – not Virginia's death but her transportation

through water – the text 'reminds' us that the bridge pilings are not intended to break down the intensity of the river current but to support the structure overhead; river water keeps gushing under and past the bridge until it empties out elsewhere. The simulation thus proceeds with unabated energy: "the current presses her, worries her" (7), tugging at Virginia's body as it crashes against the solid pilings and diffracts. But Virginia's body is a solid and solids respond differently when their motion is obstructed by other solids; they do not diffract. The intensity of the water current is such that she remains "firmly positioned at the base of the squat, square column" (8), "curl[ing] there with one arm folded against her chest" (8), as if become an extension of the bridge itself.

This last detail is of particular interest as the final section of narrative appears to breach, in the most fluid way possible, what Herman calls "the threshold past which events cease to be narratable … by suppressing or at least occluding the consciousness factor in its representation of unfolding situations and events" (*Basic Elements* 139). In this case, the threshold is breached not through the suppression of consciousness but by *extending or transmitting it posthumously*, past lived experience, relocating it elsewhere as if it were never embodied in the first place. Consider (Virginia's?) sense of space and time at this moment, caught between stone and hurtling water:

> … Some distance above her is the bright, rippled surface. The sky reflects unsteadily there, white and heavy with clouds, traversed by the black cutout shapes of rooks. Cars and trucks rumble over the bridge. A small boy, no older than three, crossing the bridge with his mother, stops at the rail, crouches, and pushes the stick he's been carrying between the slats of the railing so it will fall into the water. His mother urges him along but he insists on staying awhile, watching the stick as the current takes it.
>
> Here they are, on a day early in the Second World War: the boy and his mother on the bridge, the stick floating over the water's surface, and Virginia's body at the river's bottom, as if she is dreaming of the surface, the stick, the boy and his mother, the sky and the rooks. An olive-drab truck rolls across the bridge, loaded with soldiers in uniform, who wave to the boy who has just thrown the stick. He waves back. He demands that his mother pick him up so he can see the soldiers better, so he will be more visible to them. All this enters the bridge, resounds through its wood and stone, and enters Virginia's body. Her face, pressed sideways to the piling, absorbs it all: the truck and the soldiers, the mother and the child. (Cunningham 8)

The breach that Herman speaks of is more phenomenological than narratorial in *The Hours* and requires a reframing of perception, a heterodiegetic to a homodiegetic

shift. This consciousness which endures beyond life must now be attributed to Virginia (who is dead) rather than the omniscient narrator's (whose consciousness is always *de facto* assumed to be unlimited and pervasive). In addition, the use of zero focalisation, characteristic of heterodiegetic narration, (sec. 4.2) becomes more transparent now. Initially the reader had been lulled into what Franz K. Stanzel calls a "teller" mode of narrative mediacy (qtd. in Alber and Fludernik). The presentation of fictional space external to the fictional mind is described in the form of a running commentary, the teller mode, with the use of the present-simple form ("She appears to be flying" … "She does not travel far") (Cunningham 7). Events and actions – what is happening to Virginia's body as it drifts along with the current – are mediated 'externally' and with the added illusion of occurring in 'real time'; the richness of their phenomenology and the simulation of movement and hydrodynamics itself masking the obvious omniscience, the heterodiegetic nature of the narrative voice. What is at stake here is that this mode of narration should permit the reader to 'view' Virginia's death in the here and now, the act of reading having turned into 'witnessing' through the illusion of immediacy. However, Stanzel's teller and reflector modes soon break down in the last sequence of this passage. We now see an effortless shift in perspective from Virginia's body submerged underwater to "some distance above her" (Cunningham 8), where the water surface ripples brightly, no longer dull and granular. Reflections of clouds and darker, two-dimensional silhouette shapes of birds give the inevitable (non-natural) impression that these shapes are being viewed *from* a certain depth and *through* the medium of water (and not the other way round), 'reflected' through dead Virginia's eyes as it were. This inversion of phenomenologies, from 'natural' to 'non-natural' (impossible?)[55] experientiality results from Cunningham's displacement of consciousness and qualia. With a phenomenology appearing to be previously disembodied, (Virginia-as-insensate-body-in-motion), she now appears to have fully *embodied sentience* and proprioception – an awareness of her own body as it lies "at the river's bottom" (8) but also, seemingly, an awareness of life milling above the surface ("the boy and his mother on the bridge", "the stick

[55] The term 'non-natural' is adopted here synonymously and in line with a developing poetics of unnatural narratology and the antimimetic, specifically in the work of Jan Alber, Brian Richardson, Rüdiger Heinze, Henrik Skov Nielsen and Stefan Iversen. The non-natural, or the unnatural, a term preferred by these theorists, is by Alber's admission a loose term which allows for wide application to any work which "challenge[s] mimetic understandings of narrative and […] the consequences that the existence of such [innovative and impossible] narratives may have for the conception of what a narrative is and what it can do" (Alber et al., "Introduction" 2-3). Refer also to ft. 55 on Inversen's notion of an "unnatural mind", an example of unnatural narratology.

floating over the water's surface", the "olive-drab" military truck "roll[ing] across the bridge loaded with soldiers in uniform") (8). This is an impossibility since it would mean that Virginia's consciousness has outsurvived her, that it is not localised and now "absorbs it all" (8) through the wood and stone of the bridge itself, the structure acting as a visual and acoustic resonator, a tuning medium sensorially connecting Virginia's lingering consciousness to events occurring overhead, at a distance. But if we allow this reading, then we must also assume that *the narrative could possibly have been homodiegetic from the very beginning* – reflected through Virginia's eyes but masked as heterodiegetic third-person phenomenology. If consciousness is not bound by the physical body or life itself, then there would be no reason to believe that the phenomenological breach does not occur even earlier than this event; what we see Virginia experiencing as she is dragged by the river currents are her own qualia, her sentient feelings.

But perhaps there is only the *illusion* of a phenomenological breach after all. An alternative, 'natural' reading of this passage remains, even if hypermimesis in the last section of this passage from *The Hours* ironically *precludes this possibility*. The absorption of reverberating sounds by Virginia's body as it lies coiled around the piling is no evidence of a disembodied or roaming consciousness. Note how Cunningham also carefully avoids mentioning Virginia's eyes, the most obvious primary organ for focalisation – and therefore, explicit consciousness. We are not told whether they are open or closed, although earlier they had been "blindfolded by a thick swatch of weed" (Cunningham 7), which eventually drifts off. Rather, it is "her face" which "absorbs … all" (8) simply by being pressed in that particular position against the piling. More tellingly we have the use of simile although the reader would be forgiven for its earlier oversight. Cunningham writes that Virginia lies "at the river's bottom, *as if she is dreaming of the surface*" (8; my emphasis). This should have been enough of a textual marker for the reader to treat the experience of all successive qualia as non-actual but figuratively, a case of narratorial imagination given free-reign, only it isn't. Once the richness of sensory experience and the multitude of raw feels are *augmented* over the course of the passage rather than *muted* (as would be expected of a dying – or dead – organism) then cognitively it makes little sense for the reader to perform an extradiegetic leap to consider the possibility of 'authored' versus 'unauthored' mental states. In other words, the reader quite readily accepts a phenomenological breach (Virginia's consciousness outlives her material death),

assimilating it with the rest of the phenomenological journey by adopting a naturalistic reading. The blame, as it is, lies in extensive hypermimesis.

In section 4.2, I questioned what happens to narrative and mimesis under extreme auto-representation, which results from an extreme reductionism to linguistic structures and nothing else (the outcome would be anti-representation or communication breakdown). We can postulate the same for hypermimesis when its strategies are pushed by the desire to augment reality "to the point of exacerbation" that it becomes "a furious hyperreality" ("Travels" 7), where, as Eco explains, the "demand [for] the real thing [requires that one] fabricate the absolute fake" (8). The issue with interpreting phenomenology in this passage is unfortunately not resolved but rather problematised by a hypermimesis that ventures into hyperreality at the point where we are informed that "All this enters the bridge, resounds through its wood and stone, and enters Virginia's body" (Cunningham 8). Hypermimetic exaggeration in the final sequence of this passage therefore pushes the reader into making the inevitable assumption reached earlier – that a disembodied phenomenology has been embodied in an inanimate being. Despite the experiential and generic complexities that result (forcing us to consider Virginia Woolf's body not as almost-conscious but actually conscious), what is reconstructed is "naturalised" (qtd. in Fludernik, *'Natural' Narratology* 23), to use Jonathan Culler's term, as a by-product of the simulative process. What this means is not that such phenomenology is considered as naturally occurring; rather, as Fludernik clarifies, it becomes a "new generic option … interpretable on the basis of a different set of natural parameters" (*'Natural' Narratology* 247), through which even "the strange or deviant [can be] brought within a discursive order and thus made to seem natural" (Culler qtd. in Fludernik, *'Natural' Narratology* 23).

4.4 (Mind)reading Unnatural Minds: (Re)mapping Consciousness in Donoghue's *Room* and Ellis's *American Psycho*

The challenge to construct human experientiality, whether conventional or strange, extends well beyond phenomenology; it actually starts by mapping the hinterland of human consciousness. As seen in section 4.3, Briony Tallis, who is initially quite assured about the power of writing as a means of bequeathing mental images directly, remains little convinced that mimesis can impart states of affect with the same ease it generates objects or their sensible qualities:

> Actions she thought she could describe well enough, and she had the hang of dialogue. She could do the woods in winter, and the grimness of a castle wall. But how to do feelings? All very well to write, *She felt sad*, or describe what a sad person might do, but what of sadness itself, how was that put across so it could be felt in all its lowering immediacy? (McEwan 116)

Briony's problem is in part related to what Searle calls the "ineliminable[e] subjective element" (qtd. in Herman, *Basic Elements* 155) of consciousness, this reducible to "qualitative, subjective experiences" (146). Searle resists the idea that intersubjective mental states – the interchange of conscious and unconscious thoughts and feelings between human beings – can be represented through narrative or any other means, for the main reason that conscious mental states and qualia have an "irreducibl[e] first-person ontology" (qtd. in Herman, *Basic Elements* 155). Citing pain as one example of a subjective mental state, Searle explains that "my pain has a certain qualitative feel and is accessible to me in a way that is not accessible to you" (146). A person may observe another to *be in* pain, or to exhibit behaviours attendant upon pain; one could even explain to someone what being-in pain is, yet all these scenarios require a second-ontology of representation[56] which does not, and cannot, *make the experience of pain accessible to others directly since it is uniquely experienced* and therefore inaccessible outside its own experiencing. By this Searle did not mean that a sensation such as pain is not commensurate with general human experientiality – everyone knows what feeling or being in pain is at some point – only that pain is subjectively not intersubjectively experienced – it cannot be shared or inspected by others from without and neither can it be inspected by oneself through any form of detachment. Self-conscious detachment to observe consciousness in action, from the periphery, would do as much good as the fictional anecdote of the mad scientist who ordered his victim to think while the scientist sawed his head open, intent on observing thoughts and ideas as they arose. This is tautological since the attempt to 'observe' consciousness in action by 'standing outside it' is in itself evidence of self-consciousness in action. Or as Herman puts it: "I cannot observe the raw feels bound up with my own observational acts; strictly speaking, therefore [my] consciousness cannot be represented but only experienced" (*Basic Elements* 155).

[56] Alvin Goldman explains that "*having* a mental state and *representing* another individual *as* having such a state are entirely different matters. The latter activity, *mentalizing* or *mindreading*, is a second-order activity: It is mind thinking about minds" (*Simulating Minds* 3).

This brings us to the problem that Briony faces in chapter 10 of *Atonement*: "All very well to write, *She felt sad*, or describe what a sad person might do, but what of sadness itself, how [can] that [be] put across so it could be felt in all its lowering immediacy?" (McEwan 116). Even if Briony managed to do so, is there anything in the act of writing that guarantees that the sensation of sadness would be faithfully transported directly into the mind of her reader so that he may experience it himself? Mimesis, as traditionally opposed to diegesis, presupposes a 'showing' rather than a 'telling' (Rabinowitz 530) since the teller-mode only serves to add further frames of narrative and interpretive discourse, thus furthering ontological distance from conscious experience itself (in other words, we become increasingly conscious of the narrative act as an authorial construct rather than participate in its enactment). But, even when the hypermimetic is employed to reduce this ontological distance as much as possible, we still must account for Searle's claim that in trying to "observe [and depict] the consciousness of another, what [we] observe [and depict] is not his subjectivity but simply his conscious behavior" (qtd. in Herman, *Basic Elements* 155). We can however consider the latter in terms of *a mind in action*. If we make this concession, we are therefore in a position to model such a mind, provided that we are capable of creating the narrative nexus between what is *exteriorly manifested as an inner mental state* and *what we feel corresponds to that actual mental state*. From a narrative and mimetic perspective, the problem is therefore structural and it compels us to consider the following questions: How do we bridge the three states (others' subjective consciousness → others' external behaviour → our perception of others' behaviour) by *lessening* narrator mediacy, thus giving the illusion that unmediated personal consciousness is being presented as a first ontology? How can we sanction this narrated consciousness as one that corresponds to typical and regularly observable mental states? More importantly, how can we 'read' someone else's mind (the idiom is particularly apt in this context) while knowing all along that it is our own mind that we are reading (with)? Cognitive simulation theory might provide some of the tools that we need.

As I see it, Briony's (or any writer's) problem extends beyond the representational; it is simulational. If as Herman observes "[one has] no [direct] access to the qualia (uniquely) associated with a different first-person vantage-point, another mind" (155), then *at the very least* one has to *cognitively simulate third-person thoughts and feelings as if one were experiencing them himself* and, in addition, *project*

such feelings in such a way that they appear to be naturally occurring manifestations of a mind *evolving through narrative*. Of course, this does not put us outside the problem described by Searle or Herman but it otherwise presents a number of interesting opportunities for the *surrogate construction* of mental states, these ranging from the natural and the uncommon to the unnatural and the supranarratable. Surrogate thoughts are not unique to narrative and the construction of fictional minds; they occur in daily activities such as empathising with the mental states of others by using our own simulator-mind (sec. 1.5) and in make-believe scenarios where we ascribe functional propositions to objects, whether actual or virtual (sec. 3.2). This chapter therefore ends the discussion of the modelling of mental states through narrative by situating these within cognitive simulation theory, especially since common attributional and reception strategies underlie both. Herman, among others, has been a strong proponent of the idea that narrative serves as a form of "scaffolding for consciousness itself" (*Basic Elements* 154), in that it not only "represent[s] what it is like for experiencing minds to live through events in storyworlds, but [also] constitutes a basis for … knowing a mind at all" (154), whether oneself's or another's. The folk-knowledge or common-sense attribution discussed in ST is therefore not unlike the accreditation (sec. 4.2) or validation (sec. 3.3 and sec. 3.4) processes applied by readers when considering possible world events and characters. To know a mind is therefore to read it – in more sense than one.

Briony's challenge to depict sadness mimetically – therefore "in all its lowering immediacy" (McEwan 116) – rather than diegetically, boils down to mentalising. What Goldman calls "mentalizing" or "mindreading" (*Simulating Minds* 3), or "empathy theory" in David Premack and Guy Woodruff (qtd. in Goldman, *Simulating Minds* 10-11), is at the core of cognitive simulation theory and refers to the attribution of mental states by analogy. There is growing evidence that this simulation of third-person thoughts and feelings is natural and intrinsic to human beings, "part of the brain's design to generate mental states that match, or resonate with, states of people one is observing" (4). Goldman cites the work of psychologist Paul Harris, among others, who has investigated the ways in which children can generalise and draw inferences from the situations, mental states and actions they observe, including their own. By noticing for example "the pain that ensues after a fall, or the way in which visual experience changes with directions of gaze" (qtd. in Goldman, *Simulating Minds* 26), children come to assume that such behaviour is regular, allowing them "to make

predictions about other people, by a process of analogy" (26). Children therefore "notice their own mental states, which enables them to identify regularities in which those states figure" (26) and which are consequently applied to others. In section 1.4, I similarly discussed the blindfold experiment carried out by Meltzoff and Brooks where young children with prior experience of wearing a blindfold were less likely to follow the gaze of a blindfolded adult than children who had never been blindfolded. This shows evidence of mental attribution of self-experience to others, a form of intersubjectivity. Even more recently, research carried out by Gerhard Lauer into so-called 'mirror neurons' has revealed that "language triggers resonance phenomena in the neutrally mirrored projections of [similar] actions … Even just talking about an action leads to a resonance of those nerve cells that would also fire if the same action was actually performed" (149-50). The implications of the spontaneous mental mirroring of talked-about actions and the reception of words, both spoken and read, are therefore considerable to literary studies. If "the system of mirror neurons in connection with language allows us to ascribe consciousness and physical awareness to others similar to our own" (149-50), as Lauer and other theorists assert, then there would appear to be a *physical* neurocognitive basis for simulation theory beyond the theoretical, one located in "the premotoric system that controls actions … in an area of the brain which partly overlaps with Broca's area, a group of nerve cells that is also responsible for the production of language" (149-50). This implies that unless there are specific cognitive deficits, every person comes equipped with mind-reading tools.

An overview of simulation as a cognitive theory was given in section 1.4. However, the ways by which aspects of mind reading can be attributed to 'fictional minds' as analogs of 'real minds' requires further explication, especially when the degree of correspondence between the fictional and real mind is effaced rather than reinforced by the narrative act. Lewis's concept of 'indexicality', discussed in terms of accessibility relations and actual and non-actual possible worlds (sec. 3.4), has a lot in common with a series of "mental-state terms" (Goldman, *Simulating Minds* 7) or propositions drawn in relation to the folk psychology of mind reading, whereby psychological inferences can be made on the assumption that some behaviour in general qualifies as 'common sense'. For Lewis, three psychological laws can be derived: "(1) laws relating observable inputs to mental states, (2) laws relating mental states to other mental states, and (3) laws relating mental states to observable outputs (behavior)" (qtd. in *Simulating Minds* 7). An example of (1) would be 'Extreme

sleep deprivation leads people to behave erratically, as if they are drunk"; an example of (2) would be 'Intense bright light causes visual discomfort which needs to be alleviated', while an example of (3) would be 'Faced with a strong stimulus such as the sight or smell of rotting food, people instinctively wrinkle their nose, lower their brows and narrow their eyes.' These causally connected states form the basis of folk-psychology such that "an attributor" (the person mind-reading another's) "simply makes pertinent theoretical inferences from the observables – that is, behavior and environmental conditions – to mental states" (*Simulating Minds* 8). No other embedded theoretical knowledge is required. Since the decision-making process is biologically innate, one must simply run it through the simulator of the mind by introducing "the pretend input appropriate to the target's initial position. When the mechanism spits out a decisional output, they can use the output to predict the target's decision … Mindreaders [thus] use their own minds [as a simulator] to 'mirror' or 'mimic' the minds of others" (20). Goldman calls this "process-driven simulation" (32).

Beyond Searle's objection that consciousness cannot be experienced nor be reported intersubjectively without re-ontologising it, what is being assumed here is not only that we can map "the minds of others" but that we can theorise, discuss and somehow *know* these minds on the basis of a *relevantly similar* system, a concept underpinning all simulation processes. What happens however when the relevantly similar system stops being similar? How does one mentally simulate modes of behaviour or cognitive states which were either not experienced by the author and/or by the reader? And more importantly, how do we identify and *identify-with* altered or alternative states of consciousness that fall outside the range of normalcy or convention, so-called "unnatural minds"[57]?

Goldman counters the threat of collapse in this cognitive system by explaining that "one cannot use a priori considerations to establish that simulating mindreaders must utilize a resemblance-to-self premise [because] mentalizing is not always directed at similar targets. People anthropomorphize; they ascribe propositional attitudes and feelings to nonhuman objects such as animals …" (Goldman, *Simulating Minds* 31) and do so with the full and conscious knowledge of such activity, never believing these targets to be similar to themselves. In cases where the final mental

[57] "An unnatural mind is a presented consciousness that in its functions or realizations violates the rules governing the possible world it is part of in a way that resists naturalization or conventionalization" (Iversen 97).

state being simulated is not isomorphic with the target due to divergent or dissimilar initial attribution states (a case of not being able to put oneself in X's shoes because X is psychologically not like me) then a theory of that target needs to be constructed before it can be mentally mapped, what Goldman calls "*theory-driven* simulation" (32). Whether driven by a theory or a process, Goldman is however convinced that both forms of mental simulation can be successfully executed.

In the absence of *a priori* conventions then, when encountering unnatural or unconventional psychology, mindreaders must devise new 'laws' (to use Lewis's term) which appear to be feasibly relevant and commensurate with the behaviours being observed and mentally mimicked. These new, altered or uncommon fictional mental states are mentally generated and mentally projected onto a target in a process of pretension which is quite similar to Walton's make-believe theory of prop use (sec. 3.2). Mentalising 'similar' minds therefore involves mapping common-sense behaviours while *uncommon or unnatural mental states require a mental remapping* or reconfiguration of some sort.

Consider the following excerpt from Emma Donoghue's novel *Room*:

> It's all warm. Ma's up already. On Table there's a new box of cereal and four bananas, yippee. Old Nick must have come in the night. I jump out of Bed. There's macaroni too, and hot dogs and mandarins and –
> Ma's not eating any of it, she's standing at Dresser looking at Plant. There's three leaves off. Ma touches Plant's stalk and –
> "No!"
> "She was dead already."
> "You broke her."
> Ma shakes her head. "Alive things bend, Jack. I think it was the cold, it made Plant go all stiff inside."
> I'm trying to fit her stem back together. "She needs some tape." I remember we don't have any left, Ma put the last bit on Spaceship, stupid Ma. I run over to pull Box out from Under Bed, I find Spaceship and rip the bits of tape off.
> Ma just watches.
> I'm pressing the tape on Plant but it just slips off and she's in pieces.
> "I'm so sorry."
> "Make her be alive again," I tell Ma.
> "I would if I could." (101)

The focaliser of this passage is easily inferred by the reader to be a young child (the reference to "Ma"; his delight at simple things; his well-intentioned but naïve assumptions about life and death). Grounding these inferences is our mental map of behaviours – we *know* how a child thinks and can empathise, perhaps poignantly,

with Jack's perception of the world because some of us have children or have been in the company of children at some point, and more significantly we remember *being* a child once (although distant memories would resonate less than more recent experiences). These ideas are reinforced by Donoghue's modelling of Jack's consciousness: his inability to understand that death cannot be fixed with adhesive tape (we wish!) and his curious and sullen introspection made to converge with his speech in an attempt to show that the childish focalisation does indeed stem from a *child-narrator* and a *child's mind*, that the narrating voice and the reflecting consciousness are therefore one and the same. *Stylistically*, there is little-to-no variation in the use of Jack's interior monologue and his direct discourse, an attempt by Donoghue to demonstrate that speech and cognition are both mental processes and therefore co-extensive at some point (even in cases of cognitive impairment). Yet this passage from *Room*, as in several other instances in the novel, betrays its own "cognitive strangeness" (56), Marco Caracciolo's term for "characters who defy readers' folk-psychological competencies" (56). We 'treat' Jack's behaviour as *natural for a child* by "quarantining", to use Goldman's term, our "own genuine states that don't correspond to state of the target, … keeping such states from intruding into the simulation [and disrupting it]" (*Simulating Minds* 41). However, an altered or dissonant mental state is still observable in *Room*. For one, "there is a significant gap between the ways in which [this] child-narrator engage[s] with the world and the sense-making processes of (most) adult readers" (Caracciolo 57), a difference which emerges clearly in the way Jack and Ma consider the death of the plant from their individual perspective. In the absence of a "resemblance-to-self" (Goldman, *Simulating Minds* 31) (as adults), we have to impute behavioural conditions and 'laws' where Jack-resembles-others (based on our knowledge of what a child Jack's age would do). In the process of simulating Jack's mind and seeing through his eyes we therefore have to re-ontologise our cognitive process further (our mind must consciously validate Jack's thoughts and feelings against what we believe or know a child Jack's age would feel or do in Jack's situation). The aesthetic illusion of making our mind consonant with a fictional one and treating it as real, what Caracciolo calls "character-centered illusion" (57), requires more effort to allow us to navigate and adapt to this cognitive difference especially since it is twice removed (thinking like another-thinking like a child). This is not the case however when we perform the same mentalising process for Jack's mother.

Room presents us with an additional challenge, one which is epistemological. What can we know of Jack's environment from Jack's perceptual state? The cognitive estrangement that we must negotiate past does not necessarily result from Jack's five-year-old consciousness but from the *aspectual strangeness of the event or environment itself*. Assuming that Jack is not delusional or lying, what he describes is what he perceives. Hardly unnoticeable is Donoghue's use of capitalisation for select objects, a stylistic inversion of a linguistic rule. Proper nouns are capitalised to distinguish them from common ones; the former therefore designate particulars while the rest are generic things. Yet in this passage, Jack seems to treat "Table", "Bed", "Dresser", "Plant", "Spaceship", "Box" and "Under Bed" on the same terms he treats living people such as "Ma" and the mysterious "Old Nick" (Donoghue 101), who deposits food in the middle of the night. Jack seems to endow these objects with a tangible and comforting identity; they become phenomenological particulars in his young mind, serving to orient his perceptions and experiences daily as he spends time among them with his mother. "Bed" and "Under Bed", easily translated by the reader as states of sleep and play, nonetheless evince estrangement in the context of the environment Jack seems to share with his mother alone – they seem relatable to Jack in ways which are not relatable to us. In the context of nearly unassimilable object phenomenology and mental dispositions, the narrative of *Room* forces us to ask several questions. Why do Ma and Jack appear to be mercifully waiting for food to materialise on Table in the morning? Who is Old Nick and what role does he play in providing food under the cover of night? Why does Jack display such undue attachment and fixation with common, negligible objects that he calls them by name (rather than by article-bound signifier, *the bed, the plant* and so on)? Why is Jack so frustrated at the sight of one dead Plant that he seeks to revive this one at all costs? Cognitive estrangement is therefore as much a case of epistemological uncertainty resulting from situational defamiliarisation as it is a case of learning to read Jack's uncommon but hardly unnatural mind. Through Jack's stunted focalisation, the novel gradually makes us come to terms with a more disconcerting reality – Jack has lived in an eleven-by-eleven room all five years of his existence, sharing it with Ma, both held captive by Old Nick who kidnapped his mother when she was nineteen. "Room has a perfectly valid existence to Jack as a world" ("In Donoghue's 'Room'") explains Donoghue in an interview she gave in 2010. "It doesn't seem small to him, because he's never experienced anything bigger. The Bath, the Bed, the Wardrobe, Under the Bed – these

are all separate sort of sub-landscapes for him, and every object in the room is his friend" ("In Donoghue's 'Room'").

Donoghue's explanation for Jack's qualia is a reminder that they cannot be intersubjectively shared without being presented and *projected* onto the reader's mind as if they were naturally occurring manifestations rather than uncommon ones, natural that is, within the cognitive parameters dictated by the fictional character and his environment. It is a case of "recuperat[ing] … the strange or deviant [through] the process of justifying items within the work itself by showing that they are not arbitrary or incoherent but quite comprehensible in terms of [the] functions [they play]" (Culler qtd. in Fludernik, *'Natural' Narratology* 23). This process ironically makes it imperative for the narrator to open up Jack's individual and idiosyncratic mind to external scrutiny – what is uniquely 'felt' (by Jack) must be experienced by others through the reading process, otherwise characters and events remain 'closed books'. If Jack believes Room to be the world entire, the reader seeks out and validates conditions *within the text* which impute such beliefs in Jack, an attempt at rationalising what would otherwise appear to be a flat-out delusion. This is not to suggest that the converse cannot happen – in fact, in cases where a character manifests extreme delusion or pathology such as in Bret Easton Ellis's *American Psycho*, we perform the same heuristic (we seek conditions in the text which in this case ground Patrick Bateman's delusion and erratic behaviour in a demonstrable psychosis). Both processes determine how we relate to these characters; the extent to which we quarantine (keep in check) our personal beliefs and biases, and whether we are to 'pretend' some beliefs or not. In both cases we similarly turn to the text for the construction of a fictional mind which is "incomplete" (in Palmer's view), looking for "frames, scripts, and preference rules … required to supply the defaults that fill the gaps" (*Fictional Minds* 176), rules that are theory-driven. And along the way, we form and correct our hypotheses about this fictional mind, allowing for the belief that fictional minds, just like actual ones, have a predisposition for change (Alber et al. 121).

The 'incompleteness' of Patrick Bateman's mind in *American Psycho* however borders on the 'unreadable', to use H. Porter Abbott's term, because the mentalising process is deliberately frustrated by a narrative which simulates Bateman's own opacity (Caracciolo 107), his erraticism and his questionable belief-system. The narrative does not provide us with meaningful events which could possibly explain

Bateman's emerging disposition towards sexual violence, torture, murder and dismemberment; rather we are frequently presented with nauseating page-length descriptions of designer labels and tiresome chapter-length product reviews, everything inconveniently presented from a disjointed first-person narration, which, like it or not, we have to abide with. The well-known biases of first-person focalisation are in this case exacerbated by a mind that while undoubtedly unbalanced *might or might not be* hallucinating some aspects of the reality it inhabits:

> Courtney, McDermott and I have just left a Morgan Stanley party that took place near the Seaport at the tip of Manhattan in a new club called Goldcard … I'm wearing a six-button double-breasted wool-crepe tuxedo with pleated trousers and a silk grosgrain bow tie, all by Valentino. Luis Carruthers is in Atlanta for the week. I did a line of coke with Herbert Gittes at Goldcard and before McDermott hailed this cab to head for Nell's I took a Halcion to get rid of the edge from the cocaine, but it hasn't sunk in yet. Courtney seems attracted to McDermott … But it doesn't really matter. Even though I'm more handsome than Craig, we both look pretty much the same. Talking animals were the topic of this morning's *Patty Winters Show*. An octopus was floating in a makeshift aquarium with a microphone attached to one of its tentacles and kept asking – or so its "trainer," who is positive that mollusks have vocal cords, assured us – for "cheese." I watched, vaguely transfixed, until I started to sob. A beggar dressed as a Hawaiian frets over a garbage can on the darkened corner of Eight and Tenth. (Ellis 239-40)

The passage above is typical of Bateman's habitus, based on the generally idle yuppie lifestyle on Wall Street spent sampling trendy restaurants and clubs and doing drugs and 'hardbodies', the investment brokers' misogynistic term for any young woman who fits their pornography-fed fantasies. In between, Bateman finds time to satisfy his commodity fetishism and his homicidal compulsion in equal measure. This dual and oscillating nature, one marked by social charm and shocking ruthlessness, elegance and depravity (Caracciolo 99) hijacks the reader's attempts at making sense of a mind that may not altogether be whole, with Ellis's peculiar narrative strategies reinforcing such fragmentation. For one, there is a conspicuous lack of temporal order in Bateman's descriptions such as the one just cited, but not just – the novel formally quashes any attempt at sequence-making, structuring or temporal reference by forgoing numbered chapters in exchange for forgettable monosyllabic or short-phrase titles such as "Morning", "Girls", "Nell's", or "Tries to Cook and Eat Girl" (Ellis 23; 160; 191; 330). In the cited passage, Bateman's impressions of the Morgan Stanley party; his Valentino suit; Carruthers being in Atlanta; snorting cocaine; boarding a

cab; Courtney's attraction towards McDermott; Bateman's reaction to talking animals on *The Patty Winters Show*, and viewing the beggar rummaging through trash are events or qualia which appear to be synchronic as they jostle to emerge, unfiltered, through Bateman's convoluted consciousness. Actions (nearly) run the full gamut of temporal occurrence, conflating past and present and dissolving the sharp boundaries of what happens in between: "I have just left" (present perfect); "I'm wearing" (present continuous); "Carruthers is" (present simple); "I did a line" (past simple); "it hasn't sunk in" (present perfect); "Courtney seems attracted" (present simple); "talking animals were the topic" (past simple); "was floating" (past continuous); "its trainer who is positive" (present simple); "a beggar … frets" (present simple) (Ellis 239-40). Deictic expressions ("have *just* left"; "*before* McDermott hailed this cab"; "hasn't sunk in *yet*"; "the topic of *this morning's*"), typically used as sequential markers, are rendered somewhat ineffective when events are mediated concurrently, giving the impression that Bateman is under the effect of cocaine when watching *The Patty Winters Show* and emotionally breaking down at the sight of a 'talking' octopus. This casual and incongruous insertion of past events recalled and mediated in the immediate present makes Bateman's mind quite challenging to follow. And once we realise that the show was broadcast in the morning (when Bateman is typically not under the influence of drugs), the final effect is even more startling and farcical. We are now confronted with the heuristic challenges of remapping an unnatural mind that may be psychopathological rather than drug-addled; perhaps it would have been more comforting to know that Bateman's "watching, vaguely transfixed [and] sob[bing]" (240) at the sight of a 'talking' octopus were drug-induced rather than not.

If actions are "animated by mental states or acts" (McHale, "Speech Representation" 442), making one aspect inseparable from the other in the form of a "thought-action continuum" (*Fictional Minds* 212) as Palmer points out, then it naturally follows that in an autodiegetic narrative where the narrator is also the story's protagonist, action or consciousness are modelled on, and on behalf, of one other. In *American Psycho*, Patrick Bateman's erratic behaviour becomes a surrogate for introspection, which is significantly lacking for a first-person narrative. Then again, this lack of introspection in the novel may not be incidental. Three of the pathological markers for psychosis according to the PCL-R diagnostic model are lack of empathy, lack of remorse or guilt and shallow affect (Hare and Neumann 58), none

of which highlight emotional self-evaluation. Instead of depth we are presented with depthlessness (Jameson 6-9), symptomatic both of Bateman's condition and the postmodern condition that Jameson, Baudrillard and Debord would readily recognise, the world of the "object-become-sign" (Baudrillard qtd. in Weinreich 67). Bateman's mind appears to tether itself and float tenuously on the surface of things ("Surface, surface, surface was all that anyone found meaning in … this was civilization as I saw it, colossal and jagged"; Ellis 360), flitting from one 'irrelevant' detail to another in a non-causal string of *non sequiturs*. In the passage above, a discussion on the difference between distilled and purified water leads in quick succession to a description of the Goldcard club, to specific sartorial details, noting that Luis Carruthers is in Atlanta, that Courtney appears to be into Craig McDermott, the talking octopus and the beggar rummaging among litter. The effect is both overwhelming and comic, and since none of these mental images is actually prioritised, all are rendered equally insignificant or pointless.

Martin Weinreich, among others, has not failed to read *American Psycho* in terms of the very object that it derides – the novel itself is a simulacrum of postmodern consumer capitalism, built on a "hyperreal aesthetics and the logic of simulation" (65) to "construct a textual 'void around the real' [where] descriptions of the environment, human relations, and emotions disappear beyond the surface of an endless procession" (71). That Bateman is representative of a mode of consumption where objects and human beings are reduced to brand names and "flesh, blood, skin, hair" (Ellis 271) cannot be denied; however it is too tempting to treat Bateman as yet another postmodernist sign or code, an incarnation of the simulacrum that he inhabits, rather than a being with a highly interesting if unnatural mind. Admittedly, as Weinrich observes, the narrative itself is designed to duplicate the simulacrum. From the first line, "Abandon all hope ye who enter here … scrawled in blood red lettering on the side of the Chemical Bank" (Ellis 3) in the first chapter called "April Fools" (for good measure), we are ushered into the Bret Easton Ellis funhouse, one where Bateman shamelessly goes to his office Halloween party dressed as "a mass murderer, complete with a sign painted on [his] back that read[s] MASS MURDERER … and beneath those two words … written in blood *Yep, that's me*" (317). Another fun attraction includes a Christmas party thrown by a bored socialite where "midgets dressed in green and red elf suits and felt hats [walk] around with trays of appetizers" – but Bateman "cannot be positive that [he's] hallucinating [them]" (175). Social

conversation is similarly bathetic. When asked by Libby, a girl he has met at a club, what he does for a living, Bateman replies that he is "into, oh, murders and executions mostly. It depends.' … 'Do you like it?' she asks, unfazed. 'Um … It depends. Why?' …. 'Well, most guys I know who work in mergers and acquisitions don't really like it,' she says" (197). The effect is theatrical; the world feels staged, as inauthentic as the façade Bateman maintains and preens for social approval and consumption. His advice for this is that "If the face seems dry and flaky … use a clarifying lotion that removes flakes and uncovers fine skin … Then apply an anti-aging eye balm (Baume Des Yeux) followed by a final moisturizing 'protective' lotion" (26). In the Baudrillardian hyperscape, images proliferate images and the real "folds in on itself to the point of exhaustion" (Baudrillard qtd. in Weinreich 71). This exhaustion is experienced directly by the reader in descriptions such as the following:

> In the early light of a May dawn this is what the living room of my apartment looks like: Over the white marble and granite gas-log fireplace hangs an original David Onica. It's a six-foot-by-four-foot portrait of a naked woman, mostly done in muted grays and olives, sitting on a chaise longue watching MTV … The painting overlooks a long white down-filled sofa and a thirty-inch digital TV set from Toshiba; it's a high-contrast highly defined model plus it has a four-corner video stand with a high-tech tube combination from NEC with a picture-in-picture digital effects system (plus freeze-frame); the audio includes built-in MTS and a five-watt-per-channel on-board amp. A Toshiba VCR sits in a glass case beneath the TV set; it's a super-high-band Beta unit and has built-in editing function including a character generator with eight-page memory, a high-band record and playback, and three-week, eight-event timer. (Ellis 23-24)

However, Bateman's sham social veneer, his unreliability and his depthlessness cannot be simply accounted for in simulacral terms. If Bateman's mind reflects the simulacral order that Baudrillard speaks of, a precession of images that efface and negate the real (sec. 1.3 and sec. 2.8), we must consider a mind that is not semiotic but dysfunctional, distorted by the same sham reality that has made it sick. There is an irreducible Cartesian ontology to all of this. As a *product* of the simulacrum himself, Patrick Bateman's unnatural mind has a cause with very discernable psychosomatic effects. On illness and simulation, Baudrillard was convinced that "whoever simulates an illness produces in himself some of the symptoms" (*Simulacra* 3). And in the case of Patrick Bateman, these symptoms are medically irrefutable. Bateman's accounts of violence feel all too uncomfortably real and visceral. There is a material *substance* to his murders which is found lacking in his words and general behaviour, a strategy

employed by Ellis to prove that a real Bateman exists as long as his is fulfilling his homicidal tendencies, only to be replaced by a sham persona when he is not killing anybody. One example will suffice. Having lured a drunken Paul Owen to his Manhattan apartment, Bateman uses an axe to dispose of the investment banker who manages the secretive 'Fisher account':

> The ax hits him mid-sentence, straight in the face, its thick blade chopping sideways into his open mouth, shutting him up … There's no blood at first, no sound either except for the newspapers under Paul's kicking feet, rustling, tearing. Blood starts to slowly pour out of the sides of his mouth shortly after the first chop, and when I pull the ax out – almost yanking Owen out of the chair by his head – and strike him again in the face, splitting it open, his arms flailing at nothing, blood sprays out in twin brownish geysers, staining my raincoat. This is accompanied by a horrible momentary hissing noise actually coming from the wounds in Paul's skull, places where bone and flesh no longer connect, and this is followed by a rude farting noise caused by a section of his brain, which due to pressure forces itself out, pink and glistening, through the wounds in his face. He falls to the floor in agony, his face just gray and bloody, except for one of his eyes, which is blinking uncontrollably; his mouth is a twisted red-pink jumble of teeth and meat and jawbone, his tongue hangs out of an open gash on the side of his cheek, connected only by what looks like a thick purple string. … It takes Paul five minutes to finally die. Another thirty to stop bleeding. (Ellis 208-9)

Despite Bateman's confession that "there is an idea of a Patrick Bateman, some kind of abstraction, but there is no real me" (362), hypermimetic reporting such as in the preceding passage is further indication, to me at least, why Patrick Bateman cannot be simply construed as a simulacrum or representative of one. Bateman's pathology is quite real and schizotypal. His manic attention to object detail and specificity extends to his prolonged descriptions of violence and murder, ostensibly the only two activities that trigger any form of interest and attachment in his brain. Otherwise complete detachment succeeds vicious acts of murder, with entire chapters being devoted to music reviews (a chapter called "Genesis" follows the murder of the homeless man; "Whitney Houston" the murder of Bethany, an old girlfriend; "Huey Lewis and the News" follows a surreal film-sequence where Bateman goes on a spree) (128; 242; 339). Bateman's form of catharsis, it seems, is to ground himself into pedantic and vacuous demonstrations of cultural or sartorial knowledge, otherwise there is no "clear, identifiable emotion within" (Ellis 271). Bateman's "depersonalization" (271) is therefore not symbolic of cultural madness but symptomatic of one – an actual case of *American Pyscho(sis)* made flesh.

How do we read unnatural minds like Jack's and Patrick Bateman's? If our own mind is the simulator on which we model the actual thoughts of others, then by extension, the tools for mentalising a fictional mind are provided by the narrative model itself. What varies is the type of narrative model used. As an attributor, the (mind)reader must adopt very specific heuristics, especially when it comes to uncommon or unnatural fictional mental states such as those described in *American Psycho* or *Room*. The reader must "focus on what the target believes rather than on what the attributor himself knows, or believes, to be the case" (Goldman, *Simulating Minds* 198), even if the reader knows that things could be otherwise. Once we accept that fictional characters can be construed as a "minded being" (Caracciolo 9), despite knowing that their mind is a construct of our, and the authors' imagination, we must next accept Jack and Bateman's mind, for instance, as being 'possible' within the phenomenological parameters laid by the text. This heuristic process has particular ramifications for narrative construction.

We can only read these characters' mind once we accept that it is possible, and we can only treat their mind as possible if we consider Jack and Patrick Bateman themselves to be 'real', endowed with the same real-world behaviours we are familiar with. This "character-centered illusion" is accomplished, according to Caracciolo, through "a text [which] must contain a broad array of indicators of a character's mental life, consistently conveying his or her memories, beliefs, attitudes, and current experiences through global strategies such as internal focalization" (16) – in short, the granularity of experience and a feeling of authenticity that we have grown to expect from hypermimetic writing. However, despite what are clearly very strong analogies between cognitive and narrative simulation, arguments to the contrary have also been made. For instance, while acknowledging that "simulation and playful pretense are … situated in mental simulation" (111), Jean-Marie Schaeffer has flagged the divergences that exist between actual mindreading and what he calls "fictional simulation" (111). According to Schaeffer, fictional agents and actions "invented in and through the process of simulation [are not] referentially constrained and cannot be validated or invalidated in a direct way (e.g. by a comparison between behaviors predicted by the simulation and an actually occurring behavior)" (111). This is however imprecise. If narrative (or fictional) simulation is constructed and theorised on the conditions of actual mindreading, then the mental-state terms (Goldman) or psychological laws (Lewis) drawn from folk psychology provide ample referential

constraints and validation processes for the simulation of fictional minds, as we have seen in the rest of this chapter. Moreover, the fact that unnatural minds tend to breach these constraints and render validation problematic does not preclude attempts to map them nor does it bring narrative simulation to a complete stop. Schaeffer appears to disregard a crucial condition of narrative simulation – that it is a functional process which involves active and participatory reading. Thus his claim that "contrary to the results of mind reading, the results of a fictional narrative simulation are not fed into ongoing real-world interactions" (Schaeffer 111) is likewise imprecise. Fictional interactions are 'read' and enacted by and within an actual mind – we may not be able to interact with the fictional events and characters in text-based narratives directly but we (re)construct them as we read, based on the model or narrative blueprint provided. They are not a form of "off-line representational activity (as is every simulation)" (111), whatever she means by this, and neither is it a case where "except for pathological cases, the postulated entities of fictional representations are not fed into our belief system concerning the trappings of the real world" (111). Reader immersion (Ryan); character-centered illusion (Caracciolo); aesthetic illusion (Wolf); make-believe (Walton); transportation (Gerrig) – in none of these reader-affect theories is the belief in fictional representations considered to be actual (or delusional), yet we still feed all fictional textual inputs into our real world system and evaluate them accordingly, quarantining, suppressing or activating real world beliefs and biases as instructed by the narrative model, its conventions and its discourse. Finally, while it is indeed the case that "mental representations triggered by fictional simulation are not fed into real-world feedback loops" (Schaeffer 111) (we cannot alert Othello or Desdemona to Iago's machinations, for instance), Schaeffer's argument needs to be clarified to account for reader affect, a set of involuntary neurocognitive responses to mental and textual stimuli which are perceptively stronger when the reader's reality and his fictional reality are in the zone of their maximal proximity (sec. 3.4).

4.5 Summary

Beyond its associations with the computational and the virtual, simulation modelling can still be effectively implemented in non-digital fictions to construct and authenticate select behaviours or properties that obtain in text-exterior sources. Despite constraints of medium, narrative simulation draws on various mimetic and

cognitive strategies to enhance reader engagement, sustain immersion or otherwise reify specific experiences or behaviours which are more typical of interactive media. Simulation narratives thus place specific 'writerly' demands on the reader as producer rather than passive consumer of a text. Reading becomes a reconfigurative process (a form of mental re-writing) since the simulation of narrative requires the same imputation of laws and accreditation of behaviours between source and target worlds present in scientific simulation. In narrative simulation however, content-to-code validation occurs in the laboratory of the mind and amidst the pages of a book.

All fictional worlds are, to an extent, heterocosmic systems, but nonetheless require referential anchorage beyond the linguistic sign. More formal demands placed on narrative to model particular behaviours translates into the need for functional, if highly synthetic, mimetic structures. Unlike semiotic simulation, where the mimetic impulse is the end in itself (to imitate for the sake of imitation), functional simulation is process-driven and hypermimetic, whereby aspects of a secondary reality are augmented. Hypermimesis is especially suitable in cases where object phenomenology is to be prolonged for the sake of reader immundation. In the case of unnatural events or suprasensible phenomena, these must be 'naturalised' for the reader to process cognitively and heuristically according to a priori laws and additional phenomenological inputs to identify, and identify-with, extraneous, embodied or even disembodied behaviours.

The most directly accessible form of narrative simulation lies in mind-reading, an activity that appears to be biologically innate. We tend to make psychological inferences based on general behaviour and patterns (folk-psychology) and hence create mental models of other peoples' minds, a form of empathy. Assuming that fictional minds are analogs of the actual minds that have created them, a similar cognitive heuristic can be adopted to represent a mind in action. The text provides a specific mental map, instructing us how we are to relate to these characters and which beliefs are to be quarantined or promoted. In turn, the reader mentally runs and completes the simulation to activate this fictional consciousness. This heuristic process has particular ramifications for narrative construction. We can only read fictional minds once we consider them as possible, exemplifying (some of) the real-world behaviours we are familiar with. This illusion thus requires a granularity of experience and a degree of authenticity that can only be constructed through narrative simulation.

Chapter 5
Simulating Architexture

5.1 Introduction

"Writing means constructing, through the text, one's own model reader" ("Constructing" 48) as Eco wrote in a postscript to *The Name of the Rose*, a reminder, surely, that the same processes involved in modelling a hypothetical world necessarily construct a target reader, one who is "remediated" (Hayles 804) by the same narrative he reads and interprets. This 'model reader' for Eco is "the reader still to come … an accomplice … who would play [his] game" (48-50) but also a reader, one must note, whose behaviours would be modelled *by* the game's implicit rules.

Two implications emerge from Eco's remark. The first – the idea of text-as-game – is not unique to Eco. The metaphor has been invoked by other critics with reference to literary ludism (Warren Motte; Gonzalo Frasca; Espen Aarseth); playful poiesis (Johan Huizinga; Brian Edwards); contest (Elizabeth Bruss); narcissistic self-reflection (Linda Hutcheon; Brian McHale; Robert Detweiler); construction toolbox (Roland Barthes; Marie-Laure Ryan) and transmedial interaction (Katie Salen; Eric Zimmerman). The text-as-game is therefore a type of narrative which directly compels the reader to interact with the underlying game-like structure or discourse at its centre. Its methodology subordinates reading to a ludic act by setting its own rules and constraints, to be read/played on its own terms. Such "playtexts" (Motte 25) therefore also 'play' with readers' expectations and intellect by subverting or frustrating them, and in the process, 'constructing' or 'transforming' the reader (Eco, "Constructing" 53). The second implication therefore follows from the first and considers the reader not as someone who merely responds to the storyworld's rules of access by "adopt[ing] the interpretive position and aesthetic standpoint put forward by the work" (Schmid, "Implied Author" 170) – the implied reader – but someone who must extra-diegetically and perhaps even *physically* engage with the text with the full knowledge that he is complicit in its deconstruction, arrangement, supplementation and re-writing.

But if the model reader "corresponds to the set of felicity conditions that must be satisfied for the text's potential to be actualized [by] remov[ing] indeterminacies" (Prince 403), we need to account for a type of reader who fails to satisfy entirely these

textual conditions despite his or her best attempts, principally because the text itself seeks to remain coded and is 'engineered' to be that way. I consider such a reader to be a *modelled* reader, someone who has been 'wrought' but also 'played' by the text. When the text itself perpetuates 'indeterminacies' – through ludic strategies, regressive ontologies or impossible structures – long enough to remain potential and indefinitely 'open', a reverse process occurs. The text is perceived to operate on the reader in ways which do not encourage latent immersion but rather the contrary; a hermeneutical displacement ensues, the normal reading process is disrupted and aesthetic illusion is nullified. Now the reader is forced to openly *engage* with the text's structures and embedded systems, grappling and wrestling control of the text as a word-codifier, data-generator and *material artefact*. The text draws the reader away from "the product it presents to [face] the process it is" (Hutcheon 39), and narrative, if there ever was one, becomes secondary to the text's verbal, typographic, semiotic and spatial architecture. At this moment too, ironically with its superstructure laid bare, the text is at its most simulative and functional, challenging the reader to

> dispense with the willing suspension of disbelief in order to play another game. The hermeneutical point of departure is the destruction of the old fictional illusion, of the traditional agreement between author and reader, to make way for the game in which the author says , 'I will not allow you to inhabit an integral fictive world while you read my novel; instead, you must constantly and self-consciously connect the artifice of my narrative with the problematical real world you live in. (Detweiler 56)

Or differently put, the text now ascribes a supplementary and preliminary role to the reader – that of actual model-maker. The "integral fictive world" which Robert Detweiler speaks of is found to be already dismantled and uninhabitable, waiting for the model-maker to gather and assemble the pieces, to reconstruct it archi*text*urally before it can be recuperated through the experience of narrative immundation (sec. 4.2).

When a text is configured in terms of a ludic or experimental structure, we are presented with a semiotic system diametrically opposed to the traditional mimetic text-as-world systems we have considered so far (see Table 1 in sec. 3.3). In the latter, the text is assumed to have referential status where "meaning is vertical, since language refers to objects of the fictional world" (Ryan, *Narrative* 193), see section 3.3, and, to an extent, to a "world that precedes the text" (Villanueva 13), see section

4.2. This transparency of language serves to direct the reader's "attention toward objects in the textual world … link[ing] them with properties … animat[ing] characters and setting, and … lur[ing] the imagination into narrative simulation" (Ryan 193). Its artificiality notwithstanding, the text-as-world is considered by Ryan to simulate the right conditions for reader immersion and transportation.

Conversely, ludic structures do not facilitate the conversion of code to content necessary for seamless reading (sec. 3.3); rather they disperse the code and separate it from its content, 'spacing' it out literally and figuratively, as McHale has pointed out (*Postmodernist Fiction* 182). Spatial displacement of text is of particular interest here because the disparate arrangement of text (as typographical content) on a material surface (the page) *does not need to be simulated through mimetic representation – it is presented as actual*. What is simulated instead is the *ergodic* process (sec. 5.2) intended to engage the reader fully with textual topography. The reader is made aware of the text as t-e-x-t, a collection of signs which must be salvaged and assembled into a coherent message *before* the reading and interpreting process can begin. Ergodic strategies subject the text's *organon* to "deformation" (Hansen 599) or "deplotment" (Askin 114) and require "decipherment" (Ryan, *Narrative* 193), "experimentation" (Gibbons, "Multimodal" 421) or a "grappling with … narrative" (Bilsky 160) for the reader to successfully emerge through "the maze of the text" (Hamilton 14). Following this unwieldy and circuitous process, the "remediation" (Hayles 781) of both text and reader occurs. The spatial displacement of words and signs and their necessary linking also attests to the hypertextual quality of a physical text which exists apart from a digital environment which would perhaps facilitate its construction, further indication that simulative processes may also be found in print-based media.

If therefore the text-as-world corresponds with readerly immersion, the text-as-game can be equated with interactivity, where meaning is not a "preformed representation encoded in words" but requires the reader to "follow trails of associative connotations … like following links on the Internet: surfing the surface …" (Ryan, *Narrative* 193). Ryan's simile is felicitous here as it also allows us to consider playtexts in their native spatial print form to be capable of some interaction, manipulation and narrative choice as typical of digital or web-based media. This would also somewhat fulfill Ryan and Frasca's restrictive conditions for simulation, previously only held applicable to virtual, dynamic and hypertextual narratives (sec.

4.1). Central to Ryan and Frasca's understanding of simulation is its enactive or performative function, however such condition is also met through an experimentation with, and a merging of, various representational modes, the *multimodal* literary print equivalent of digital multimedia. Employing "multiple semiotic modalities, primarily the verbal and the visual" (Gibbons, *Multimodality* 1) while privileging no single mode, the text, paratext, typesetting, graphic design and generic intermixing come together in multimodal works as literary print-based surrogates for keyboard, mouse and computer screen interfaces.

Likening the "literary experience [to] "physical movement" (*Multimodality* 74), Gibbons explains how Gerrig's metaphor for narrative transportation – where the reader is "*transported* by virtue of *performing* that narrative" (Gerrig 2; original emphasis) – should also be taken to account for functional rather than purely cognitive participation. The reading of playtexts/texts-as-games/multimodal literature is a physical performative act since according to Gibbons, beyond the "imaginative and [the] emotional [the] reading path adds … literal ocular movement and participation parallel to that in the world of the text" (74) whereby the reader jointly collaborates with the author in "deciding and organising the visual layout according to narrative content" (74).

In the previous chapter, I stipulated a number of formal assumptions concerning narrative simulation as a discernable narrative mode, focusing on hypermimetic strategies and cognitive simulation as a way of modelling phenomenology and mental states in fiction (sec. 4.1). However, as Ronald Sukenick has observed, narrative reality is not the only way to experience the text. "We badly need a new way of thinking about novels that acknowledges their technological reality" he says, and we need to focus on texts presented "as a concrete structure rather than an allegory, existing in the realm of experience rather than of discursive meaning" (qtd. in McHale, *Postmodernist Fiction* 180). Beyond the thematic and the conceptual, literature also has "a physical context which criticism should not ignore: the printed book" (White qtd. in Gibbons, *Multimodality* 1). Simulation therefore does not need to limit itself to the modelling of fictional qualia when the experience of a fictional world starts its formation from an actual "subbasement of foundation" (McHale 180), a first ontology which is the "material book" (180) itself. The book is the "material metaphor" (*Writing Machines* 22) par excellence for Hayles, "an artifact whose physical processes and historical usages" (22) have served to construct the

reader as much as the text itself. Thus, the page constitutes "a unit of reading" (22) and the sequential "binding [of] pages … indicate an order of reading" (22), while "the opacity of paper" (22) reinforces this linearity and sequentiality rather than allowing the reading process to be "interpenetrating and simultaneous" (23). However, while a transmedial shift from printed to electronic text has already brought with it new implications for information processing and reading, a "change in the physical form of the artefact" (*Writing Machines* 23) need not be transmedial at all. Sufficient experimentation with the material and textual topography of a book permits a reconfiguration of the narrative space, such that the restrictive conventions of linear and sequential reading are completely circumvented (sec. 5.2).

A second mode of narrative simulation would consequently be one which considers such a reconfiguration of a text's narrative space more directly in terms of its material means of production. Therefore the material and multimodal strategies through which some narratives are read-produced is this chapter's theoretical focus. McHale has spoken of "a major ontological 'cut' divid[ing] the book as real, material object from the text as intentional object" (180), or in other words, the text's actual infrastructure in relation to its virtual narrative structure. Renewed interest in "procedural or constrained writing" (Bray et al. 13) since the founding of the OuLiPo group in 1960 as well as the "visuality of language" (11) (sec. 5.2) has led to the creation of ergodic and multimodal texts which require the reader to navigate and interact with their *hypertextual* (texts-as-networks) and material *topographies* (texts-as-surfaces). Since the text is not 'preformed' as a ready-made product to be processed by the mind but exists as raw information, it needs to undergo collation, parsing and processing before it becomes fully accessible. Establishing and connecting nodes of information within and beyond the synthetic system thus *extends* beyond the text (hence *hyper*text), while the playtext's "non-sequential writing … branches and allows choices to the reader" (Nelson qtd. in Bell 1), which choices determine narrative proliferation, randomness, combination, and openness of outcome typical of digital narrative simulation (sec. 4.1). I believe that this calls for a revised role of the reader and brings a totally different take on Ricoeur's "mimesis III" phase of "refiguration" (sec. 4.2). If a text is non-sequential and spatially dispersed, then it must first be reconfigured into a readable artefact, which process endows the reader with a writerly role (Ryan, *Narrative* 192-6); see section 4.1.

When the reader is made aware of the indispensability of form he or she also becomes aware of structural malleability – since the text's particular infrastructure is open, it can be successively re-opened. The text therefore simulates the *architextural* conditions of its own material organisation and processing pre-requisite to its reception. At this point in the discussion it would be useful to clarify that my understanding and use of the term 'architext' has little in common with Genette's, for whom the *archè*-text is a dominant genre under which all texts fall (*The Architext* 82-83). Rather, it can be aligned with Mary Ann Caws's use of "architexture" to "call attention to the surface texture of the construction made by reading" (xiv) – textual architecture, therefore, as *sjuzhet*. The Russian Formalists used the latter term to refer to the organisation of situation and events in narrative and how the text presents or cues readers to reconstruct these events. *Sjuzhet* has also become synonymous with emplotment or discourse (Banfield 535). Steve Tomasula also makes a similar point when he draws attention to the constructed nature of the novel as a form of information design since this becomes part of the message conveyed (Marshall McLuhan's "the medium is the message"). "Which architecture best tells *our* story?" asks Tomasula (439; original emphasis).

The organisational and structural qualities foregrounded by architextural simulation are discussed further in the sections that follow, with a number of examples drawn from experimental and multimodal print literature, evidence of the performative, interactive and hypertextual processes previously accorded to digital-based simulations. Key analyses from Mark Danielewski's *House of Leaves* conclude this chapter. Danielewski's novel is the epitome of the architext, fulfilling Peta Mitchell's definition of "a text in which architecture and literature are so thoroughly imbricated that book and building become one" (2). I explain how simulational structures permit the reader to navigate the textual and semiotic labyrinth that is the Navidsons' house on Ash Tree Lane, both a fictional location and an actual 'house of leaves' (the material book). Gibbons's point that earlier work on multimodal literature has "overlook[ed] the issue of reading paths" (*Multimodality* 14) due to the syntagmatic relations established between words and sentences is quite crucial here. "Images do not impose an equivalent and compulsory structural linearity", writes Gibbons, while "sentences, in Western cultures, are necessarily read from left to right, from given to new" (15). This is why multimodal print-based narratives fulfil a number of the conditions experienced transmedially within a digital environment. In

the case of multimodal texts such as *House of Leaves*, the deliberate scrambling of forking paths by the author renders the act of reading a *traversable* act: the typo-topographical nature of the text – its architexture – must first be navigated by the reader before it can be read, in much the same way the gaping interior of the Navidsons' property on Ash Tree Lane must be explored and documented. The architext, in turn, models the reader's performance as much as the reader serves to impose a narrative model onto the text.

5.2 Materiality, Multimodality and the Model(led) Reader

The connection between the text-as-game, materiality, multimodality and the revised role of the reader is perhaps best introduced through Georges Perec's "Preamble" to *La Vie, mode d'emploi* (*Life A User's Manual*), which novel is dedicated to the memory of Raymond Queneau, one of the founders of the OuLiPo group in 1960. The writers making up the *Ouvroir de Littérature Potentielle* (or Workshop of Potential Literature), among them Perec, reinvented techniques of constrained writing after becoming disenchanted with what they considered to be the "formlessness" of mainstream literature as well as the desire to "experiment for experiment's sake" (Baetens 117). These self-imposed constraints were equated with mathematical theorems requiring "demonstrations" (117) of the applied procedure, with early experiments in constrained writing involving the substitution of each noun in a set text with the seventh listed noun in a dictionary – the "N+7 constraint" (117) – or writing lipogramatic texts where a single letter or group of letters was avoided completely. For instance, Perec's *La Disparition* (*A Void*) is a three hundred-page novel consisting entirely of words without the letter 'e', "the most frequent letter in French" according to Baetens (118), with the author's name being the only unavoidable exception.

In *Life A User's Manual*, Perec uses the "art of jigsaw puzzles" as analogy for architextural construction and the extended reader's role as "puzzle-lover" ("Preamble"). "The pieces are readable, take on a sense, only when assembled" insists Perec, but "in isolation, a puzzle piece means nothing – just an impossible question, an opaque challenge. But as soon as you have succeeded … the piece disappears, ceases to exist as a piece" ("Preamble"). Perec's architextural novel, more chess-game than jigsaw puzzle, is a detailed description in ninety-nine chapters of the rooms, occupants and objects of an apartment building on 11, Rue Simon-Crubellier, with a

number of these individual narratives eventually interlinking with the death of Bartlebooth, the main narrative thread behind *Life A User's Manual*. Perec describes the fictional Parisian apartment block as a 10x10 elevation plan with the façade exposed, allowing for a number of narrative nodes to be established between the occupants and objects framed within its ten floors and ten rooms across, including cellars, stairways and attics. The artifice that binds building to book is evident from the several connections established between each chapter and the room it describes, complete with its objects, furnishings, surfaces and occupant history; less evident is the trajectory the narrative takes in the sequencing of the novel's chapter-rooms (Mitchell 4). An erudite observation by Barrière is that "the movements around the house, that is, the 10x10 square, follow a hamiltonian path, according to the movements of a knight on a 10x10 chessboard" (324) while Mitchell further explains how "each room visited is a knight's move away from the last. In chess, this … is called a knight's tour and requires the player to move a piece … in a series of knight's moves, never landing on the same square more than once" (4). However, the ludic structures of the text are never rendered quite explicit beyond the various allusions to chess and jigsaw-puzzles found interspersed in its many narratives. Mitchell claims that "the requirement for the reader to piece together these various oblique references in order to decipher the novel's underlying structure" (4) depends entirely on an "active independent reader, one, who must recognize, first, that, there is indeed a puzzle to solve before becoming participant in the 'game' of puzzling" (4).

Perec's essential premise of a text-as-game or puzzle corroborates the role of Eco's "model reader", the one who would willingly "play the game" as the author's "accomplice" ("Constructing" 48-50), with the difference that at some point the reader is left to his own devices since in Perec's words, "solving the puzzle consists simply of trying all the plausible combinations one by one" ("Preamble"). This sounds irreducibly oversimplified of course, especially in the light of another notorious combinatorial work by Queneau whose *Cent mille milliards de poèmes* (*Hundred Thousand Billion Poems*) was published seventeen-years before Perec's *Life A User's Manual* and its analogy with puzzling. The daunting title of Queneau's experimental work reflects the procedure the reader must undertake to read all the possible combinations of a set of one hundred and forty recombinable verses from a set of ten sonnets, which by virtue of having a fixed rhyme scheme can be rearranged into *one hundred trillion* possible sonnets within the same print-based work (Barrière 324).

How far procedural writing can be taken – and how willing (not to mention, equipped) the reader would be to take up such a challenge – has of course been amply debated. Baetens refers to one of the most conspicuous discussions raised within the OuliPo: "Must the writer allow the reader to see which constraint has been used, or not?" (124) and to which extent? Given that the OuLiPian exercise was one of poiesis, a "process-oriented art [which] values the experience of *making* over the *thing made*" (Bray et al. 13; original emphasis), the reader's collaboration in the artwork's production was considered to be necessarily one of active experimentation and discovery and one whose generative potential could be possibly undermined if the author "reveal[ed] too much of the work's genesis" (Baetens 124). In fact, Queneau used to claim that "Once the house of the novel has been built … the writer has to take away the scaffold" (124).

Lest the reader gets lost in the interconnecting rooms and passageways of the spacious architext, Perec offers some consolation in the writer's promise that the path to be taken by the model reader has been traversed already and therefore the game is not unplayable nor indefinite since

> despite appearances, puzzling is not a solitary game: every move the puzzler makes, the puzzle-maker has made before; every piece the puzzler picks up … and studies and strokes, every combination he tries … every blunder and every insight, each hope and each discouragement have all been designed, calculated, and decided by the other. ("Preamble")

Perec's preamble proposes writing as artifice, an assemblage of "pieces" which are given form and structure through design and calculation, taken apart and re-assembled to simulate the potential choice-maps and reading-routes the model reader will take. In this manner, the model reader has already been *modelled* by the "puzzle-maker". *Constrained writing becomes synonymous with constrained reading.* Normal reading processes are surrendered to a conscious reading-as-process, the text simulating the process required of the reader to forcibly open and re-open its narrative, manipulate, rotate and annotate its pages, and draw links between its textual and graphic spaces. Aarseth has clarified that this "cybertextual" process (1) is unlike typical reading processes where "the performance … takes place all in [the reader's] head" (1). Cybertextual readings are "extranoematic" (1) since their understanding requires additional "selective movement" and "physical construction

that the various concepts of 'reading' do not account for" (1). Aarseth classifies such literature under the more recognisable term "ergodic", explaining that

> In ergodic literature, nontrivial effort is required to allow the reader to traverse the text … [In] nonergodic literature … the effort to traverse the text is trivial, with no extranoematic responsibilities placed upon the reader except (for example) eye movement and the periodic or arbitrary turning of pages. (1)

Ergodic readings sum up Perec's analogy of the "puzzler [who] studies and strokes, every combination he tries" (Perec, "Preamble"). This figurative focus on the picking up of the puzzle pieces, their stroking and their placement as each combination is tested in turn, becomes literal in a number of multimodal or experimental texts as the *book itself - preceding the narratives inscribed within - becomes the architextural surface upon which the game is played*; *the pages and the paragraphs its pieces*.

Alejandro Zambra's *Multiple Choice* is another example of constrained and ergodic reading, presenting the reader with a series of multiple choice exercises and short reading comprehension tasks which ostensibly indicate a final narrative once all exercises have been completed (in pencil). Drawing attention to multiple narrative options while questioning any final author-intended reading, *Multiple Choice* sets impossible rules for the reader, the novel being more interested in simulating semiosis[58] than presenting itself as a valid lexical test. In the first chapter called "Excluded Term", Zambra invites the reader to "mark the answer that corresponds to the word whose meaning has no relation to either the heading or the other words listed" (1). True enough, while the first question follows somewhat this rubric ("1. MULTIPLE A) manifold B) numerous C) untold D) five E) two") (3), the rest of the questions bear a greater number of incongruous responses, leading the reader to question the original instructions but also the ludic pattern potentially at play. For instance, in question 3., for "YOURS", the selection process humorously allows for *four* different answers ("A) hers B) his D) their E) ours") (3), with "C) mine" being the only word related to the title. This abandoning of the rubric is also more evident in question 6, entitled "BODY", with Zambra making the following list of answers

[58] In *Semiotics and the Philosophy of Language*, Eco developed his "principle of unlimited semiosis" based on the ideas of Charles Sanders Peirce, where "the meaning of every sign, both verbal and non-verbal, can be understood only through another sign , its 'interpretant' … But the meaning of this second sign, in turn, can only be seen again through another sign, and so on ad infinitum" (Bianchi and Gieri 20). Such a principle is evident in Zambra's multiple choice options.

available: “A) dust B) ashes C) dirt D) grit E) smut” (4). It is obvious to the reader that *all* answers fulfil the conditions of the excluded term in bearing “no relation to the heading” (1), thereby invalidating the original instructions and multiple choice test. However, the lexical relations that Zambra seems to have in mind are less semantic and more semiotic, one where meaning is associative, relational and intertextual. Thus, in question 6 we find a complete semiotic chain of the kind that frequently occupied Eco: body > dust and ashes (Biblical association, Gen. 3:19) > dirt and grit (synonymic association) > smut (synonymic association with ash and grit; connotative association, sexually and politically laden, with body). Ironically therefore, question 6 (and many others like it) in Zambra’s *Multiple Choice* foregrounds procedural reading by drawing attention to its alternative method of seeking associations among signs while discarding others, a method requiring active participation from the reader and annotation on the book as the right answer/s contribute to a larger, open narrative, possibly one of several. The multiple narrative options presented by *Multiple Choice* are therefore simulated directly through micro-interactions with the reader, such as in question 27, where Zambra instructs us to “mark the answer that puts the sentences in the best possible order to form a coherent text” (11):

> A child
>
> 1. You dream that you lose a child.
> 2. You wake up.
> 3. You cry.
> 4. You lose a child.
> 5. You cry.
>
> A) 1-2-4-3-5
> B) 1-2-3-5-4
> C) 2-3-4-5-1
> D) 3-4-5-1-2
> E) 4-5-3-1-2 (Zambra 15)

Again, as in the previous examples, the rule appears to be futile since all combinations are possible, giving rise to interesting narrative options of the kind that Robert Coover explores in “The Babysitter”, which “juxtapose[s] contradictory and nonsequential events suggesting many … narrative unfoldings” (Hayles, *Writing Machines* 26). Interestingly, the most obvious narrative sequence for “A child” (1-2-

3-4-5)– the one given by Zambra himself – does not feature in the multiple choice answers, again an invitation by Zambra to consider alternatively plausible and non-obvious plots in the same way his text *Multiple Choice* can be considered generically indeterminate.[59]

N. Katherine Hayles and Nick Montfort believe that texts which proliferate narrative paths by allowing the reader to select reading sequences are "crucial to a work's appeal [by] creating, refreshing, and developing a storyworld" (455). In Zambra's *Multiple Choice* and Julio Cortázar's *Hopscotch* – where the novel offers two different reading paths; "one linear through a codex, the other through the number sequences offered in the work's preface" (Hayles and Montfort 455) – interaction with the playtext remains faithfully inscriptional (text-on-bound-paper), despite the variety of reading strategies (horizontal, vertical) employed. Other works have promoted more unusual circular or haphazard reading paths, such as Danielewski's *Only Revolutions* and *House of Leaves* respectively, pushing inscription well within the boundaries of multimodal and material experimentation. Concrete poetry and concrete prose, defined by Joe Bray as "pared-down pieces of text that are intended to be seen rather than read aloud" ("Concrete" 298), for instance exhibit at least three formal features from a list of eight which Gibbons considers to be consistent with multimodal novels, excluding the pervasiveness of images:

> (1) Unusual textual layouts and page design.
> (2) Varied typography.
> (3) Use of colour in both type and imagistic content.
> (4) Concrete realisation of text to create images, as in concrete poetry.
> (5) Devices that draw attention to the text's materiality, including metafictive writing.
> (6) Footnotes and self-interrogative critical voices.
> (7) Flipbook sections.
> (8) Mixing of genres, both in literary terms, such as horror, and in terms of visual effect, such as newspaper clippings and play dialogue. (*Multimodality* 2)

Features (1), (2) and (4) are typical of calligrams, writing where the visual-inscriptional rather than the figurative-semantic aspects of text are used to "imitate through their shapes the shapes of objects or processes in the real world" (McHale

[59] The 2016 Penguin edition of *Multiple Choice* contains an insert on its cover with five answers related to the text's generic qualities that in itself prefigures the novel's design and narrative options. Thus we find: "A. Fiction B. Nonfiction C. Poetry D. All of the above E. None of the above".

qtd. in Bray, "Concrete" 305). The signifiers *perceived collectively as a single image* therefore precede any signification which arises when the same signifiers are read in sequence. A visual and ontological short-circuiting of form and content ensues when the expression 'to paint a picture with words' is rendered actual, forcing the reader to consider the text as a material signifying object first, semiotic structure second. Early experimentation with "shaped typography" (Bray "Concrete" 305) can be found in Eugen Gomringer's "silencio", where the word 'silence' is typed fourteen-times by rectilinearly framing empty white space in the middle of the page, thus mimetically enacting the "silence of the title … at the center of the text … the noisy black type … replaced by a silent gap" (Solt qtd. in Bray 305). Text and space are complementary; space is not seen to be the absence of text but possesses a semantic functionality when it is used to frame, mould and define text as a visible artefact. In the case of Gomringer's calligram, "it is as if the white space trumps the linguistic attempt to represent silence; it achieves what words cannot" (Solt qtd. in Bray 299). Physical image makes theme immanent. Other often-cited examples of concrete poetry are Guillaume Apollinaire's *Calligrames*, featuring poetic works in the shape of a gushing fountain, a ballerina en pointe and other shapes; George Herbert's "Easter Wings, where a landscape view of the poem recalls angels flying with outstretched wings; John Hollander's "Swan and Shadow", a poem typographically set to depict a swan silhouetted and reflected on the water surface, and George Starbuck's unabashedly named "Sonnet in the Shape of a Potted Christmas Tree".

When language aesthetically informs structures, it becomes self-illustrative and self-referential. "An iconic shaped text in effect illustrates itself" says McHale, "its shape illustrates its content" (*Postmodernist Fiction* 187). This verbal iconicity, as in concrete poetry, is mimetically employed, both for real-world objects and processes but also to concretise metaphorical or allegorical abstractions (184). Unlike concrete poetry however, where content is constrained and can be easily contained within a single calligram, the word-designs in concrete prose cannot always be sustained beyond a certain length and tend to be accompanied by other visual modes. McHale (185-188) gives a number of examples from Christine-Brooke Rose's novel *Thru*, where a section of the text mimetically recreates an arrangement of rows of writing-desks in a classroom as they radiate from an epicentre; Ronald Sukenick's *Long Talk Bad Conditions Blues* involving a blanked out passage to represent a blizzard and one whose spacing imitates an urban landscape, and Ramond Federman's *Double or*

Nothing, with its diagrammed text forcing the reader to take unconventional reading paths, all axes of the book being considered valid for the purpose of illustrating the immigrant protagonist's struggles with learning English syntax. The convoluted diagrammatic structure of sentences also doubles for a lesson on the structures of syntax; "that language can be broken down into its constituent parts and put back together like a machine" (Tomasula 436). Additionally, Gibbons refers to earlier precursors of concrete prose and multimodal experimentation such as Laurence Sterne's *Tristram Shandy*, with a section covered in "squiggly lines depicting narrative trajectories" ("Multimodal" 424), and the passage in Lewis Carroll's *Alice in Wonderland* referred to as "The Mouse's Tale" which is entirely a visual pun on the mouse's "long and sad tale" (35) which Alice mistakes for a tail, the appendage playfully recreated by the text's undulating and tapering structure.

More interesting and interactive forms of "literary hypertexts" (455) or cybertexts (Aarseth 1) exploit the print medium beyond its inscription strategies and test its material limitations through their tactility. "Tactile fictions" (Gibbons, "Multimodal" 428) – "books that play with form in a way that emphasises their materiality and makes readers engage with them in notably physical ways" (428) – are evidence, for one, that multiple narrative reading paths are not limited to bound texts nor to digital environments, thus simulating the latter through the former. Hayles and Montfort mention Marc Saporta's *Composition No. 1, roman* and B. S. Johnson's *The Unfortunates* as examples of unbound texts which are presented in a box as a series of loose pages, pamphlets or cards, a "model kit" as Gibbons has called it ("Multimodal Literature" 425), "with instructions telling the reader to shuffle before beginning" (Hayles and Montfort 454). At some point, *Composition No. 1* goes beyond being a simulation of fragmentary narrative to becoming an actual sample of one (especially if one loses a page of text), raising the obvious observation by Montfort that "almost no one has succeeded in putting it together into a coherent narrative" (qtd. in Hayles and Montfort 454). The arbitrariness of random shuffling is slightly more controlled in *The Unfortunates*, with its "pre-set opening and closing segments" (454) intended to provide some form of narrative orientation despite its aleatory nature.

Extending the concept of the build-it-yourself narrative model kit to full multimodality, *Building Stories* by Chris Ware is a veritable house of a graphic novel, comprising fourteen assorted illustrated works ranging from booklets, flip-books,

newspapers, broadsheets, posters, cloth-bound books and fold-out designs which can be read in any order, although the bottom of the box it comes in proclaims to be "EVERYTHING YOU NEED to read the new graphic novel BUILDING STORIES" and includes "a diagram with instructional cues" (Roeder). Again, the material and tactile nature of the work – its "objecthood" as Roeder terms it – makes form inseparable from content; reading becomes "a physical experience", the "pieces … architectural fragments, building upon each other and accumulating meaning" (Roeder).

Fully resisting the sequential reading path imposed by the material conditions of print literature, authors such as Queneau, Jonson, Jonathan Safran Foer and Tom Phillips have produced works referred to as "cut-outs" or "altered books" (Gibbons, "Multimodal" 428-9), circumventing the material problem identified by Hayles with the impermeability of paper (*Writing Machines* 22). Windows, holes, slits and strips cut strategically in some experimental works of fiction actually prohibit conventional reading, forcing the reader to make ergodic leaps, with sections of text peeping through successive layers in an "interpenetrating and simultaneous" (Hayles, *Writing Machines* 23) reading experience. Queneau's *Cent mille milliards de poèmes* works by combinatorics, the book composed of hundreds of horizontal strips of paper attached to the spine, each representing a single sonnet verse, and which can be folded and lifted in parts to generate the hundred thousand billion poems of the title. Other multimodal texts like Jonson's *Albert Angelo* and Safran Foer's *Tree of Codes*, are less restrained in the way they (aesthetically) deface the book. Jonson pioneered the die-cut method by carving windows into the text to allow readers a literal glimpse of future narrative events, a method which *Tree of Codes* appropriates in an unorthodox take on the concept of the palimpsest, where rather than fresh text being superimposed onto an extant inscription, the reader is confronted by an actual novel (*Street of Crocodiles* by Bruno Schulz) with some of its words cleanly excised, allowing surviving words and phrases to peek through. Foer's method was also adopted by Tom Phillips in *A Humument*, another postmodern palimpsest based on the Victorian novel *A Human Document* by W. H. Mallock, this time with layers of paint covering the pages, leaving select words and phrases exposed. Gibbons also notes how *A Humument* "is continually altered in new editions (most recently an iPad app)" ("Multimodal" 430), evidence of the protean and evolutionary form of multimodal experimentation.

Architextural works are comparable to metafictional narratives in terms of their self-reflexive, auto-representational strategies, however they are also manifestly distinct in the way they uncouple product from process by imposing their physical, material infrastructure onto the reader to simulate particular conditions for their reading. In terms of the working definition of simulation that I have employed in this study (sec. 2.5), the architext can therefore be considered a model fully capable of functional representation and which materiality the reader must first engage with in order to disclose or generate a number of narrative possibilities – the poietic outcome of simulation-as-process.

5.3 Typography as Topography: Architextural Simulation in Danielewski's *House of Leaves*

Preceding Mark B.N. Hansen's discussion of the "digital topography" (597) of *House of Leaves* is an extract from an interview Mark Z. Danielewski gave to Sophie Cottrell in 2002. Like Sukenick, McHale, Hayles, Gibbons and others who have made a case for the material versatility of the book, Danielewski similarly drew attention to the hypertextual, multimodal possibilities present in the book as an analogue rather than a digital medium:

> Books don't have to be so limited. They can intensify informational content and experience. Multiple stories can lie side by side on the page … Words can also be colored and those colors can have meaning. How quickly pages are turned or not turned can be addressed … pages can be tilted, turned upside down, even read backwards … But here's the joke. Books have had this capacity all along … Books are remarkable constructions with enormous possibilities … (qtd. in Hansen 597)

House of Leaves is predominantly an experiment in *un*constrained writing, a multimodal, multi-diegetic labyrinth of a novel that tests all the possible affordances of inscription technologies within the same material medium. It fulfills all but one feature (number 7: "flipbook sections") characteristic of multimodal texts set out by Gibbons in *Multimodality, Cognition and Experimental Literature* (2) and discussed in section 5.2. Additionally, beyond a wide range of visual elements and images such as signs, collages, diagrams, sketches and photographs, *House of Leaves* includes "lists of some sort [and] discipline-specific symbolic languages like mathematical formulae [and] algorithms" (Hallet 131), all of which contribute to the novel's eccentric multi-

genericity. Hallet is of the opinion that although these modes are unconventional to the novel form, "in multimodal novels [they] normally [do not] have a disruptive or disturbing effect on the reading process" (131).

However, I do not believe that this is the case with *House of Leaves*. For one, it takes a while for the reader to "perceive [these multimodalities] as an integral part of the novel" (Hallet 131). In addition, the extent to which readers would fully "incorporate them in their cognitive construction of the narrated world" (131) to render immersion complete, is quite debatable. In *House of Leaves*, the pervasive presence of multiple modes and levels of information occurs at the expense of narrative and textual displacement – figuratively and literally, the narrative is rendered non-contiguous and, at times, non-traversable. This disintegrates rather than integrates the text, transforming it into an artifactual bricolage – an architext minus its floor plan – with the consequence that cognitive construction is deferred. I argue that this is deliberate since *House of Leaves* is intended to be experienced primarily as a phenomenological and tactile reality irrespective of its fictitiousness, which topographical reality is simulated for the reader to experience through the novel's architextural properties. Correctly, Moritz Ingwersen has called attention to the novel's ergodic "effects [which] elevate the process of reading to a level best described as haptic" (1), in which case immersion in the form of latent cognition cedes territory to fuller reader engagement.

It is clear therefore that *House of Leaves* does not transport readers (if at all) the same way that other novels do – we are constantly made aware of the text's own double ontology, both as a work of fiction with its own storyworld *and* an actual material artefact contributing to, and inseparable from, that same storyworld. Similarly, the double phenomenological input required to i.) read by ii.) traversing *House of Leaves* is characteristic of its ergodicity, one which would not otherwise be possible if the novel promoted conventional and contiguous reading paths. Write Marianne Corrigan and Ash Ogden: "*House of Leaves* features extremely alienating textual layouts as a means of achieving ergodicity: cross-referenced appendices that lead to nowhere, fake-footnotes, and hidden codes that reward the reader for breaking the conventional rhythm of reading" (2013).

A correlative argument is made by Sukenick, who notes that realist fiction has "den[ied] [the book] its technological reality" (qtd. in McHale, *Postmodernist* 181) by suppressing or "conventionalizing space right out of existence" (181). Since a realist

representation attempts to retain the reader's attention solely on the textual world rather than the book – a functional semiotic and narrative tool in itself – the medium in its conventional format is typically rendered "familiar and predictable" (and thus, negligible), with a "solid block of print from one margin to another running down the page from top to bottom [with] occasional paragraph indentation" (Sukenick qtd. in McHale, *Postmodernist* 181). Additionally, given that "the introduction of blank space has the effect of foregrounding the presence and materiality of the book and of disrupting the reality of the projected world" (181), it is minimised or erased completely "out of existence" (181) in conventional narrative inscription, to be replaced by uniform repetition. Conversely, and precisely to disrupt the suspension of disbelief so necessary for full readerly transportation/immersion, extreme typographic experimentation in *House of* Leaves using "the spacing-out of the text, along whatever axis or combination of axes, induces an ontological hesitation or oscillation between the fictional world and the real-world object – the material book" (McHale, *Postmodernist* 184). The book's architextural properties become a figurative and literal map against which the novel's narrative is chartered in this act of double ontology or forced re-centering of the reader (sec. 3.4).

Jan Alber has cited Herman's description of the function of storytelling as that which entails the "modelling, and enabling others to model, an emergent constellation of spatially related entities" ("Antimimetic Spaces" 186). Similarly, Ryan has made the argument that "the reader's imagination needs a mental model of space to simulate the narrative action" (qtd. in Alber, "Antimimetic Spaces" 186). Both claims above treat the narrative modelling of fictional entities primarily in terms of a cognitive process which conceives and permits these fictional entities to exist in space and time, if only for the duration of their description. Simulational processes beyond the mimetic which are invoked to trigger and cognitively sustain the experiencing of a fictional phenomenology have been amply discussed in chapters 3 and 4. However, in the case of architexts, the *actual material model of a typographically or formally-modified text precedes and subordinates the mental model* that Herman and Ryan allude to. The process where the reader generates a mental model of a fictional (impossible) space such as Danielewski's house on Ash Tree Lane becomes secondary to its first-hand material experiencing through the book's own architextural "manipulation of the extension of space", "disruption of spatial orientation" and "destabilization of space" (Alber, "Antimimetic Spaces" 187). These are all

"antimimetic spaces" (185) which are not just created through narrative description but also simulated through inscription strategies and require ergodic reading. Typography and the multimodal genre-scape quickly become synonymous with narrative topography; word clusters with walls; blank margins with paths and recesses; the book with the house, and its circuitous labyrinth with the convolutions of recursive narration in an "imbrication of the fictional and the real" (Hansen 601).

Mimicking the novel's protagonist, prize-winning photographer Will Navidson, readers progressively find themselves immured and lost within the shifting walls of the house (of leaves) on Ash Tree Lane, hermeneutically discovering that the space of its interior does not correspond with its exterior. What starts as a one-fourth-of-an-inch anomaly soon materialises into a doorway and eventually a yawning hallway that violates all known physical rules while six successive explorations into spaces, both narrow and vast, that seem to unspool and retract at will lead the explorers to the possibility that the interior of the house exceeds the diameter of the earth and is older than the solar system itself. Prefacing a series of extradiegetic moves, Danielewski's novel recreates this spatial impossibility by having its black front cover cut shorter, allowing the underlying pages to protrude. This is also a symbolic affirmation/foregrounding of the novel's untamable parts being essentially greater than its organic whole, a short-circuiting of its hermeneutic circle intended to resist any reader's attempt at totalising its content. Or in Zampanò's (one of Danielewski's intradiegetic narrators) words, "the dichotomy between those who participate inside and those who view from the outside breaks down when considering the house [or book], simply because no one ever sees that labyrinth in its entirety" (Danielewski 114). Yet for the book/labyrinth to be seen, it must be experienced. As Zampanò advises, "comprehension of its intricacies must always be derived from within" (114). Robert Scholes has, in fact, observed how works of metafiction tend to be structurally designed to project the reader within a system "not necessarily arranged for his benefit" (qtd. in Hutcheon 19) while Danielewski's direct injunction to the reader, "This is not for you" (ix.), is certainly not meant to be interpreted any differently.

Danielewski's unconventional admonition challenges readers to step inside and experience the book's topographic and diegetic labyrinth by subverting "the customary creation of and shift into the [textual world]" (Gibbons, *Multimodality* 51). But precisely by prohibiting the reader such an entry, the novel concurrently proffers

it for curious investigation in much the same way that Navidson has little choice but to explore the "spatial violation" (Danielewski 24) that develops in his living room wall. Danielewski's provocation that the book (or the narrative experience?) is not intended for a/any (type of) reader is a "deliberate strategy" (Gibbons, *Multimodality* 52) that runs counter to Eco's principle of the model reader. A game of sorts is being played here, one which ironically still 'selects' its model readers through their "reactance" (54) to its opening challenge.

House of Leaves is a veritable textual and narrative labyrinth that simulates the latter through the former on at least two mimetic levels – the typographic and the extradiegetic. The first simulates the house-book's shifting topography (as a spatial anomaly); the second its ontology (as an impossible referent). Simulation-by-typography is primarily achieved through the text's ergodic multimodality. The spatial configuration of text and marks on the page represents Navidson's physical restrictions in exploring the labyrinth but also simulates approximate ergodic conditions by imposing similar constraints on the reading process. Beyond figurative analogy, the book however also assumes some "properties of the HOUSE domain, such as corridors, doorways [and] windows" to recreate, in abstracted form, the "*structural* analogy of HOUSE" (Gibbons, *Multimodality* 66; my emphasis).

The first of these architextural constructs appears in Chapter V ("Echo")[60] with Navidson's so-documented, Exploration A. Pushing deeper into the hallway that materialises inside his house walls, Navidson's video equipment captures the enormity and "otherness inherent in that place … focusing on something that is terrifying as it is threatening" (Danielewski 64). Right after this description is the metaleptic assertion that "There is also the courage to face and shape the subject in an extremely original manner" (64) followed by two pages of densely packed footnotes (Figure 7 on p. 208). The deliberate typographical arrangement is a playful allusion to Zampanò's previous remark on originality but concurrently a concrete figuration of the "undisturbed blackness" (Danielewski 64) that can barely be penetrated by Navidson's visual equipment.

[60] One of the lists presented in Appendix A by "The Editors" is called "Possible Chapter Titles" (Danielewski 540), another instance of the many diegetic ruptures that occur in a novel that mainly presents itself as a documentary corroborated by academic references and archive material.

Libsohn, Huynh Cong ("Nick") Ut, Lester Talkington, William Henry Jackson, Edward Weston, William Baker, Yousuf Karsh, Adam Clark Vroman, Julia Margaret Cameron, George Barnard, Lennart Nilsson, Herb Ritts, Nancy Burson ("Untitled, 1993"), Bragaglia, Henri Cartier-Bresson ("Place de l'Europe"), William Wegman, Gordon Parks, Alvin Langdon Coburn, Edward Ruscha, Herbert Pointing, Simpson Kalisher, Bob Adelman, Volkhard Hofer ("Natural Buildings, 1991"), Lee Friedlander, Mark Edwards, Harry Callahan, Robert Frank, Baltimore *Sun* photographer Aubrey Bodine, Charles Gatewood, Ferenc Berko, Leland Rice, Joan Lyons, Robert D'Alessandro, Victor Keppler, Larry Fink, Bevan Davies, Lotte Jacobi, Burk Uzzle, George Washington Wilson, Julia Margaret Cameron, Carleton Watkins, Edward S. Curtis, Eve Arnold, Michael Lesy (*Wisconsin Death Trip*), Aaron Siskind, Kelly Wise, Cornell Capa, Bert Stern, James Van Der Zee, Leonard Freed, Philip Perkis, Keith Smith, Burt Glin, Bill Brandt, László Moholy-Nagy, Lennart Arthur Rothstein, Louis Stettner, Ray K. Metzker, Edward W. Quigley, Jim Bengston, Richard Prince, Walter Chappell, Paz Errazuriz, Rosamond Wolff Purcell, E. J. Marey, Gary Winogrand, Alexander Gardner, Wynn Bullock, Neal Slavin, Lew Thomas, Patrick Nagatani, Donald Blumberg, David Plowden, Ernestine Ruben, Will McBride, David Vestal, Jerry Burchard, George Gardner, Galina Sunkova, Frank Gohlke, Olivia Parker, Charles Traub, Ashvin Mehta, Walter Rosenblum, Bruce Gilden, Imogen Cunningham, Barbara Crane, Lewis Baltz, Roger Minick, George Krause, Saul Leiter, William Horeis, Ed Douglas, John Baldessari, Charles Harbutt, Greg McGregor, Liliane Decock, Lilo Raymond, Hiro, Don Worth, Peter Magubane, Brett Weston, Jill Freedman, Joanne Leonard, Larry Clark, Nancy Rexroth, Jack Manning, Ben Shahn, Marie Cosindas, Robert Demachy, Aleksandra Macijauskas, Andreas Serrano, Les Krims, Heinrich Tönnies, George Rodger, Art Sinsabaugh, Arnold Genthe, Frank Majore, Gertrude Käsebier, Charles Nègre, Harold Edgerton, Shomei Tomatsu, Roy Decarava, Samuel Bourne, Giuseppe Primoli, Paul Strand, Lewis Hine, William Eggleston, Frank Sutcliffe, Diane Arbus, Daniel Ibis, Raja Lala Deen Dayal, Ralph Eugene Meatyard, Walker Evans, Mary Ellen Mark, Timothy O'Sullivan, Jacob A. Riis, Ian Isaacs, David Epstein, Karl Struss, Sally Mann, P.H. Emerson, Ansel Adams, Liu Ban Nong, Berencie Abbot, Susan Lipper, Dorthea Lange, James Balog, Doris Ulmann, William Henry Fox Talbot, John Thomson, Phillippe Halsman, Morris Engel, Christophe Yve, Thomas Annan, Alexander Rodchenko, Eliot Elisofon, Eugène Atget, Clarence John Laughlin, Arthur Leipzig, F. Holland Day, Jack English, Alice Austen, Bruce Davidson, Eudora Welty, Jimmy Hare, Ruth Orkin, Masahiko Yoshioka, Paul Outerbridge, Jr., Jerry N. Uelsmann, Louis Jacques Mandé Daguerre, Emmet Gowin, Cary Wasserman, Susan Meiselas, Naomi Savage, Henry Peach Robinson, Sandra Eleta, Boris Ignatovich, Eva Rubinstein, Weegee (Arthur Fellig), Benjamin Stone, André Kertész, Stephen Shore, Lee Miller, Sid Grossman, Donigan Cumming, Jack Welpott, David Sims, Detlef Orlopp ("Untitled"), Margaret Bourke-White, Dmitri Kessel, Val Telberg, Patt Blue, Francisco Infante, Jed Fielding, John Heartfield, Eliot Porter, Gabriele and Helmut Nothhelfer, Francis Bruguière, Jerome Liebling, Eugene Richards, Werner Bischof, Martin Munkacsi, Bruno Barbey, Linda Connor, Oliver Gagliani, Arno Rafael Minkkinen, Richard Margolis, Judith Golden, Philip Trager, Scott Hyde, Willard Van Dyke, Eileen Cowin, Nadar (Gaspard Felix Tournachon), Roger Mertin, Lucas Samaras, Raoul Hausmann, Vilem Kriz, Lisette Model, Robert Leverant, Josef Sudek, Glen Luchford, Edna Bullock, Susan Rankaitis, Gail Skoff, Frank Hurley, Bank Langmore, Carrie Mae Weems, Michael Bishop, Albert and Jean Seeberger, John Gutmann, Kipton Kumler, Joel Sternfeld, Derek Bennett, William Clift, Erica Lennard, Arthur Siegel, Marcia Resnick, Clarence H. White, Fritz Henle, Julio Etchart, Fritz Goro, E.J. Bellocq, Nathan Lyons, Ralph Gibson, Leon Levinstein, Elaine Mayes, Arthur Tess, William Larson, Duane Michals, Benno Friedman, Eve Sonneman, Mark Cohen, Joyce Tenneson, John Pfahl, Doug Prince, Albert Sands Southworth and Josiah Johnson Hawes, Robert W. Fichter, George A. Tice, John Collier, Anton Bruehl, Paul Martin, Tina Barney, Bob Willoughby, Steven Szabo, Paul Caponigro, Gilles Peress, Robert Heinecken, Wright Morris, Inez van Lamsweerde, Peter Hujar, Inge Morath, Judith Joy Ross, Judy Dater, Melissa Shook, Bea Nettles, Dmitri Baltermants, Karl Blossfeldt, Alexander Liberman, Wolfgang Tillmans, Hans Namuth, Bill Burke, Marion Palfi, Jan Groover, Peter Keetman ("Porcelain Hands, 1958"), Henry Wessel, Jr., Syl Labrot, Gilles Ehrmann, Tana Hoban, Martine Franck, John Dominis, Ilse Bing, Jo Ann Callis, Lou Bernstein, Vinoodh Matadin, Todd Webb, Andre Gelpke ("Chiffre 389506: Inkognito, 1993"), Thomas F. Barrow, Robert Cumming, Josef Ehm, Mark Yavno, Tod Papageorge, Ruth Bernhard, Charles Sheeler, Tina Modotti, Zofia Rydet, M. Alvarez Bravo, William Henry Jackson, Peeter Tooming, Betty Hahn, T. S. Nagarajan, Meridel Rubinstein, Romano Cagnoni, Robert Mapplethorpe, Albert Renger-Patzsch, Stasys Zvirgzdas, Geoff Winningham, Thomas Joshua Cooper, Erich Hartmann, Oscar Bailey, Herbert List, Mirella Ricciardi, Franco Fontana, Art Kane, Georgij Zelma, Sergei Mikhailovich Prokudin-Gorskii, Mario Sorrenti, Craig McDean, René Burri, David Douglas Duncan, Tazio Secchiaroli, Joseph D. Jachna, Richard Baltauss, Richard Misrach, Yoshihiko Ito, Minor White, Ellen Auerbach, Izis, Deborah Turbeville, Arnold Newman,

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Tzachi Ostrovsky, Joel-Peter Witkin, Adam Fuss, Inge Osswald, Enzo Ragazzini, Bill Owens, Soyna Noskowiak, David Lawrence Levinthal, Mariana Yampolsky, Juergen Teller, Nancy Honey, Elliott Erwitt, Bill Witt, Taizo Ichinose, Nicholas Nixon, Allen A. Dutton, Henry Callahan, Joel Meyrowitz, Willaim A. Garnett, Ulf Sjöstedt, Hiroshi Sugimoto, Toni Frissell, John Blakemore, Roman Vishniac, Debbie Fleming Caffery, Raúl Corrales, Gyorgy Kepes, Joe Deal, David P. Bayles, Michael Snow, Aleksander Krzywoblocki, Paul Bowen, Laura Gilpin, Andy Warhol, Tuija Lydia Elisabeth Lindström-Caudwell, Corinne Day, Kristen McMenamy, Danny Lyon, Erich Salomon, Désiré Charnay, Paul Kwilecki, Carol Beckwith, George Citcherson ("Sailing Ships in an Ice Field, 1869"), W. Eugene Smith, William Klein, José Ortiz-Echagüe, Eadweard Muybridge, and David Octavius Hill, August Sander (*Antlitz der Zeit*), Herbert Bayer, Man Ray, Alex Webb, Frances B. Johnston, Russell Lee, Suzy Lake, Jack Delano, Diane Cook, Heinrich Zille, Lyalya Kuznetsova, Miodrag Djordjevi, Terry Fincher, Joel Meyerowitz, John R. Gossage, Barbara Morgan, Édouard Boubat, Horst P. Horst, Hippolyte Bayard, Albert Kahn, Karen Helen Knorr, Carlotta M. Corpon, Abigail Heyman, Marion Post Wolcott, Lillian Bassman, Henry Holmes Smith, Constantine Manos, Gjon Mili, Michael Nichols, Roger Fenton, Adolph de Meyer, Van Deren Coke, Barbara Astman, Richard Kirstel, William Notman, Kenneth Josephson, Louise Dahl-Wolfe, Josef Koudelka, Sarah E. Charlesworth, Erwin Blumenfeld, Jacques Henri Lartigue, Pirkle Jones, Edward Steichen, George Hurrell, Steve Fitch, Lady Hawarden, Helmar Lerski, Oscar Gustave Rejlander, John Thomson, Irving Penn, and Jane Evelyn Atwood (photographs of children at the National School for Blind Youth). Not to mention Suze Randall, Art Wolfe, Charles and Rita Summers, Tom and Pat Leeson, Michael H. Francis, John Botkin, Dan Blackburn, Barbara Ess, Erwin and Peggy Bauer, Peter Arnold, Gerald Lacz, James Wojcik, Dan Borris, Melanie Acevedo, Micheal McLaughlin, Darrin Haddad, William Vazquez, J. Michael Myers, Rosa & Rosa, Patricia McDonough, Aldo Rossi, Mark Weiss, Craig Cutler, David Barry, Chris Sanders, Neil Brown, James Schnepf, Kevin Wilkes, Ron Simmons, Chip Clark, Ron Kerbo, Kevin Downey, Nick Nichols; also Erik Aeder, Drew Kampion, Les Walker, Rob Gilley, Don King, Jeff Hornbaker, Alexander Gallardo, Russell Hoover, Jeff Flindt, Chris Van Lennep, Mike Moir, Brent Humble, Ivan Ferrer, Don James, John Callahan, Bill Morris, Kimiro Kondo, Leonard Brady, Fred Swegles, Eric Baeseman, Tsuchiya, Darrell Wong, Warren Bolster, Joseph Libby, Russell Hoover, Peter Frieden, Craig Peterson, Ted Grambeau, Gordinho, Steve Wilkings, Mike Foley, Kevin Welsh, LeRoy Grannis, John Bilderback, Craig Fineman, Michael Grosswendt, Craig Huglin, Seamas Mercado, John Heath "Doc" Ball, Tom Boyle, Rob Keith, Vince Cavataio, Jeff Divine, Aaron Loyd, Chris Dyball, Steve Fox, George Greenough, Aaron Loyd, Ron Stoner, Jason Childs, Kin Kimoto, Chris Dyball, Bob Barbour, John Witzig, Ben Siegfried, Ron Romanosky, Brian Bielmann, Dave Bjorn, John Severson, Martin Thick (see his profound shot of Dana Fisher cradling a chimpanze rescued from a meat vendor in Zaire), Doug Cockwell, Art Brewer, Fred Swegles, Erik Hans, Mike Balzer, John Scott, Rob Brown, Bernie Baker, William Sharp, Randy Johnson, Nick Pugay, Tom Servais, Dennis Junor, Eric Baeseman, Sylvain Cazenave, Woody Woodworth, and of course, J.C. Hemment, David "Chim" Seymour, Vu Ngoc Tong, William Dinwiddie, James Burton, Marv Wolf, London Thorne, John Gallo, Nguyen Huy, Leonidas Stanson, Pham Co Phac, Kadel & Herbert, Underwood & Underwood, James H. Hare, Tran Oai Dung, Lucian S. Kirtland, Edmond Ratisbonne, Pham Tranh, Luong Tan Tuc, George Strock, Joe Rosenthal, Ralph Morse, Ho Van De, Nguyen Nhut Hoa, Nguyen Van Chien, Nguyen Van Thang, Phung Quang Liem, Truong Phu Thien, John Florea, George Silk, Carl Mydans, Pham Van Kuong, Nguyen Khac Tam, Vu Hung Dung, Nguyen Van Nang, Yevgeny Khaldei, To Dinh, Ho Ca, Hank Walker, Tran Ngoc Dang, Vo Duc Hiep, Trinh Dinh Hy, Howard Breedlove, Nguyen Van Thuan, Vu Hanh, Ly Van Cao, Burr McIntosh, Ho Van Tu, Helen Levitt, Robert Capa, Ly Eng, Mathew Brady, Sau Van, Thoi Hun, Leng, Thong Veasna, Nguyen Luong Nam, Huynh Van Hua, Ngoc Huong, Alan Hirons, Lek, George J. Denoncourt II, Hoang Chau, Eric Weigand, Pham Vu Binh, Gilles Caron, Tran Binh Khuol, Jerald Kringle, Le Duy Que, Thanh Tinh, Frederick Sommer, Nguyen Van Thuy, Robert Moeser, Chhim Sarath, Duong Thanh Van, Howard Nurenberger, Vo Ngoc Khanh, Dang Van Hang, James Pardue, Bui Dinh Tuy, Doug Clifford, Tran Xuan Hy, Nguyen Van Tha, Keizaburo Shimamoto, Nguyen Van Ung, Bob Hodierne, Nguyen Viet Hien, Dinh De, Sun Heang, Tea "Moorface" Kim Heang, Lyng Nhan, Charles Chellappah, The Dinh, Nguyen Van Nhu, Ngoc Nhu, John Andescavage, Nguyen Van Huong, Francis Bailly, Georg Gensluckner, Vo Van Luong, James Denis Gill, Huynh Van Dung, Nguyen Than Hien, Terrence Khoo, Paul Schutzer, Vo Van Quy, Malcolm Browne, Le Khac Tam, Huynh Van Huong, Do Van Nhan, Franz Dalma, Kyoichi Sawada, Willy Mettler, James Lohr, Le Kia, Sam Kai Faye, Frank Lee, Nguyen Van Man, Joseph Tourtelot, Doan Phi Hung, Ty Many, Nguyen Ngoc Tu, Le Thi Nang, Nguyen Van Chien, Doug Woods, Glen Rasmussen, Hiromichi Mine, Duong Cong Thien, Bernard B. Fall, Randall Reimer, Luong Nghia Dung, Bill Hackwell, Pen, Nguyen Duc Thanh, Chea Ho, Jerry Wyngarden, Vantha, Chip Maury, J.

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Figure 7: Exploration A and "undisturbed blackness"
Source: Danielewski, *House of Leaves* 65-66

Interestingly, the refiguration of text-turned-blackout requires the reader to hold the text at a distance in order for the effect to be simulated; once the entire page is 'faced', the 'subject' itself comes into 'shape' (as per Zampanò's cue). Yet conventional reading tends to reinforce the opposite – to treat lines of words as narrative signifiers which must be read *closely* and in single succession, seeking correspondences between the word in print and the referent outside it. The reader soon gives up reading the names cited in the footnote, the futility of the exercise becoming evident when one starts questioning whether the names listed are fictional and therefore irrelevant as far as referential footnotes go.[61] Yet the two-and-a half-page footnote acquires signification when the text is considered in block rather than discretely; the dense typographical cluster supervenes on single lines and a visual and tactile connection is established between the reader and Navidson's world through the reader's direct engagement with the material text (in this case, holding it at least three feet away until the text blends into a dark frame).

[61] As a matter of fact, however, they aren't. An authoritative fan forum dedicated to deciphering the codes embedded in *House of Leaves* gives an entry from 02 Mar 2010 entitled "The Long List of Visionaries", with 776 names listed, and over 200 hyperlinked. All names cited are actual personages (MH Sub I LLC dba vBulletin 2019).

Multimodal experimentation increments considerably from Chapter IX ("The Labyrinth") onwards with Navidson's further peregrinations inside the bowels of his house. This chapter is notable in this regard, consisting entirely of paratextual elements which privilege no single narrative voice and serves to 'bury' the narrative thread (Exploration #4) which only picks up twelve pages later. Genette discussed the paratext as an extra-literary system intended to render a text more accessible by incorporating additional textual matter such as "titles and subtitles … epigraphs, dedications, prefaces, afterwords, running heads, the copyright page, and all jacket copy" (Gorman 419). In turn, Danielewski's copious use of footnotes subverts Genette's principle of accessibility through what Emily Squadra refers to as "supplementation" (2). The result is a Borgesian and Derridean pastiche – but not just.

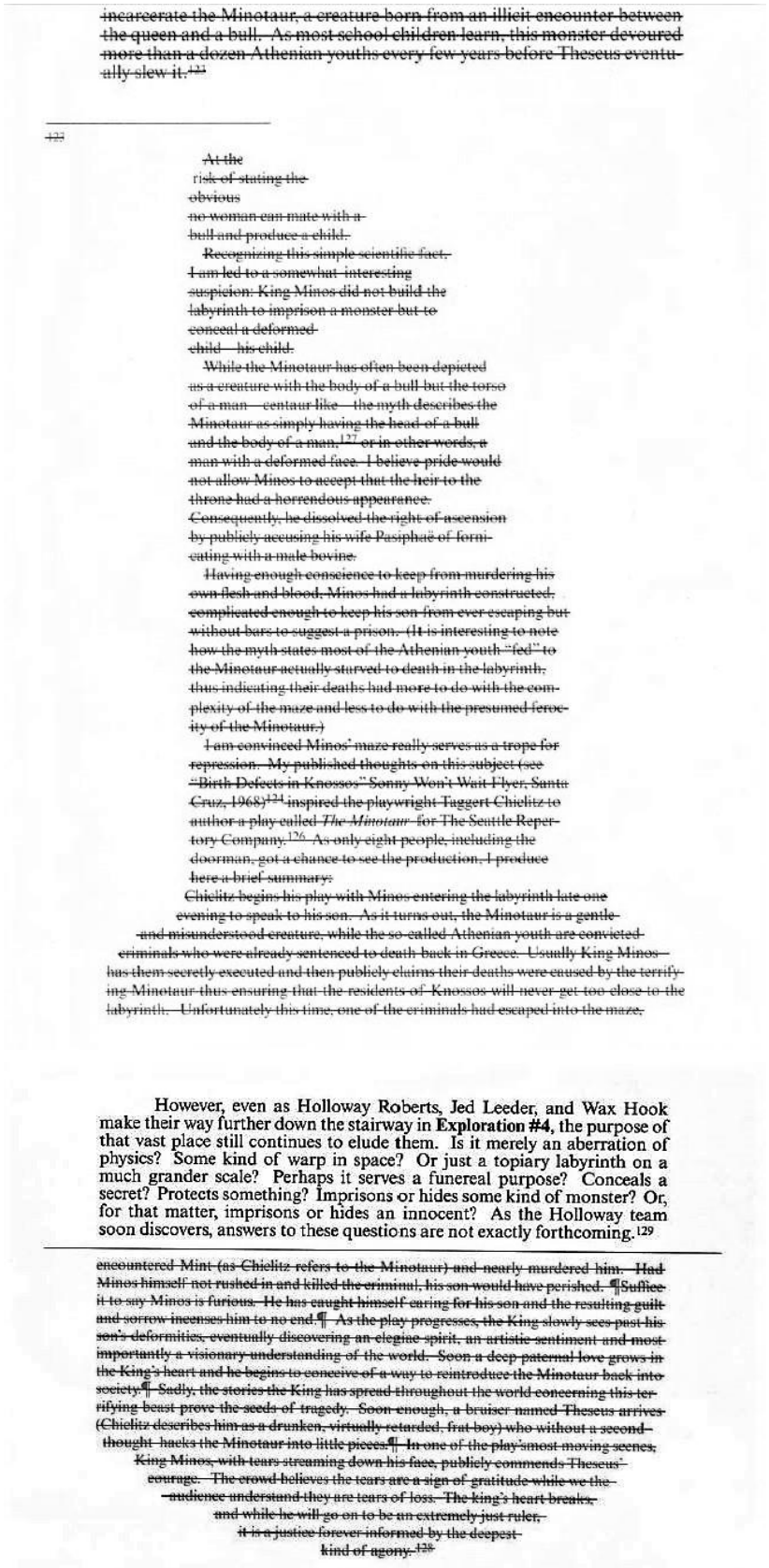
To simply read Chapter IX's paratextuality in terms of Johnny Truant – the autodiegetic narrator's – snide remarks on Zampanò's "obscur[ing] [of] the secondary sources he's using in order to appear more versed in primary documents" (Danielewski 107) would be to miss its multi-layered simulation. The house on Ash Tree Lane is a spatial aberration which properties Danielewski recreates through semiotic displacement and topographical distortion. The four tiered "cross-world" (Gibbons, *Multimodality* 83) narrative structure is "endlessly supplemented" (Squadra 3) through Truant and Zampanò's parallel footnote and body commentaries on *The Navidson Record* – a dissertation by Zampanò based on a film documenting Navidson's explorations of the house ("The Five and a Half Minute Hallway") but which, according to Truant, "doesn't even exist" (Danielewski xix), despite Zampanò's detailed description of its footage. Additionally, fictitious and anonymous Editors occasionally remark on Truant and Zampanò's material, thus contributing towards further hypodiegetic levels. Supplementation, "the movement of play, permitted by the lack or absence of a center or origin" (Derrida qtd. in Squadra 5) results in a bewildering hypertextual network which, like the labyrinth that Navidson attempts to explore, centrifugally derails the reader from any identifiable locus of meaning, redirecting them from one source of information to the next, a perpetual cross-referencing that requires the back-and-forth turning, and up-down-lateral scanning, of one page after another. From this cross-referencing of footnotes emerges a non-digital hyper-text ('hyper', from the Greek *hupér* meaning 'over') that appears as an extension to the main text but gradually comes to precede and overshadow it through

its excess. The result is narrative burial, when the epitext – Genette's term for content that follows the body text, such as direct or indirect author commentary (Gorman 419) – substitutes the main narrative almost completely to the point that the term 'footnote' becomes somewhat inapplicable.

The purpose of paratext from Chapter IX onwards is to derail meaning while tracing Navidson's digressions through the interior labyrinth of the house (essentially, therefore, one substitutes for the other). But Navidson's journey – recorded on Hi 8 camcorders and 16mm Arriflexes (Danielewski 10) – undergoes several ontological shifts: it is narrativised by Zampanò; it is elevated to academic discourse by Zampanò's text and paratext; it is assembled and edited by Johnny Truant, and finally it is presented to the reader in a form equally labyrinthine and transmodal. It soon becomes clear why Zampanò chooses to say the following before the epitext completely goes into typographic excess:

> It would be fantastic if based on footage from *The Navidson Record* someone were able to reconstruct a *bauplan* for the house. Of course this is an impossibility, not only due to the wall-shifts but also the film's constant destruction of continuity, frequent jump cuts prohibiting any sort of accurate mapmaking. Consequently, in lieu of a schematic, the film offers instead a schismatic rendering of empty rooms, long hallways, and dead ends, perpetually promising but forever eluding the finality of an immutable layout. (Danielewski 109)

Zampanò's paratext takes up the challenge of simulating – in part – the missing "*bauplan*" (from the German, 'building plan') he writes of, but it is a *bauplan* intended to be ergodically experienced at a metadiegetic level – by Truant, by the Editors, but ultimately the reader who was initially warned to steer away from *House of Leaves*. Pages 110-11 exhibit one of a series of diagrammatic texts that immerse the reader in the textual-typographic labyrinth they now explore together with Navidson and his crew as they descend down the "Great Hall" in Exploration #2, described later as having a span approaching one mile and feeling like being "inside of some preternatural hull designed to travel vast seas never before observed in this world" (Danielewski 155) (Figure 8 on p. 211):



incarcerate the Minotaur, a creature born from an illicit encounter between the queen and a bull. As most school children learn, this monster devoured more than a dozen Athenian youths every few years before Theseus eventually slew it.[121]

[121]

At the risk of stating the obvious no woman can mate with a bull and produce a child.

Recognizing this simple scientific fact, I am led to a somewhat interesting suspicion: King Minos did not build the labyrinth to imprison a monster but to conceal a deformed child—his child.

While the Minotaur has often been depicted as a creature with the body of a bull but the torso of a man—centaur like—the myth describes the Minotaur as simply having the head of a bull and the body of a man,[127] or in other words, a man with a deformed face. I believe pride would not allow Minos to accept that the heir to the throne had a horrendous appearance. Consequently, he dissolved the right of ascension by publicly accusing his wife Pasiphaë of fornicating with a male bovine.

Having enough conscience to keep from murdering his own flesh and blood, Minos had a labyrinth constructed, complicated enough to keep his son from ever escaping but without bars to suggest a prison. (It is interesting to note how the myth states most of the Athenian youth "fed" to the Minotaur actually starved to death in the labyrinth, thus indicating their deaths had more to do with the complexity of the maze and less to do with the presumed ferocity of the Minotaur.)

I am convinced Minos' maze really serves as a trope for repression. My published thoughts on this subject (see "Birth Defects in Knossos," Sonny Won't Wait Flyer, Santa Cruz, 1968)[124] inspired the playwright Taggert Chielitz to author a play called *The Minotaur* for The Seattle Repertory Company.[126] As only eight people, including the doorman, got a chance to see the production, I produce here a brief summary:

Chielitz begins his play with Minos entering the labyrinth late one evening to speak to his son. As it turns out, the Minotaur is a gentle and misunderstood creature, while the so-called Athenian youth are convicted criminals who were already sentenced to death back in Greece. Usually King Minos has them secretly executed and then publicly claims their deaths were caused by the terrifying Minotaur thus ensuring that the residents of Knossos will never get too close to the labyrinth. Unfortunately this time, one of the criminals had escaped into the maze,

However, even as Holloway Roberts, Jed Leeder, and Wax Hook make their way further down the stairway in **Exploration #4**, the purpose of that vast place still continues to elude them. Is it merely an aberration of physics? Some kind of warp in space? Or just a topiary labyrinth on a much grander scale? Perhaps it serves a funereal purpose? Conceals a secret? Protects something? Imprisons or hides some kind of monster? Or, for that matter, imprisons or hides an innocent? As the Holloway team soon discovers, answers to these questions are not exactly forthcoming.[129]

encountered Mint (as Chielitz refers to the Minotaur) and nearly murdered him. Had Minos himself not rushed in and killed the criminal, his son would have perished. ¶Suffice it to say Minos is furious. He has caught himself caring for his son and the resulting guilt and sorrow incenses him to no end.¶ As the play progresses, the King slowly sees past his son's deformities, eventually discovering an elegiac spirit, an artistic sentiment and most importantly a visionary understanding of the world. Soon a deep paternal love grows in the King's heart and he begins to conceive of a way to reintroduce the Minotaur back into society.¶ Sadly, the stories the King has spread throughout the world concerning this terrifying beast prove the seeds of tragedy. Soon enough, a bruiser named Theseus arrives. (Chielitz describes him as a drunken, virtually retarded, frat-boy) who without a second thought hacks the Minotaur into little pieces.¶ In one of the play's most moving scenes, King Minos, with tears streaming down his face, publicly commends Theseus' courage. The crowd believes the tears are a sign of gratitude while we the audience understand they are tears of loss. The king's heart breaks, and while he will go on to be an extremely just ruler, it is a justice forever informed by the deepest kind of agony.[128]

Figure 8: Exploration #2 – The Great Hall as epitextual *bauplan* (vertical view)
Source: Danielewski, *House of Leaves* 110-11

This is structuralism at its barest – text conceived as image in its pure conceptual form before it is remediated through semantic associations and language. Visualisation precedes reading as the act of engaging with the book becomes a form of performative hypermimesis in this case, rather than a cognitive one (chap. 4). We are reminded that we are embedded in a simulation in process, not observing it from without or entertaining it within the mind but are now its enactors as we allow ourselves to be modelled (directed) by the architext's properties – and react to them. "If the work demanded by any labyrinth means penetrating or escaping it, the question of process becomes extremely relevant" writes Zampanò, adding that "any way out remains singular and applicable only to those on that path at that particular time. All solutions then are necessarily personal" (Danielewski 115). Equally, Bida (45) notes that Zampanò's "emphasis on process … involves an engagement with learning to navigate and build upon a conceptual space", in this case one defined by the reader's experience of home.

Exploration #4 eventually results in rooms "spawning yet another endless series of empty rooms and passageways, all with walls potentially hiding and thus hinting at a possible exterior, though invariably winding up as just another border to another interior" (Danielewski 119). Gibbons has noted the "extensive and dramatic multimodal[ity]" (*Multimodality* 67) which characterises Exploration #4, its lengthier and diverse material layout placing it apart from Explorations #1 to #3, both in terms of elapsed storyworld time (Navidson and his team's) but also in terms of extradiegetic experience (the reader's). To obtain an idea of the functional representability of space, one which *House of Leaves* simulates for the reader to explore, we can take cue from the following epigraph by Dagobert Frey that prefaces Chapter X ("The Rescue: Part One"):

> Every house is an architecturally structured "path": the specific possibilities of movement and the drives toward movement as one proceeds from the entrance through the sequence of spatial entities have been pre-determined by the architectural structuring of that space and one experiences the space accordingly. But at the same time, in its relation to the surrounding space, it is a "goal", and we either advance towards this goal or depart from it. (qtd. in Danielewski 153)

The architextural configuration of Chapter IX is intended to emulate corridors and passageways through innovative but "labyrinthine configurations" (Gibbons, *Multimodality* 67), with "columns of text forming 'corridors' of words" (67), each

corridor "a cluster, spatially confined by either a border or … white space of page with the typography of [the polyphonic] discourse[s] and the direction of the text making each cluster distinct" (69). But beyond this, there is simulation at work as textual re-alignment predetermines reading pathways. On a visual-semiotic level, the diagrammatic arrangement of text is mimetic, however text on a page is intended to be read, or in this case, engaged with. Chapter IX is therefore less representational and more functional; reading becomes a performative act. Concurrent with Navidson's team's intradiegetic exploration of the labyrinth, we are compelled to perform our own extradiegetic exploration of the material surface by turning the book clockwise and anticlockwise, reading horizontally as well as vertically, and in the case of the infamous footnote 114 – described by Fordham as a "ductnote" (qtd. in Gibbons, *Multimodality* 70) because it "appears to tunnel through the pages" (70) – to attempt mirror reading (Figure 9 on p. 214).

Figure 9: Exploration #4 – Multi-directional textual orientation vs. reader disorientation (mirror page view)
Source: Danielewski, *House of Leaves* 130-31

Narrative in the architext becomes secondary to style and structure, which in turn serve an ergodic function beyond the visual or the analogic. The reader's topographic mapping of the text is directed but also diverted by excessive annotation

which acts both as a referential and trajectorial signpost. Thus one is led to eight-pages of column of text on the right margins, "listing names of architects and patrons of buildings [but] offering little semantic or narrative content" (Gibbons, *Multimodality* 69) or to the near-meaningless footnote 144, essentially "a list of items that do not appear in the dark interior of the Ash Tree Lane house" (70), "a list of 'subtractives' rather than 'additives'" (Fordham qtd. in Gibbons, *Multimodality* 70) but which serves as a 'permeable' link or tunnel from one page to the next. Having been modelled sufficiently by the "ever elusive internal shape of the house" (Danielewski 121) and book, the reader might want to attempt an initial close reading of its repetitive paratext. Gibbons suggests that the reading experience may eventually be abandoned and "treated as a 'dead end'" (*Multimodality* 69) in much the same way Navidson and his team avoid or fail to explore certain corridors or rooms. In either case, whether the shifting typo/topography serves to proliferate an endless hypertext of cross-references or uses such paratext to materially recreate its corridors, walls and enclosures, *House of Leaves* would have served its simulative purpose – that of disorienting the reader/traveller by forcing them to retrace their path and choose new ones.

If Chapter IX is structurally defined by claustrophobia and digression, Chapter X is its converse, with Tom Navidson and Billy Reston, two other members on Will Navidson's team emerging into the Great Hall, a chamber which dwarves the explorers and described as "a centre [of] immense incomprehensible space" having an "impenetrable wall of nothingness" (Danielewski 155). From this point onwards, as the explorers start their descent of what they term the "Spiral Staircase" – a stairway estimated to be "an incredible thirteen miles down" (159) – the text 'behaves' accordingly. If paratext buried the narrative in Chapter IX, with footnotes swarming across entire pages, Chapter X is mostly devoid of annotation and characterised by a noticeable absence of text (apart from Zampanò's narrative thread). This spatial vacuum visibly evolves together with the reading experience demanded; the text initially occupies the upper margins of the page (153-58) but in subsequent pages (159-69) paragraphs are staggered to mimic the slow descent in stages, with periods of time for rest. These moments also coincide with the discovery of trail markers and nylon line left by the previous team led by Holloway Roberts, an experienced explorer who mentally succumbs to the shifting topological phenomena of the house. However, as Navidson comes to realise, the house's interior does not

merely disrupt space, but also time: "Everything here is constantly shifting. It took Holloway, Jed, and Wax almost four days to reach the bottom of the staircase, and yet we made it down in five minutes", he says (Danielewski 164). Time for the descent; time to set camp; time to obtain new bearings; time to push deeper into the labyrinth – the "collapsing, expanding, tilting, closing" (165) mutations of the house are, as Danielewski suggests, idiosyncratically and exhaustingly experienced. And if "architecture comes into being only when experienced" (Norberg-Schulz qtd. in Danielewski 170), the ontological void resulting from limited apperception must also, somehow, be rendered experienceable to the reader. This is achieved through a dilation of the reading experience brought about by textual displacement across entire pages. From single paragraphs typed on single pages which gradually retract into shorter phrases and eventually condense into single words, the process undergoes slight modulations, so that narrative events are prolonged in a reading process intended to capture the same action in slow-motion. Figure 10 on page 217 reads (with segments identified by page number):

> Then just as the strobe captures him lifting the weapon, presumably now aiming at the blinding flash, we hear a series of sharp cracks. Neither Navidson nor Reston have any idea where these sounds are coming from, though gratefully the stills reveal what is happening: all those doors (216) behind (217) the man (218) are slamming shut … (219)

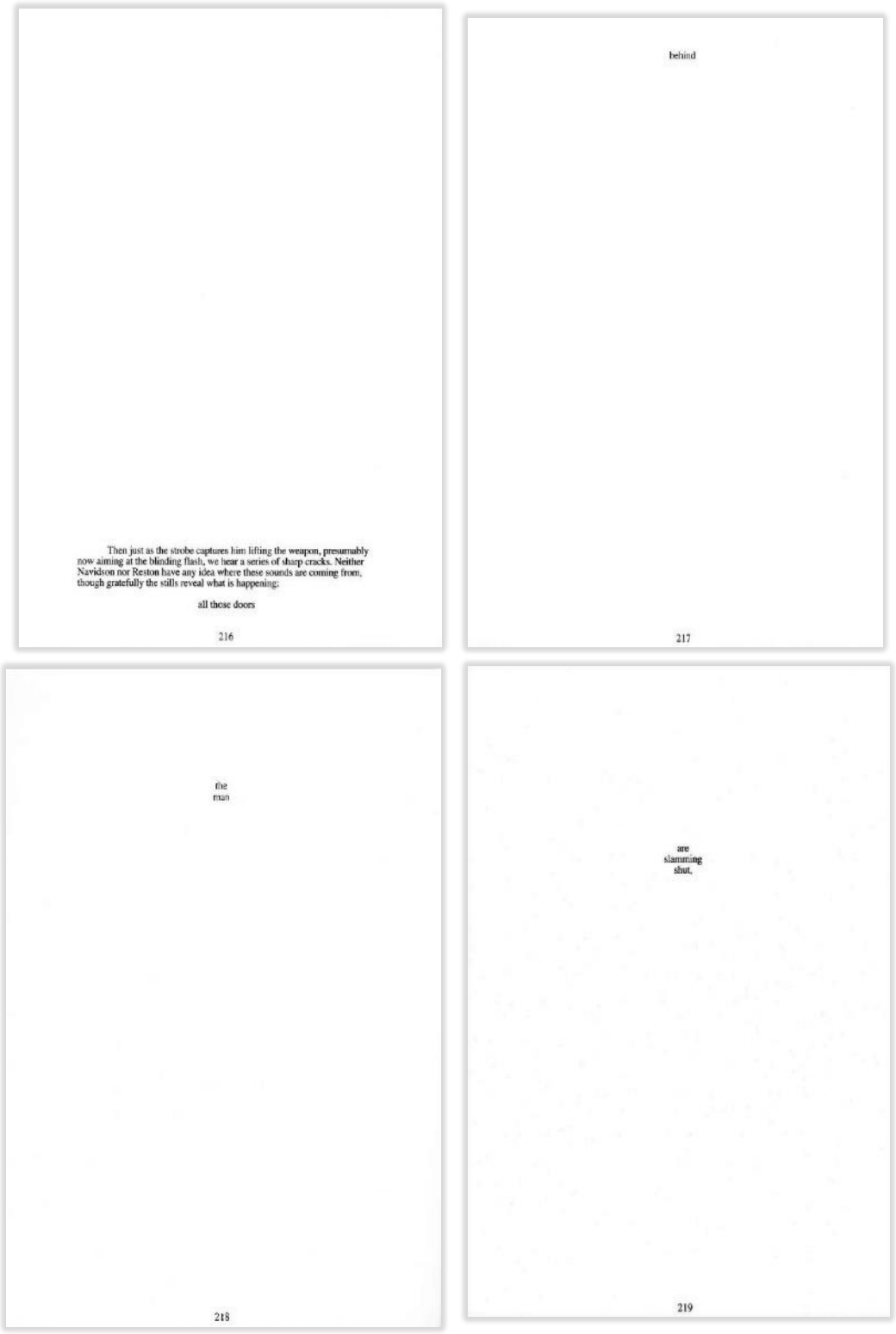


Figure 10: Exploration #4 – Reading time dilation simulated through narrative slow-motion (quadriptych view)
Source: Danielewski, *House of Leaves* 216-19

Thus for instance, the sequence where Holloway surprises Navidson's team and takes aim with his rifle, killing Jed and wounding Wax, is narrated in nothing less than 54

pages (sec. 5.4) while in Chapter XII ("The Rescue: Part Two"), Navidson and Reston's attempt to reach the top of the Spiral Staircase is spread over 32 pages, interrupted by 5 pages of copious paratext by Truant which disrupts narrative diegesis and dilates reading time further. The distension of time and space are accompanied by further physical violations, the most noticeable occurring during Exploration #5 in Chapter XX ("The Return"), coinciding with Navidson's last solo exploration of the house interior.

Multimodal analysis of *House of Leaves* has tended to concentrate attention on this final chapter in Zampanò's narrative due to its high distribution of textual displacement, pervasive diagramming and semiotic modes which include an epigraph in Braille[62] (423), a musical melody (479) and cryptic symbolic patterns (484; 486). Gibbons describes Navidson's ascent up a narrow vertical shaft with protruding black rungs as "synecdochical mapping" (*Multimodality* 71), requiring the reader to visualise the text in segments but also in its figurative totality, a "linguistic configuration [which] in effect, transcends its static manifestation (as words on a page), instilling dynamism and animation into the narrative world" (73) – and, I would add, outside it. In section 2.5 I made the assertion that 'depictions of dynamic action as such … are not simulations; clearly a lot more is demanded of simulation modelling than just a process of visual referentiality'. In the examples of architextural simulation discussed, typographic depiction is not simply mimetic – visual referentiality is necessarily accompanied by, and demands, a performative act, and while this act certainly does not assume the reader to physically ascend ladders or wind their way around narrow, windowless corridors of stone to reenact the narrative, typographic experimentation nonetheless renders the reading act a highly ergodic, and therefore, dynamic one. Writes Gibbons: "These 'stairs' push the eyes' path upward, step by step, toward the rungs of the ladder where the unconventional rising of textual fragments makes for a somewhat uncomfortable and awkward reading process" (*Multimodality* 73). Similarly, Hayles has drawn attention to *House of Leaves* as a "technotext", "display[ing] [its] heightened sense of … materiality by

[62] The anonymous Editors supply a transcription of the epigraph, which is ironically unreadable both to its target audience and the model reader. Braille requires perforated and raised print, not dots typed on a flat surface, while the model reader who is assumed to be non-visually impaired would not have had the necessity to learn Braille and thus cannot read the passage without help. The playtext reminds us of the redoubling, effacing, ludic nature of the architext: "The walls are endlessly bare. Nothing hangs on them, nothing defines them. They are without texture. Even to the keenest eye or most sentient fingertip, they remain unreadable. You will never find a mark there. No trace survives. The walls obliterate everything … Behold the perfect pantheon of absence" (Danielewski 423).

foreground[ing] the inscription technologies that produce[d] [it]" ("Saving the Subject" 794). Again, as in the heightening of a secondary reality discussed in chapters 3 and 4, this heightened materiality can be considered in terms of hypermimetic – or simulational – strategies, consciously deployed by Danielewski to subject the reader to the ontological cut, from "*looking through a page* (when we are immersed in a fictional world and so are scarcely conscious of the page as a material object) and *looking at the page*" (Lanham qtd. in Hayles, "Saving the Subject" 794). Hayles gives the example of the rope pulling the gurney in Chapter X as stretching and eventually snapping when the stairway inexplicably starts to expand; at this point, "the text also stretches, taking three pages to inscribe the word 'snaps'" (796). Similarly, in Chapter XX, as Navidson's body squeezes into tighter passages, the body of the text mimics this effort, typographically becoming more compressed, with words breaking down to form clusters of letters.

In a conversation with Danielewski, Hayles had suggested that "the topography in this chapter is mimetic" ("Saving the Subject" 796). Unquestionably of course, but not just. It is mimetic to the point of being simulationist since it generates the conditions and the process with/in which it is to be read. Hayles writes:

> While not denying [mimeticism] Danielewski pointed out a subtler correspondence between reading speed and the emotional pacing of the narrative. Drawing an analogy with filmmaking techniques that correlate the intensity of the scene with how much the viewer's eye has to move across the screen, he suggested that the typography creates a similar correspondence between how much time it takes to read a page and the represented action. (796)

Since *House of Leaves* is foremost an architext, it "accentuates the reader's involvement in [textual world] creation" (Gibbons, *Multimodality* 78), rendered possible only when some form of embodiment or "corporeal resonance" (81) with the book's characters and the book's topography itself is achieved. Thus, unlike Alber's conclusion that the novel can be read allegorically ("Antimimetic Spaces" 189) – and I do not dispute this – the novel extends beyond the level of narrative (at which allegory is seen to operate) to model processes which are predominantly actual, not figurative. In turn, from the reader's material engagement with the architext, "meaning arises from creating or simulating the perception/action situation described by sentences" (Glenberg et al. qtd. in Gibbons, *Multimodality* 76).

5.4 Summary

Having discussed how narratives are built as system models with properties and behaviours which are cognitively simulated by the reader (chapters 3 and 4), this chapter directed attention to the text as a material object (the book as multi/modal interface) capable of more immediate functional simulation, interpellating and engaging the reader to play a more pronounced user/participant role in its world-building processes. This conceptual shift, from text to architext and reader to user, emerges from the multimodal possibilities of print literature and how it has been subject to inscriptional and typographic ludism since at least the eighteenth century, eventually coming into its own in the 1960s with experiments in procedural or constrained writing by the French OuLiPo group. Prominent OuLiPans such as Perec and Queneau incorporated mathematical theorems and combinatorics in their work, opening bare the possibility of multiple narrative paths nested within the same work; this innovation however simultaneously placed considerable demands on the reader and their involvement as puzzle-lover (Perec). Similarly, Eco believed that all works construct their own model reader, one who would be complicit in the author's game; however, in the case of playtexts (Motte) or architexts (Caws; Mitchell) – texts of an intrinsically ludic, metafictional and constructed nature – I have suggested that the reader is also *modelled* by the playtext when the reader's expectations of the conventional are subverted or frustrated completely by peculiar narrative design. Such texts disrupt hermeneutics together with reader immersion, compelling the reader/user to treat them as a material artefact complete with their own physical and spatial reality, and one which must be actively engaged with before some sensible narrative may be recuperated.

Playtexts or text-as-games (Ryan) disrupt direct referential relations by generating multiple reading pathways and semiotic linking typical of web-based hyperlinked media. This allows us to consider such texts as being sufficient to permit some form of individualised narrative choice associated with digitally-interactive and evolving narrative simulations. Furthermore, the merging of multiple modes of representation, from experimentation with graphical layouts to material inserts, within the same print-based medium allows us to consider multimodal works as non-digital literary surrogates for keyboard, mouse and computer screen interfaces. By extension, reading becomes a performative act across a haptic surface (Ingwersen) or an ergodic process (Aarseth) requiring extranoematic exploration and/or re-

construction of the text when it is presented to us in the form of a puzzle (Perec), a narrative model kit (Gibbons) or a multidiegetic, multi-storied edifice of a book, as in Danielewski's *House of Leaves*.

Beyond narrative design, simulation processes can also create and drive specific reading-production conditions in architexts which have been deliberately constructed to replicate an intrinsic hermeneutic and ontological 'problem' at their structure – the problem of arriving at some definite meaning or significance. This problem is *material*ised by the topographical oddities and multiple configurations of the material text. Novels such as *House of Leaves* are a step ahead of mimesis in that they generically validate this problem at the heart of their narratives by modelling it *as part* of their structure, inseparable to it, the text as architext. To this extent, the reading process can be considered to be totally directed by the ontic problems of the text.

Conclusion

Towards a Poetics of Narrative Simulation

Despite being burdened by more traditional pejorative associations, the term 'simulation' today has moved beyond the idea of imposturing or deceit, or the making of copies, to earn its reputable status in the sciences as a valid model-making episteme. An understanding of such a shift in concept is possible when we untether it from a semantics of ambiguous ambivalence, through which, verbs such as 'to simulate' or concepts like 'simulation' continue to exist side-by-side as synonyms for deceitful-pretense and truth-testing. Clearly, however, one is not conducive to the other, even if simulation requires *both* source and model and is a process that connects both rather than a final product. I perceive this to be the crucial juncture where theorists have parted ways in their discussion of simulation – the validity of the simulation in relation to its source. From models-as-fake-copies to models-as-real-copies and from scientific method to cultural critique, the authenticity/inauthenticity binary remains the frequently traipsed frontier where the discourse around simulation keeps changing.

Liberating simulation from a pejorative semantics extends the possibilities of simulation studies. In this study, I have therefore attempted to move beyond aesthetically misleading terms to focus on simulation's capacity for construction, implicit in terms associated with mimesis such as 'imitation', 'pretense' or 'make-believe'. That more complex simulations are generative systems rather than replicative ones is a point often missed by those who would consider simulations purely imitative systems, denying them an openness and freedom associated with autonomous agents. It is also tautological that simulations become redundant when their outcome is predictable.

Jean Baudrillard, whose concept of simulation is one tied to the generation of simulacral images and events that precede and efface the real, was also of the understanding that simulation is a generative, albeit dangerous, activity: "Someone who feigns an illness can simply go to bed and make believe he is ill. Someone who simulates an illness produces in himself some of the symptoms" (5). My argument is however not ontological and more aligned with Stephen Halliwell's observation that there are "varieties of mimetic theory and attitude" which are attached to a "'world-

reflecting' model … and, on the other side, a 'world-simulating' or 'world-creating' conception" (23). Effective simulation – especially the one I see operating within narrative world-systems and their construction – is one which uses the modelling paradigms of the former to actualise the latter. The modelling of simulations is therefore a mimetic and *poietic* (from Aristotle's *poiēsis*, a purposeful bringing-into-being or production) process.

An investigation into the nature of simulations reveals them to be dynamic and evolving systems with self-validating, self-consistent structures, allowing the user a degree of intervention. Simulation models are more than analogies of their source system – the figure of speech is both imprecise and undesirable, especially in my claim that a number of literary narratives evince simulational qualities which are *actual not figurative*. Simulations are functional surrogate systems from which behaviours tend to emerge. This is the crucial dichotomy between models which simulate behaviour or some form of action and others which only semiotically represent their referent, represented as a sign-equivalent. It is also a dichotomy which has served as a contextual framework when I sought to investigate ways how simulation modelling can be applied to narrative theory, and more specifically within a domain previously unaffiliated to it, that of non-interactive, non-digital literature – conceptually not entertainable as a medium inviting direct participation or engagement with its system. A taxonomy of features for functional and semiotic simulation are therefore presented in Table 2 below as a synthesis of the conceptual arguments made in this study:

Functional Simulation	Semiotic Simulation
Simulation modelling	Simulacral
Representation as	Representation of
Process-driven	Image or product-based
Constructive and poietic	Replicative or imitative
Mimesis used as a means	Mimesis used as an end
Open and developing	Closed and prescriptive
Mandates active reader participation	Encourages passive reader participation
Authenticates/tests (limits of) the real	Delegitimises/queries the real

Table 2: A taxonomy of narrative simulation as functional simulation

Narrative simulation assumes a source reality for its modelling, as well as implicit rules which determine reception success, or otherwise. Fludernik has made a case for narrative mimesis, one which

> evokes a world, whether that world is identical to the interlocutors' shared environment, to a historical reality or to an invented fictional fantasy. And in so far as all reading is interpreting along the lines of a represented world, it necessarily relies on the parameters and frames of real-world experience and their underlying cognitive understandings. (*'Natural' Narratology* 27)

This study (temporarily) concludes by suggesting a framework for an emerging poietics of narrative simulation, one which integrates possible worlds theory, modelling theory, cognitive simulation theory and multimodal experimentation. A number of formal properties of narrative simulation, certainly not final nor exhaustive, but ones explored within the scope of this dissertation are summarised in five, successive moves:

1. Simulation-as-narrative is a form of modelling of behaviours within the textual world but also with a high capacity for, and dependence on, reader affect. It is therefore reader-centric, with the reader enacting or cognitively modelling such narratives through the act of reading (or *mental re-writing* of the text);

2. Narrative simulation is a pragmatic and interpretive act which draws on various levels of reader cognitive states, engagement and experientiality, as the reader inter-mediates between source and target worlds and actual and possible events;

3. Because simulation naturally privileges process over product, interactivity over passivity, openness over closure and the writeable versus the written, only narratives which embody a number of these features can be considered simulative, and then again, to various extents;

4. Ergodic strategies generate new and divergent readings made possible through revisitation of simulation narratives. The act of reading becomes a performative act in the simulation process – the reader is modelled/introduced into the system as a necessary constituent. Texts which require narrative revisitation – an extradiegetic loop where the reader is forced to emerge from and be re-immersed in the narrative to evaluate its semiotic structures – provide a level of open-endedness and emergent possibilities that are typical of more complex simulations; and

5. Narrative simulation moves along a *mimetic continuum* from the mimetic to the "synthetic" (Phelan's term) (2-3) and finally hypermimetic re-presentation (or simulation). Hypermimesis – functional representation beyond the semiotic and associated with a heightening of a second reality – is necessary in textual narratives which place considerably more demands on the reader to obtain full immersion and credibility of the fictional storyworld, or the reification of an experience, as is typically expected of interactive, audio-visual media.

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