GENIUS, WOMANHOOD AND THE STATISTICAL IMAGINARY: 1890s HEREDITY THEORY IN THE BRITISH SOCIAL NOVEL

by

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Abstract

The central argument of this thesis is that several tropes or motifs exist in social novels of the 1890s which connect them with each other in a genre, and which indicate a significant literary preoccupation with contemporary heredity theory. These tropes include sibling and twin comparison stories, the woman musician's conflict between professionalism and domesticity, and speculation about biparental inheritance. The particulars of heredity theory with which these novels engage are consistent with the writings of Francis Galton, specifically on hereditary genius and regression theory, sibling and twin biometry, and theoretical population studies.

Concurrent with the curiosity of novelists about science, was the anxiety of scientists about discursive linguistic sharing. In the thesis, I illuminate moments when science writers (Galton, August Weismann, William Bates, and Karl Pearson) acknowledged the literary process and the reading audience. I have structured the thesis around the chronological appearance of heredity themes in 1890s social novels, because I am arguing for the existence of a broader cultural curiosity about heredity themes, irrespective of authors' primary engagement with scientific texts.

Finally, I introduce the statistical imaginary as a framework for understanding human difference through populations and time, as evidenced by the construction of theoretical population samples – communities, crowds, and peer groups – in 1890s social fictions.

Preface

This thesis is original, unpublished, independent work by the author, Zoe Gray Beavis, under the committee supervision of Dr. Suzy Anger and Dr. Deanna Kreisel.

No part of this thesis has been published elsewhere.

No ethics approval was required for the research of this thesis.

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Chapter One: On the Eve of the Century of the Gene: Influential Figures in 1890s Heredity Theory

Introduction

In the 1890s human heredity science underwent developments in method, theory, and practice. Scientists such as Francis Galton (1822-1911), August Weismann (1834-1914), William Bateson (1861-1926), Karl Pearson (1857-1936), and others refined Darwinian understandings of how human traits, behaviours and potential for biological and social success were transmitted across generations, and distributed in family and population samples. At the end of the nineteenth century three broad methodological trends dominated heredity science: studies of non-human species applied to human-specific theory; large-scale human data collection categorised by morally- and aesthetically-charged typologies (anthropometry); and increasingly complex statistical modeling (biometry). Speculation about human heredity was not, however, restricted to scientific discourse. As Gregory Radick writes,

> Beyond the medical scientific literature, the topic [of heredity] became an object of public fascination, with a particular surge of interest in the 1890s. Of the hundred plus entries cataloged under "heredity" in the SciPer index (http://www.sciper.org) covering science content within general British periodicals in the nineteenth century, more than half come from the final decade. (717)

Reading key scientific texts alongside contemporary British social novels exhibits that specific refinements made to heredity theory emerge in *fin de siècle* fiction as well. In my readings of 1890s British novels, I demonstrate that the implications of this scientific work, which sought to explain and also predict heredity across generations, manifested in fictional

tropes: in plots emphasising chance, genius, and duty in marital, vocational and medical choices for individual characters. In this thesis I trace in popular fiction literary expressions of late-nineteenth-century refinements in models of heredity and related statistical techniques, linking fictional representations of social and psychological allegories to ideas in contemporary heredity science.

The novels I have chosen (popular works by Grant Allen, Mona Caird, George Gissing, Sarah Grand, and Olive Schreiner) collectively exhibit a conception of and curiosity about hereditary processes and probability-based ideations of inheriting social, medical, and personal traits, unique to 1890s discourse. Taking into consideration literary references to heredity theories and debates specific to the decade, I demonstrate how authorial engagement with these theories manifested in didactic narratives about the duties of genius, reproductive responsibility, and complex character typographies directed by the increasingly biometric focus which human evolutionary theory took toward the end of the nineteenth century. Finally, I argue that the social fictions of this last decade before "the century of the gene" (as Evelyn Fox Keller has termed the 20th Century), engaged as they were in questions of generational heredity, sibling biometry and rational reproduction, exhibit familiarity with the terms and concepts employed in contemporary biological heredity debates, and occasionally an antagonism towards these concepts' implications (for example, biological determinism and sexual essentialism) for the future of the human species.

My research acknowledges three well-established cultural responses to innovations in heredity theory in the 1890s, which recent criticism already explores in depth: eugenics; "The Woman Question"; and degeneration theory. I both build upon and diverge from that criticism, in my emphasis on a close examination of new heredity theories. My approach

concentrates on the overlap between these debates, evidenced by the fictional moralising of biological heredity, and the appropriation of scientific terminology to non-scientific purpose.

Angelique Richardson, George Levine, Peter Morton and others have influenced my research by making critical connections between late Victorian biology theories and literatures. Gillian Beer's and George Levine's work provides a useful methodological starting point for my research as they read Darwinian ideas in relation to Victorian literary texts. These scholars attend to the rich semantic crossover between scientific and literary language, and the role of metaphor and analogy in creating and interpreting human evolutionary narratives which explore the agency of the biological self. I am interested in the semantic anxiety of Francis Galton and Karl Pearson that scientific terminology was attracting broader connotations than the original context intended. I examine how, in the 1890s, the language and ideas of heredity influenced the representation of developmental agency and generational stasis and change in fictional characters, and how these ideas are used in procreation narratives of chance and duty.

In *Open Fields* Beer argues that linguistic history "provided a model" for mechanisms of inheritance under debate earlier in the nineteenth century, such that the demonstration of phonetic laws made conceivable newer enquiries into biological filiation (109). This reimagination of hereditary "chance" into "as yet unknown laws" is an example of how the abstraction of semantic nuance from one discourse (history of linguistic evolution) to another (history of biological evolution) is an effective stimulant for theoretical innovation. Beer models a useful instance of reading theoretical influence across discourses on the threshold of the evolution paradigm shift, which informs my reading of heredity theory on the threshold of the genetics paradigm shift forty years later.

Levine's identification of the discursive appropriation of scientifically-charged concepts into social literary narratives in *Darwin and the Novelists: Patterns of Science in Victorian Fiction* has been another useful model for my research. I am intrigued by Levine's study of which semantic implications stick and which are cast off in the importation of scientific metaphor into Victorian novels. The marriage plot, tirelessly recapitulated across decades and integral to social novels of the 1890s, is an example I examine closely. The marriage plot explicates a nuanced reproductive morality implicit in contemporary studies of heredity. Galton's sustained, complex collection of family tree data, combined with his eugenics theory, stimulated literary explorations of the social mechanics of responsible reproduction, especially for women characters coming of age. But also of interest is how the moral semantics of scientific terminology (such as "average", "inheritance" or "cause") became amplified by the process of literary exploration by writers who were not scientifically educated. I look to Levine's model for examining cultural dissemination of scientific ideas irrespective of individual authors' familiarity with particular scientific texts.

For a history of science perspective I look to Evelyn Fox Keller's discussion of how interdisciplinary analogies effectively invite discursive conceptual overlap, i.e., how employing mathematical modeling techniques to explain biological phenomena necessarily confuses boundaries between the mathematical and the biological to the extent that human heredity becomes imagined as calculable. In 1890s biology, a fruitful overlap existed between measuring human populations and measuring hereditary traits. In *Making Sense of Life: Explaining Biological Development with Models, Metaphors and Machines*, Keller assesses the theoretical implications of the mathematisation of biological investigation in the twentieth century. I am inspired to apply her assessment framework to statistical analogies

(such as "laws" of heredity) in the decade prior to those she examines. These analogies imply a formulaic predictability of hereditary phenomena which was then exported into fictional contexts: character-formation, contingency, even career choice, are attributed to the odds of heredity. Identity, as Galton's *Hereditary Genius* (republished 1892) reminds the Victorians, is inherited, and the control families exert over individuals is as much biological as it is social.

In this first chapter, I describe the climate of scientific inquiry into human heredity in the 1890s: the advances on earlier Darwinian and Lamarckian mechanistic ideas, the employment of animal (and plant) case studies and human genealogical mapping, and the inexorable methodological gravity of biostatistics. This provides a context for my explanation of some common literary motifs (such as genius, responsible reproduction, and sibling/twin studies) in 1890s British social novels in terms of contemporary human heredity science.

Francis Galton

Much scholarship has addressed the reception and deployment of Malthusian (for example, the struggle for resources), Darwinian (fitness, sexual selection), Spencerian (survival of the fittest), and Lamarckian (heredity of acquired characteristics) ideas and language in discourses ranging from biology to the arts. Francis Galton's eugenics has attracted critical attention (from Angelique Richardson, among others) for its uptake into racial, medical and other political discourses. Considering Galton's ubiquity and celebrity status in the nineteenth-century scientific establishment, there is not enough critical attention to his other writings and their ideational influence upon other literatures.

Published in 1889, Galton's *Natural Inheritance* introduced biometrics into heredity

science. These case studies showed his system of seeking, documenting, and ordering human biological data for the purpose of measuring "the inheritance of moderately exceptional qualities in brotherhoods and multitudes" (1). He imagined human traits from feebleness to exceptionality on a mathematically-measurable scale; exceptionality in any human quality (eye colour, stature, artistic ability) was mapped in proximity to a statistically-derived average. This systematic scaling of traits, behaviours and potentials was, to Galton, not only a methodological advancement in heredity science but a whole philosophical framework. Galton enthuses on "The Charms of Statistics":

> An Average is but a solitary fact, whereas if a single other fact be added to it, an entire Normal Scheme[1], which nearly corresponds to the observed one[2], starts potentially into existence. Some people hate the very name of statistics, but I find them full of beauty and interest. Whenever they are not brutalised, but delicately handled by the higher methods, and are warily interpreted, their power of dealing with complicated phenomena is extraordinary.[3] They are the only tools by which an opening can be cut through the thicket of difficulties that bars the path of those who pursue the Science of man. (62-3)

This passage shows not only Galton's statistical enthrallment, but also his broad, frequent use of metaphor. He reimagines statistics as a rugged and adventurous savior, "pathbreaking" (as Stigler writes) through a particularly homogenous wild space ("thicket") representing the state of biology theory (Stigler 330). Galton believed in the illuminating applications of statistics beyond heredity science to criminology, anthropometry, and climatology. Michael

[1] Normal or "Gaussian" distribution refers to the bell curve vision of fitting data into a shape which peaks in the centre (where the average lies) and tapers at each extreme.
[2] By "the observed scheme" Galton refers to the data before it is subject to statistical analysis.
[3] As Stephen M. Stigler writes, "Throughout most of the [nineteenth] century it was assumed that observations of a single phenomenon, homogenous with respect to all but random, individually insignificant factors, would follow the normal curve. Indeed … others took the appearance of that curve as a validation of those hypotheses" (330). Stigler credits Galton with challenging and refining this grand normal assumption by "separate[ing] … normal worlds into separate normal colonies on the basis of correlated measurements" (330).

Bulmer's description of Galton as "an archetypal romantic, an innovator with the gift of seeing problems in statistical terms, but lacking the mathematical ability and the inclination to push his ideas to their logical conclusion" is what makes him a large figure in my literary study (xvi). His ideas were haphazardly conceived and, as Bulmer suggests, begged for refinement by other minds (e.g. Karl Pearson), but his visionary and domineering presence in multiple scientific discourses ensured that his ideas crossed discursive borders and inspired cross-disciplinary engagement with statistics.

As I will discuss in chapter two, Galton's theory of the heredity of genius was eagerly adopted in literary discourse. In 1892 Galton republished *Hereditary Genius* (1862) with a revised introduction, signaling changes in heredity theory over the latter half of the century. That such a dated text was republished at all suggests that it was still scientifically relevant, and since explanations for mechanisms of heredity had progressed (beyond both Darwinian and Galtonian theories), this relevance must be its preliminary attempts to establish a statistical methodology for heredity studies (later realised in *Natural Inheritance*). In *The Dial*, Frederick Starr praises Galton's mathematical approach: "Galton is … a statistician. He reduces his results, wherever practicable, to mathematical form and statement" (13).

Hereditary Genius is valuable for its frank awareness of and anxiety about the conditions of cross-disciplinary employment of technical terminology. Galton worried:

> I chiefly regret the choice of its title of *Hereditary Genius* … There was not the slightest intention on my part to use the word genius in any technical sense … If it could be altered now, it would appear as *Hereditary Ability*. (ix) [4]

[4] As *The British Journal of Psychiatry* (39:412-414, 1893) points out in a review of this second edition, "At present, it is not possible to give a sound scientific definition of genius… It is among the services rendered by Mr. Galton's book that is has largely helped to clear the field, and to render possible the precise psychological study of 'genius in the technical sense'" (414) This review speaks to the perceived "confusion of ideas", against

Galton was right to be concerned about metaphorical transfer: a biologised Galtonian concept of genius attracted intense moral scrutiny, especially when applied to middle class women (rather than Galton's initial focus, Great British Men) in social novels. Galton's authorial anxiety is also traceable in *Natural Inheritance*: "I have a great subject to write upon, but feel keenly my literary incapacity to make it easily intelligible without sacrificing accuracy and thoroughness" (3). He was conscious of his position as popular bestselling author and scientific authority because by the 1890s his science writing had a broad audience. And he was conscious of semantic discontinuity between observed hereditary phenomena (by scientists and novelists alike) and the "accuracy" of descriptive efforts (ranging from metaphors to neologisms).

Another Galtonian concept of importance to 1890s social fiction is regression theory. As I argue in chapter three, careful observation of which parent contributes what qualities to their offspring is central to examinations of reproductive probability in the novels under consideration. When examining variable heredity of human stature in *Natural Inheritance*, Galton affirms that "the stature of the adult offspring must on the whole be more *mediocre* than the stature of their parents; … more near to the M[edian] of the general population" (95).[5] Notwithstanding the semantic challenge of considering the word "mediocre" without

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which Galton defends himself, as a matter of disciplinary territoriality; psychology and biology both here vying for authority in defining this term. Genius in popular discourse became a sort of ability which is loaded with a sense of rarity.

[5] Filial regression exemplifies Galton's laissez-faire attitude towards mathematical precision, as he appears supremely unconcerned about the accuracy of his formula: "I call this ratio of 2 to 3 the ratio of 'filial regression'. It is the proportion in which the Son is, on the average, less exceptional than his Mid-Parent. My first estimate of the average proportion between the Mid-Filial and the Mid Parental deviations was made from a study of the MS chart, and I then reckoned it as 3 to 5. The value afterwards was substituted, because the data seemed to admit of that interpretation also, in which case the fraction of two-thirds was preferable as being the more simple expression. …This value of two-thirds will therefore be accepted as the amount of Regression, on the average of many cases, from the Mid-Parental to the Mid-Filial stature" (97-8). Galton first used the term "mid-parent" in 1885, in *Reports of the British Association for the Advancement of Science*, however he neatly defines the term in *Natural Inheritance* (1889): "The word 'Mid-Parent'… expresses an ideal person of

admitting its second-rate connotations, for a popular audience, the greater implications of this theory can be imagined bleakly: the inexorable rarefication of human uniqueness over time. Galton writes explicitly about filial regression's effect on human statures, which "gradually become more mediocre in the successive stages of kinship until they all reach absolute mediocrity" [and humans become all the same height!] (114). The relationship between mediocrity and exceptionality is reimagined in fiction as women characters of exceptional talent fulfill their artistic abilities, but produce offspring showing fewer or no signs of exceptionality. Predicting filial regression thus becomes a complex experiment in responsibly balancing career and family according to late Victorian artistic and hereditary ideals.

Galton's genealogical studies of sibling and twin phenotypic polymorphism[6] had a profound conceptual influence on late-century novels comparing generations, siblings, and twins. In chapter four, I examine how authors invoked sibling biometry to explore differing fates of sisters, and the sexual politics of raising male/female twins (in Sarah Grand's *The Heavenly Twins*). In 1875 Galton provided a precedent for "the long and contentious use of twins to test the relative strength of heredity and environment" and in 1883 Galton erased a border initially drawn (in earlier twin writings) pre- and post-birth between heredity and environment by clarifying that "nurture acts before birth, during every stage of embryonic and pre-embryonic existence, causing the potential faculties at the time of birth to be in some degree the effect of nurture" (Burbridge, Galton quoted in Burbridge 331).[7] We can read this more widely-received idea about environmental influence in descriptions of pregnancy and

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composite sex, whose Stature is half way between the Stature of the father and the transmuted Stature of the Mother." (Oxford English Dictionary, np.)

[6] That is, the way that twins can share a phenotype (physical/psychological traits of an organism) and yet display such difference.

[7] I cannot find evidence that Galton's earlier neat conceptual alignment of "nature" with prenatal circumstances and "nurture" with antenatal circumstances was widely shared.

maternal fitness in 1890s social novels (for example, in George Gissing's *The Whirlpool*, Mona Caird's *The Daughters of Danaus* and Grant Allen's *The Woman Who Did)*. We can also read Galton's faith in the illuminative qualities of sibling and twin studies upon hereditary phenomena in novels where siblings differ from each other and from the previous generation in morals, abilities, and fates.

August Weismann

In August Weismann's *Essays upon Heredity and Kindred Biological Problems* (1889), the editor's preface appeals to the recent explosion of "very general" and "deep interest" in heredity science and the "very foundations of evolution" to justify publication of essays collected from English scientific periodicals dating from the early 1880s (vii). This speculation paid off, as the preface to the second edition (1891) affirms: "It has been a great satisfaction to find that such widespread interest has been excited by the essays which are now reprinted" (ix).

Weismann's most profound contribution to heredity science and, by extension, cultural discourse was the "doctrine of germinal continuity" by means of the "germ-plasm" (Brooks 121). Effectively outdating Larmackian ideas of inheriting acquired traits, Wiesmann theorised that originary traits were conveyed unadulterated across generations in the "germ-plasm" (like a genotype before genes were widely known), that variation is a result of the combination of parent germs in sexual reproduction, and that ancient traits could be sequestered in the "germ-plasm" to appear in younger generations.[8] In 1896 when his address

[8] Weismann's "germ-plasm" mechanism of inheritance surpassed Galton's "stirp" mechanism because it allowed for continuous variation across generations. Although the word "stirp" had been used to mean pedigree or lineage since the early 1500s, Galton appropriated this term in 1875 "to express the sum-total of the germs, gemmules, or whatever they may be called, which are to be found … in the newly fertilised ovum—that is, in the earliest pre-embryonic stage—from which time it receives nothing further from its parents, not even from its mother, than mere nutriment... This word 'stirp'.is equally applicable to the contents of buds" (OED, online,

"On Germinal Selection as a Source of Definite Selection" of the previous year was published in *The Monist,* Weismann underscored the heredity-specific application of his germ-plasm theory: "it was never intended as a theory of life, nor, indeed, primarily, a theory of evolution, but first, and above all, as a theory of heredity" (9).[9] He also advocated distinction between heredity, evolution, and morphogenesis[10], proposing theoretical separation of these three fields in order to advance knowledge: "The riddles of heredity are not concealed in the ontogenesis of types[11], or … in the developmental history of man … but in the ontogenesis of *individuals*, in that of a *definite* and *particular* man" (8). Weismann's exasperated prose in the Preface responded to widespread scientific and cultural conflation of heredity, evolution, and morphogenesis. He attempts to reconcile the theory of continuously-selected hereditary variation with competitive theories of "accidental" (mutational) variation: "Though still assuming that primary variations are "accidental", I yet hope to have demonstrated that an interior mechanism exists which compels them to go on increasing in a definite direction, the moment selection intervenes"(3). By this "interior mechanism", he

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np). "Stirp" only allowed for individual mutational variation, called "saltation theory" or "discontinuous inheritance").

[9] In an article for *The Contemporary Review* (Vol 57, May 1890, pp. 686-699), George Romanes compares Weismann's theory of "germ-plasm" with Darwin's theory of "pangenesis", and extrapolates broad claims from Weismann: "In the case of gemmation, when a protozoon parts with a small portion of its living material in the form of a bud, this portion does not die, but develops into a new individual … *Now if life be thus immortal* in the case of unicellular organisms, why should it have ceased to be so in the case of multicellular organisms? Weismann's answer is … sexual fertilisation, where the condition to a new organism arising is that minute and specialised portions of two parent organisms should fuse together" (Romanes 689) [Italics mine]. By putting Weismann's theory of inheritance in conversation with Darwin's theory of evolution, Romanes is creating the circumstances under which Weismann's inheritance theory might become popularly received as a broader "theory of life".

[10] Morphogenesis is the "origination and development" of "the form of living organisms and their parts, and the relationships between their structures" ("morphogenesis" and "morphology" OED, online, np). This term was appropriated by biology from geology in the mid to late nineteenth century.

[11] Weismann here uses "ontogenesis" generally to mean development from embryo to maturity, and clarifies that this can only be observed and studied on an organism-by-organism basis, rather than a population-wide basis. The phrase "ontogeny recapitulates phylogeny" (recapitulation theory, that is, the embryonic development of the individual mirrors the evolutionary development of the species) was coined by Enrst Haekel (1834-1919) in 1866, but by the 1890s this theory was under much suspicion ("Recapitulation", Benson, *Encyclopedia of Evolution,* (ed. Mark Pagel), online np).

refers to the "germ-plasm"; when the mutated trait is naturally selected, he argues, the "germ-plasm" ensures its iteration in future generations.

His rhetorical approach to this conciliatory project is to advocate for the role of "the scientific import of imagination" and the "significance of theory" rather than statistical calculations in biological theory:

> Owing to the greater complexity of the phenomena in biology we can never hope to reach the same distinctness in our constructs and models as in physics, and the attempt to derive from them mathematical formulae … would be utterly fruitless. In the meantime it seems preferable to have some sort of adequate model to which the imagination can always resort and with which it can easily operate. (5, 7)[12]

This appeal to metaphorical "models" is evident in contemporary fictions: hereditary continuity across multiple generations allowed for character studies in which children recapitulate ancestral features, talents and even actions. "Accidental" characteristics (mutations) might be selected for in future generations, appearing as plot tensions between vocational and sexual decisions for genius characters. Further, for socially-minded novelists, the conflict between statistical models ("mathematical formulae") and metaphors (Weismann's "imaginative model", echoed by Galton in the preface to *Hereditary Genius*) was a stimulus to narrative engagement with heredity science: if both mathematical and scientific languages were struggling to articulate hereditary phenomena, could not literary language make an attempt?

Weismann's scientific methodology, widely shared by heredity studies scholars

[12] Galton and Weismann both appeal to metaphor as a scientific tool, but for different reasons. In contrast to Weismann, Galton frequently resorted to imaginative "models" in his writings, as J.S. Wilkie notes, in his very attempt to *avoid* theory (195). Staffan Müller-Wille & Hans-Jörg Rheinberger discuss Galton's varying rhetorical success with such metaphors as "the heredity process as a post office" and as a "democratic population" (9).

(including Galton), of extrapolating heredity laws from case studies of diverse animal and plant species lent a universality to the imagined mechanisms and probabilities of human heredity.[13] As Martin Danahay writes, the holistic application of heredity theory to humans and non-humans was morally and politically charged:

> The term "animal" in the 1890s and into the early twentieth century … became the site of a contest between those who would simply and directly apply a model of animal breeding to humans, and those… who questioned the terms and procedures of this form of "artificial selection." (469)

Danahay refers to eugenics in H.G. Wells' *The Island of Dr Moreau,* but I see evidence in social fictions of the 1890s of serious reflection on human/animal parallels in social behavioural patterns and individual organismic development, and on the universality of rites of passage or mores hitherto considered strictly human. Although human exceptionality has a thematic history post-Darwin, literary connections between heredity and challenges to human exceptionality were particularly ubiquitous in the 1890s. For instance, in Schreiner's *From Man to Man,* characters make morally reflective connections between animal and plant lifecycles and behaviours, and human experience in rural and suburban settings.

William Bateson

Bateson has not featured greatly in late nineteenth century history of biology. Despite his large and fractious personality, eminence in British institutions such as the Royal Society, and strong professional alliance with Galton, his contributions to heredity or evolutionary theory were a series of "near misses" as his biographers admit, "rightly soon forgotten"

[13] He famously cut off the tails of sixty-eight mice over five generations to disprove Lamarckian inheritance of acquired characteristics

(Cock and Forsdyke xviii).[14] While Bateson is credited with inventing the term "genetics" and introducing Mendel's work to Britain in 1900, it is his bitter debate with the biometricians (including Karl Pearson) about discontinuous heredity (change arising from mutation, rather than from gradual breeding over time) and statistical applications in biology[15], and his vacillating position on the use of non-scientific terminology in scientific discourse which render Bateson of interest to my study.

Bateson shared his belief in discontinuous heredity with Galton but it was Bateson alone who insisted on its total irreconcilability with continuous variation and its inability to be predictively imagined by population statistics**.** P. Froggatt's and N.C. Nevin's "The 'Law of Ancestral Heredity' and the Mendelian-Ancestrian Controversy in England, 1889-1906" and William B. Provine's *The Origins of Theoretical Population Genetics* are essentially the only accounts of the debate between William Bateson and Karl Pearson in the late 1890s that led to the schism between the biometrics research program and Galton's established Evolution Committee (of which Bateson was a member).[16] This debate, conducted primarily in open letters to the professional journals *Nature* and *Proceedings of the Royal Society* between

[14] An example of such a "near miss" is Bateson's confident conflation of morphology, evolution and heredity (of which Weismann, as stated above, despaired): "When the theory of evolution first gained a hearing it was felt that it was of primary importance to know first, whether it was true that forms of life had been evolving from each other; and secondly, if evolved, on what lines had this been effected and what was the ancestry of each" (Bateson, quoted in Cock & Forsdyke 86, Provine 42).

[15] Bateson's struggle with mathematics spanned his whole education; he was as disenchanted by statistical methodology as Galton was enthralled by it. William Provine argues that this struggle caused Bateson's conflict with Pearson and Weldon over the relationship of statistics to biology: "Bateson never became competent in mathematics – a sore point in his later controversy with the biometricians" (Provide 36)**.**

[16] Very roughly: Bateson's *Materials for the Study of Variation, Treated with Especial Regard to Discontinuity in the* Origin of Species (1894) contained 886 case studies of discontinuous variation and was approved by Galton. W. F. R. Weldon reviewed this book, critical of both Bateson's interpretation and his methodology, proposing instead that the impact of 'sports' (mutations) on heredity was better assessed from the long view of population statistics than from selective case studies. When Bateson joined Galton's "Measurement Committee" (the Evolution Committee within the Royal Society) in 1896, he continued to clash with Pearson and Weldon because of his strenuous objection to and failure to understand complex mathematical renderings of biological data. Bateson's preferred method was to accumulate case studies in animal and plant breeding and argue for discontinuous heredity. Pearson, Weldon, and Galton (although Galton was a committed Saltationist), on the other hand, preferred to construct mathematical models to predict variation over time (an example of one of these models is Pearson's correlation coefficient).

1895 and 1901, was admittedly not the purview of popular reading audiences. This marks the gradual distancing of heredity science from layman discourse. Biology was effectively coopted by statistical methods by the 1902 founding of Karl Pearson's journal *Biometrika*.

Before this debate erupted, associating Bateson irrevocably with pre-Evolutionary Synthesis Mendelism[17], he was a prolific contributor to heredity science with his case studies of discontinuous species variation and his belief in the direct linkage of heredity to evolution. In his magnum opus of case studies, *Materials for the Study of Variation* (1894), Bateson "avoided any use of the terms 'Heredity' and 'Inheritance'" because of their "mischievous influence on the development of biological thought" (75).[18] Given the conceptual saturation of heredity terminology in popular culture, and, as this thesis explores, the enthusiasm of writers without formal scientific education to engage with issues of heredity in fictional contexts (where semantic complexity is valued), I contend that Bateson's (and Galton's) anxiety about terminological appropriation outside biology was well-founded.[19] Gillian Beer is optimistic about the "unforeseen … appropriat[ion of] terms and texts", describing this as

[17] The "Evolutionary Synthesis" (or "Modern Synthesis") is the term for how, between 1936 and 1947, the theoretical population biologists and the Mendelian biologists achieved a consensus of understanding evolution by demonstrating that Mendelian genetics (from one generation to the next) was consistent with gradual evolutionary change. The name comes from Julian Huxley's book *Evolution: The Modern Synthesis* (1942).

[18] Bates continues to recall the metaphorical origins of "heredity" terminology in science: "from the descent of property,… applied to organic Descent in a time when the nature of the process of reproduction was wholly misunderstood" (75). Gregory Radick probes the discursive circumstances which led Bateson to declare these words inappropriate to scientific discourse because connotation from a history of lay usage would misdirect or bias scientific inquiry. The word "inheritance" came metaphorically loaded from legal property distribution across generations, and the word "heredity" from early nineteenth-century French studies of disease transmission through families (716). The impact of these legal and pathological resonances on scientific inquiry is debatable: Carlos Lopez Beltran argues that the switch from adjectival to noun forms (hereditaire to heredite) in French 1830s biology writing signifies an irrevocable "change from analogy (or metaphor) to a direct ontological commitment to the reference of the concept" (213-4). But this is only plausible when applied strictly to certain (scientific) discursive contexts. Evelyn Fox Keller also discusses this in *The Mirage of a Space Between Nature and Nurture* (21).

[19] To avoid the dangers of semantic ambiguity to the progress of heredity and evolutionary theory, several new words appeared over the late nineteenth and early twentieth centuries (for example, Darwin's "pangenesis", Haeckel's "palingenesis", Galton's "stirp", Weismann's "germ-plasm" and Bateson's "genetics") to describe observed biological phenomena in scientific discourse. These terms were successfully excluded from fiction writing, unlike appropriated terminology which did reappear in fiction enriched with scientific connotation.

an "engrossing question", and I agree that terms shared between discourses are more likely to "generate further thinking (1). Beer also acknowledges that the transfer of terms between scientific and literary discoursed in the 19th century was not "a one-way traffic"; however, this thesis is primarily concerned with examining the appearance of heredity science in fiction, and only secondarily concerned with the semantic anxieties and decisions of scientific authors (174).

Karl Pearson

The final scientist of relevance to my study is Karl Pearson, whose name and legacy have not figured largely in 1890s literary scholarship. As Theodore M. Porter writes in his biography, Pearson was a polymath who, by the 1890s, was inspired by Galton's anthropometry to refine statistical methodology in heredity studies.[20] He lent technical accuracy and mathematical rigour to Galton's theory, and effectively introduced probability science to heredity science.[21] Pearson's relevance to my study of the relationship between heredity science and popular fiction is twofold. He exhibits anxieties similar to Galton and Bateson about semantic ambiguity in biological terminology, which I see as direct evidence of the popular use of these terms outside scientific discourse. And, as I argue in Chapter Four, his contribution to the mathematisation of heredity science manifested in fiction as conjecture (by both narrators and characters) over characters' probability for success, in

[20] Pearson was also a prolific author, who wrote a biography of Galton, a novel, and a passion play, among other works. Levine examines Pearson's role as an author and epistemologist, with specific attention to his great attempt "to unify all the sciences" in *The Grammar of Science*, praised as "surely one of the most interesting books of the nineteenth century" (Levine 222).

[21] Charles Pence differentiates between Adolphe Quetelet's (1796-1874) and Francis Galton's applications of statistical methods to human population samples, arguing that Quetelet sought to define a "l'hommemoyen" (a universal standard of human averageness), whereas Galton was motivated to "capture outliers" by defining ranges of diversity (Pence 475). This historical shift in research curiosity, from averageness to diversity, and from human types to human individuals, and a "fascination with the exceptional" is reflected in late-century fictions (Hacking 181). This interest in the transmission of exceptionality across generations is embodied in characters of genius in contemporary fictions, as I discuss in Chapter Two.

correlation of characters' biological, behavioural and familial factors, and in the representation of statistical sample populations surrounding central characters.

In *The Grammar of Science* (1892) Pearson echoes Weismann's claims for the primacy of imagination in scientific endeavours, praising "the Englishmen who during our generation have had the widest imaginations and exercised them most beneficially" as not "novelists and poets" but "Michael Faraday and Charles Darwin" (37).[22] Pearson's rhetorical comparison of literary and scientific innovators suggests that creativity is being imported from literary discourse into scientific, but he adds the caveat that scientific imagination must be "disciplined" (implying that literary imagination is not) (38).[23] According to Pearson, scientists have an imaginative responsibility not only to discern scientific laws, but also to apprehend their relativity:

> Law in the scientific sense is … essentially a product of the human mind. ... It owes its existence to the creative power of his intellect. There is more meaning in the statement that man gives laws to Nature than in its converse that Nature gives laws to man. (104)

Pearson's conception of the relationship between literature and science assumes that science borrows terminology from other discourses. Consequently, Pearson worries that "law", as a civic metaphor, is an ambiguous descriptor of natural phenomena: "It has taken centuries for men to arrive at a full appreciation of this distinction [between natural and civic laws]" (113). He proposes that "the distinction be now emphasised by the specialisation of the word *law* in

[22] Michael Faraday (1791-1867), a self-educated scientist who discovered electromagnetic induction, diamagnetism and electrolysis, was known for his clear and stylish science writing.

[23] Jonathan Smith likewise interprets Pearson's views on imagination as appropriative and competitive: "For some, the incorporation of imagination into scientific method meant that science could lay claim to a higher status than poetry, which became 'merely' imaginative in the way that science had been 'merely' empirical" (36).

one or other of its senses" (113).[24] Pearson's preoccupation with the semantic problems inherent in cross-discursive terminological appropriation is only one aspect of his relevance to my study of heredity theory in 1890s social novels. Belying Weismann's philosophy that the application of "mathematical formulae" to biosciences is "utterly fruitless", Pearson became a major figure in the history of heredity studies when he applied the concept of correlation to Galton's regression theory (7). Levine characterises the transition from individual case studies to large-scale population data collection as a transition from Darwinian to Galtonian methodologies:

> The individual, Darwin's source of transformative variation, does not matter to natural selection, but all individuals die and in dying carry out its work. The individual is lost in a great set of species-sized crowds, measurable by what Pearson and Galton would call biometrics. (224)

Pearson's correlation coefficient enshrined Galton's population sampling in mathematical convention by measuring linear correlation between variables (such as phenotypic traits). It also assumed a knowledge value in large-scale biological data collection and contributed to what Hacking describes as the "avalanche of numbers" in late Victorian social and scientific

[24] Pearson continues: "We sadly need separate terms for the routine of sense-impressions, for the brief description or formula or science, and for the canon of social conduct, or, in other words, for the perceptive order, the descriptive order, and the prescriptive order. Historically we cannot say that any of these orders has the highest claim to the title *law*, for the Roman ideas much at least be traced back to their Greek parentage" (113).
Ironically, Pearson here employs an inheritance metaphor to describe the procession of the term "law" through civic history to natural history: Greek "law" begat Roman "law", which much later begat British "law", which was then borrowed by science. Pearson's lament over the lack of "distinction" between civic and scientific usage belies Lopez Beltran's assertion of a unidirectional adoption and consolidation of words into the scientific lexicon. Instead, it suggests (like Galton, Weismann and Bateson, above) that for the process to be complete, the originary discourse would have to renounce the word altogether; "the specialisation", as Lopez Beltran describes it, of terminology does not imply a sharing between discourses (213-4). Gillian Beer disagrees, as mentioned earlier, in her chapter "Translation of Transformation? The Relations of Sciences and Literature", although she does acknowledge that "the movement towards mathematisation" (to which Pearson contributed hugely in heredity science) "has enhanced hopes of a stable community of meaning for scientists at work" (174).

discourses (2, 3).

Like Galton, Pearson's enthusiasm for statistics, combined with his high profile in the scientific community, positions him as an undeniable influence upon any traces of statistical thinking in literature of the 1890s. Evidence of his epistemological insistence on the value of quantitative methods (of which his correlation coefficient is perhaps the best known) in explicating biological, and particularly hereditary, phenomena is admittedly difficult to detect in contemporary fictions, but close attention to the expression of theoretical population sampling and probability theory in the novels of Grand (*Heavenly Twins*), Allen (*The Woman Who Did*) and Gissing (*The Whirlpool*) reveals imaginative literary attempts to reconcile heredity and chance in human experience.

Conclusion: Decentralising Darwin

My study of British literary considerations of heredity theory ends circa 1900, when Bateson reintroduced Mendel's work to a warmer British scientific audience, and Hugo de Vries, Carl Correns and Erich von Tschermak all separately discovered the gene.[25] The explanatory power of genetics, from 1900 onwards, effectively ended heredity theory as a literary project (although the imaginary of eugenics continued to pervade fiction for decades to come). For this reason, Mendel remains significantly absent from my discussion of the cultural reception of heredity theory. His "Experiments in Plant Hybridisation" (written in 1865), culminating eight years of experiments in the heredity of seven different "characters" (forms and colours of seed, pod, stem and flower) across generations of pea plants, was not sufficiently well or widely received by scientific audiences upon its publication in 1866. James Wynn argues that between the mid and late nineteenth century, a methodological shift occurred in the biological sciences away from the case-based (or qualitative) and towards the

[25] Though the gene was not so named until 1906.

mathematical (or quantitative), and that the very rhetorical failure of Mendel's paper to appeal to his contemporary audiences allowed for its rhetorical success amongst later audiences (5).[26] Wynn would agree with Stephen M. Stigler's description of the period from 1885 to 1935 as "The Statistical Enlightenment" (like Hacking's "avalanche of numbers"), with Galton and Pearson being key actors (Stigler 2010). Stigler, Hacking and Wynn describe the late-century zeitgeist which prepared scientific as well as popular audiences for the successful reemergence of Mendel's gene theory; this zeitgeist produced the semantic anxieties which made heredity theory such a fertile subject for social fictions.

The novels I have chosen to analyse show ethically-inflected imaginative engagement with 1890s heredity theory, irrespective of authors' specialist knowledge of contemporary scientific theory.[27] I model my investigation after the work of scholars such as Beer, Levine, Morton and Richardson, who associate Victorian scientific and literary writing on biology with attention to audience and reception, and socio-political contexts. The spectre of Charles Darwin has justifiably dominated studies of the relationship between Victorian biology and literature; I seek to refocus 1890s heredity discourse onto the influence of later scientists who worked to correct Darwin's theory. In the following chapters, I will demonstrate the influence of 1890s heredity theory on *fin de siècle* fiction by reading selected novels chosen for their shared preoccupations with the relationship between genius and womanhood, comparative sibling and twin studies, and the ethics of marriage and procreation choice.

[26] Wynn writes: "Mendel's use of mathematical and quasi mathematical formulae, operations, and laws added rigor to his biological arguments that appealed to his early 20th century supporters for whom mathematically describable laws were quickly becoming the gold standard for making arguments about evolution, heredity, and variation. Interestingly, however, whereas Mendel's use of mathematics appealed to later audiences, this approach provoked an adverse reaction in his contemporaries who thought that Mendel was being presumptuous" (Wynn 5). This emphasises the importance of not only rhetorical but imaginative engagement with biological theory.

[27] Grant Allen is a bold exception to this statement; he was somewhat scientifically educated, and wrote prolifically for popular (rather than scientific) publications about biology and evolution (among other things), as Peter Morton discusses in his biography of Allen, *The Busiest Man in England*.

Chapter Two: "Rare Exceptions": The Hereditary Misfortune of the Woman Genius

Introduction

In 1905, Frank Challice Constable responded, thirty-six years late, to Galton's *Hereditary Genius* with *Poverty and Hereditary Genius; a Criticism of Mr Francis Galton's Theory of Hereditary Genius*.[28] Constable appreciates that Galton's work "still stands pre-eminent" in the twentieth century "for its admirable and laborious collation of facts relating to hereditary genius and ability" (xiv). He revises Galton's every point, chapter for chapter, substituting economic conditions for Galton's hereditary conditions, and advocating rather for an environmental view of genius, concluding that "Galton does not touch on the question of what is really the average level of ability ... In taking reputation (achievement) as his measure, he is dealing with environments" (142). The review of Constable's book which appeared in *Nature* the following year criticises not Constable's revisionary project, but his methodological failure to engage with Galton on Galton's most successful terms: "[Constable] appears to have overlooked altogether in his argument that other statistics exist and tend to show that psychical and physical characteristics are inherited in the same way, a point which seems to us to upset a good deal of [his] criticism" (350). *Nature* faults Constable for dismissing Galton's statistical methods for isolating existing genius and predicting future genius as arbitrary and rhetorical, and for not refuting Galton in his own mathematical language (Constable is suspicious of Galton's oft-quoted "one in 1, 000, 000" of eminent men and "one in 250" of men of genius, and dismisses "average intellect" as

[28] Among other fictions, F.C. Constable pseudonymously published *The Curse of Intellect* (1895), about an ape introduced into decadent London society. In it, Constable introduces his theory (here interestingly gendered) of the obligation of intelligence.

unknowable due to "the swamping effect of poverty") (23, 26). Constable's exasperation with Galton's mathematical language, and *Nature*'s review in Galton's favour, reveal a statistical mania which reformed the ways in which human populations, traits and fortunes were imagined in 1890s cultural discourse. Galton's rhetorical innovation, which Constable overlooks, was to sort humans into phenotypic[29] categories subject to quantitative measure. Once considered a holy gift, now reimagined as a phenotypic category, above-average intellectual ability (or as Galton "regretfully" termed it, genius) became subject to biomedical and sociological scrutiny (Galton viii).[30]The decades after Galton's *Hereditary Genius* saw a rash of other works published on intelligence, such that by 1890 Noble Kibby Royse wryly prefaced his *Study of Genius*:

> "Another book on Genius! Why, if all the works already printed on this subject were collected, they would form no small library in themselves." … Many and divers are the books on genius. … One discusses genius in its relation to *heredity*; another investigates its connection with *insanity*; a third sets forth the *self-consciousness* of genius; a fourth, the *precociousness* of genius; a fifth pictures the *environments* of genius; while others still are mere collections of *anecdotes*, designed more for the entertainment of readers than for the elucidation of any special aspects of genius. (7)

Royse assumes that Galton's agenda to qualify and quantify genius is popularly considered new and anomalous:

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[29] The phenotype is "the observable features of or differences between organisms" (OED, n.p., online)

[30] Kurt Danziger notes in *Naming the Mind* that "intelligence" as a measurable phenomenon emerged from biology discourse in the late nineteenth century, in part due to Galton's innovations in biometry (Danziger credits Galton with "inspir[ing] … the first generation of Anglo-American intelligence tests") (67). Danziger does, however distinguish between Galton's definition of intelligence as a confluence of "natural ability" and "very labourious work" and modern (twentieth-century) psychology's definition as "capacity for scholastic achievement" (67). Also relevant to my thesis is Danziger's recognition that the biological construction of intelligence encompassed sentient life generally (he recalls George Romanes' 1882 book *Animal Intelligence*), that is, it was considered "a question of degree" in women, animals and other beings who were not white British men (68).

> It has been customary all throughout the past to regard genius as something essentially phenomenal, and its possessor as one without either satisfactory antecedents or consequents … a unique, a sublimely isolated being. Of late, however, some have thought that genius, no less than all other manifestations of human nature, must submit itself as a proper subject for scientific analysis and definition. (Royse 157)

Royse dates the patholagisation of genius "of late", but this is not entirely accurate. In the shift from phenomenological to heredity theory, genius became subject to political and moral discourse on eugenics. Galton isolated genius as a hereditary anomaly beneficial to human eugenic progress, not necessarily pathological. But this benign view disappears in fiction, as we shall see in the transmutation of genius into female subjects in social novels.

Cesare Lombroso's *The Man of Genius* (1891) is a good example of the pathologisation of genius as a hereditary mental illness.[31] His assertive prose acknowledges a moment in medical history in which genius was subject to clinical scrutiny, classified with "insanity and epilepsy" and considered "teratogenic" (vii, v).[32] He also acknowledges the broad influence of theoretical population studies upon heredity science: "There are … no individual cases in nature; all particular cases are the expression and effect of a law" (vii).[33] But in a book so emphatically titled *The Man of Genius*, what exactly is the place of women in the heredity of genius? Lombroso roundly dismisses the instances of genius occurring in women: "Women of genius are rare exceptions in the world" (Lombroso 137). By labeling women geniuses "exceptions" he relegates them to outliers even from restricted "genius" population data

[31] Lombroso is known for his pioneering connections between heredity and criminality, which, as Walters and White describe, interestingly echo Galton's own theories of eugenics and regression (Walters and White 456).
[32] It is unclear whether this term refers to a birth defect or a cause of birth defects in offspring; possibly both.
[33] The legal metaphor, as discussed in Chapter One, is a direct reference to Galton's "Laws of Ancestral Heredity" (1885), which considered bold correlations between factors (genius and insanity) as evidence of regression; that is, the idea that the strength of relational levels of genius and insanity in individuals ("other men") is determined by the strength of those relational traits in previous generations ("certain men") (Lombroso vii).

samples.

In fact, the attempts of Galton et al. to pathologise genius in the latter half of the nineteenth century were systemically concerned with men of the great and British variety.[34] In this chapter, I will look at the ways in which British novelists in the 1890s re-gendered genius as a female quality, and invested it with an ethics of vocation and reproduction. The literary leap of imagination involved in re-gendering genius was made possible in part by a statistical understanding of heredity. In the novels examined, this re-gendering appears in speculation about women characters' chance of inheriting genius, and their responsibility in ensuring genius passed to future generations.

Two manifestations of female genius which recur in 1890s fiction are musical and literary talent. Mona Caird's *The Daughters of Danaus* (1894) and George Gissing's *The Whirlpool* (1897) similarly position musical genius in competition with the responsibilities of childrearing, as heroines Hadria (Caird) and Alma (Gissing) struggle against their families to fulfill their musical vocation by training, performing and composing.[35] These novels agree that there is a tension between "the duties of genius" and the duties of late Victorian womanhood (Allen 101). This tension stems from social beliefs about maternal heredity: that the genius must fulfill her artistic abilities in order to pass her genius on, but also that she must enact recognisably maternal behaviours in order to ensure the developmental success of her offspring. This sense of conflicting vocational and biological duties is infused with an

[34] Galton commences his 1875 book *English Men of Science* (also a treatise on the heredity of talent) with a nationally-specific genealogy: '…It will describe their [the scientists'] earliest antecedents, including the hereditary influences, the inborn qualities of their mind and body, the causes which first induced them to pursue science… The advantages are great of confining the investigation to men of our own period and nation." (Galton EMS 1) Galton cites ease of statistical sampling, the eminence of the British Royal Society, and the cosmopolitan character of London as scientifically valid reasons for restricting this study.

[35] Earlier Victorian fictional representations of gifted women writers or artists exist (such as Dorothea Brooke in *Middlemarch*, Jane Eyre, and Helen Lawrence Huntingdon in *The Tenant of Wildfell Hall*), and art is pitched against wifely duty. But it was not until the 1890s that artistic giftedness becomes such a hereditary imperative.

ethic of rational reproduction: women exercising mate choice to maximise the fitness of their offspring, and husbands, family members and other male stakeholders asserting control over women's musical and literary productions.

Angelique Richardson describes the phenomenon of "rational reproduction" as scientising the marriage plot by sexual selection:

> Shifting attention from natural selection, which was *random*, Darwin now gave sexual selection, which was directed by *choice*, a much more important role in his theory of evolution. … In so doing, he tacitly granted humans agency in their own evolutionary development, for if natural selection was selection by nature, then sexual selection invested agency, and agency for change, in individuals. (Richardson 78-79)

I read Richardson's dichotomy of randomness and choice alongside Ian Hacking's thesis about the emergence of "an avalanche of numbers" in *The Taming of Chance* (5). As Richardson articulates the theoretical abandonment of randomness in heredity, so Hacking describes the introduction of probability; as mid-century Darwinian sexual selection suggested the efficacy of informed reproductive choices, so Galtonian biometrics measured the chances of passing on traits. Hacking gives a history of philosophical definitions of determinism ("the doctrine that everything that happens constitutes chain of causation") in the 1850s to 1880s, contemporary with the popularisation of Darwin's theory of sexual selection (151). In the 1880s to 1890s deterministic theories of heredity were superseded by probabilistic, population-based theories, which allowed for chance in heredity: "By the end of the century, chance had attained the respectability of a Victorian valet, ready to be the loyal servant of the natural, biological and social sciences" (Hacking 2). Hacking writes that Galton understood probability as a way of schematising (as Hacking terms it, "taming")

ostensibly random phenomena (such as heredity). And, complementarily, Richardson describes Galton's feel for the "popularising" power of the "new biological narrative"(79, 80). Galton's eugenics is the theoretical link between sexual selection and hereditary probability. The fictional women under consideration in this chapter appeared as a result of this philosophical move from deterministic explanations of talent and other heritable traits, towards an agential ethics of reproductive choice: musical or literary genius represented as random gift of natural selection whose heredity needed to be controlled by the sexual choices of the women who bore it.

Music as Heredity Metaphor: Duty and Failure in Mona Caird's *The Daughters of Danaus*

Caird's *Daughter of Danaus* has been critically located in the canon of New Woman fictions. Titled after the fifty Greek mythical women sentenced (for matricide) to an eternity carrying water in leaking vessels, the metaphorical richness is appreciable. The novel is a dichotomous narrative of feminine labour (marriage and childrearing) and the artist's creative duty. Heroine Hadria Fullerton and sister Algitha initially resist marriage in order to fulfill their vocations. Algitha, untalented, refuses a marriage offer and flees to London (away from the Scottish Highlands of their youth) to pursue "really wise, useful work among the poor. …At home, there was nothing that she did that the housekeeper could not do better. … Hadria had her music and her study … but Algitha had nothing" (Caird 29-30). Hadria's musical talent is equivalent in personal, but not social, value to Algitha's philanthropic work. Hadria recognises music as an insufficiently feminine calling, and resists marriage for vocational reasons. Both sisters' vocations are considered to be against their natures by other characters; their mother describes Algitha's decision to work as "bad and unnatural",

predicting it will "ruin her life" (41). I agree with Angelique Richardson's interpretation that Caird's representation of the sisters' vocational choices is a criticism of "the eugenic rhetoric of self-sacrifice as well as the idea of biological determinism" (183). A remark by Hadria's husband-to-be, Hubert Temperley, betrays the biological determinism in gendered vocation:

> Swarms of small birds flew out of the hedges, with a whirring sound, to settle further on, while an incessant chatter was kept up on each side. "I often think that modern women might take example from these little creatures… They never attempt to shirk their lowly tasks on the plea of higher vocations. Not one turns from the path marked out by our great Mother, who also teaches her human children the same lesson of patient duty". (79-80)

This passage exemplifies trends in the cultural treatment of hereditary genius: it applies observation of one species' behaviour ("small birds") to human behaviour ("modern women"); it denies women's capacity to perform more than "lowly tasks" in biological metaphor; and the Mother Nature metaphor simultaneously posits women's "natural" labour as lowly and universally prescriptive. In this metaphor, the universal mother is the sole determinate of all offspring's vocational fates ("path").

Temperley, also a musician, is recommended to Hadria by the "benevolent" Professor Fortescue, a local natural historian who tells "stories full of natural lore" and is "friends … with every living creature" (81). This benevolent scientist-figure ascribes Temperley's fortunes and suitability for marriage to a combination of chance and talent: "a man who ought to make his mark, for he has splendid chances and good ability" (82). "Harmony" continues as a metaphor for romantic or environmental compatibility. When Hadria is later coerced into marrying Temperley she describes their relationship in musical terms of "radical

disharmony" (210). A musical imaginary of environments and individuals extends to Hadria's travels to France for professional development as a composer. Hadria is described and describes herself in terms of harmony with people and environments:

> One felt oneself in a land of artists. There was no inharmonious, no unfitting thing anywhere. Man had wedded himself to Nature, and his works seemed to receive her seal and benediction. English landscape was beautiful … but in revenge, there was something here that England could not boast. Was it fanciful to see in the characteristics of vegetation and scenery, the origin or expression of the difference of the two races at their greatest? (301)

Hadria "fancifully" correlates environment and culture, crediting her French artistic freedom to an imagined harmonious "wedded" relationship between man and Nature. The relationship's "beauty" is a result of Nature's approval of human "works". By describing humans in a subservient relationship with their environment, Caird acknowledges the role of environment in shaping artistic endeavor.

Caird invokes a Galtonian "nature/nurture" paradigm in Hadria's musicality, acknowledged as hereditary by Hadria and other characters in the novel. Caird directly discourses on contemporary popular understandings of heredity:

> There appeared to be more here than mere heredity could account for. But science had never solved this problem; originality seemed always to enter upon its career, uncaused and unaccountable. It was ever a miraculous phenomenon. The Professor had always said so. ... Heredity might have some discoverable part in the apparent marvel. Each member of the Fullerton family had unusual ability of some kind. (58-9)

"The Professor" character is in this novel (as in *The Heavenly Twins*, as I will later argue) a

symbol of the scientific. Caird here acknowledges the history of genius ("miraculous phenomenon"), later explained by heredity, as members of Hadria's family are consistently described as having "unusual ability". Caird is skeptical about heredity as the sole source of character formation, so Hadria's holistic character (that is, not just her genius) is sourced environmentally in the Scottish highlands: they had "not been without … influence in the forming of Hadria's character" and "every instinct that was born in her with her Celtic blood—which lurked still in the family to the confounding of its fortunes—was fostered by the mystery and wildness of her surroundings" (18).

Hadria juxtaposes the harsh Scottish hills with the garden in which she is domestically trapped:

> The borders were brilliant with vast sunflowers, white lilies, and blazing "red-hot pokers" tangled together in splendid profusion, a very type of richness and glory of life. Such was the sort of existence that Hadria claimed from Fate. Her eyes turned to the bare, forlorn hills that even the August sunshine could not conjure into sumptuousness, and there she saw the threatened reality. (40)

Despite her conformation to the domestic, Hadria's wild natural state (her genius) underlies and eventually thwarts her domesticity. The "threatened reality" which Hadria projects onto her broader environment (beyond the domestic artifice of the garden structure, like a nuclear family structure, that she is now in) foreshadows her later fate of loveless marriage and unenthusiastic motherhood. Her music, bare and forlorn, is unattractive to her family and society and therefore neglected ("threatened" with abandonment the longer she stays in her marriage), but ultimately underlying her domesticated existence like the Scottish landscape underlies the flower garden.

Musical composition directly conflicts with womanly duties in Hadria's struggle to entertain. Temperley "judge[s] the presence of oratorio by the absence of food" when Hadria fails to feel their dinner guests (161). Temperley critiques the oratorio in particular, because these long, rhetorical, sung narratives "without costume, scenery or action" evoke Hadria's rural austerity and her polemical disposition (*OED*, n.p.). So Hadria's musical genius renders her unfit for domesticity, and by extension, motherhood. Later, when she leaves Scotland and her family to pursue music professionally, her different environmental circumstances (bohemian France) specifically allow her to fulfill her musical potential to no monetary or social advantage, and to the abandonment of her children.

The conflict between maternal and artistic responsibility arises elsewhere in the novel, in a didactic conversation between artists and housewives, parsing the relationship between parenthood, heredity and chance. Hadria voices her "unorthodox" opinion of parenting:

> "Since few of us know how to bring up so much as an earth-worm reasonably, I can't see that it matters so very much which particular woman looks after the children. Any average fool would do. … The children would have the usual chances of their class; neither more nor less, as it seems to me, for lack of a maternal burnt-offering." (184-5)

Parenting, Hadria argues, has negligible effect on "the usual chances of class" in the formation of character in offspring. Hadria's descriptors appeal to mathematics: in the cross-species comparison of children and earth-worms, neither are subject to "reasonable" parenting; in the cliché "any fool would do" is inserted "average". This semantic appeal to "reason" and "averages" codes her view of parenting in statistical-philosophical terms. Like Galton in *Hereditary Genius*, she assumes that class is a biometric, subject to theoretical population statistics, and hence that all parents of a certain class will effect similar influence

over their offspring, according to the "usual chances… neither more nor less", or in statistical terms, the normal distribution. Her argument that specific biological parenting is nonessential also assumes that all parental influence occurs *before* birth, by biological inheritance of parents' and ancestors' traits.

In "Darwin and Reductionisms" Richardson interprets the compulsion to statistical population modeling as a response to the ineffable mass of variation and contingency[36], or environmental influence in its very broadest sense, in 1890s heredity theory: as if the complexity of data (in *The Daughters of Danaus*, a concatenation of genius, responsible womanhood, heredity and environment) were more comprehensible when rendered statistically, and I agree (7-8). Statistical language, when it appears in these novels, also hints at the contentious relationship between chance, based on individual choice, and biological determinism, based on inexorable heredity. *The Daughters of Danaus* explicitly links genius with statistical probability and scientific scrutiny, when Hadria's small intellectual friendship group gathers:

> "It is not for us to say that, individually, we transcend the average of educated mortals," said Professor Theobald, "but I do assert that collectively we soar high above that depressing standard." Professor Fortescue observed that whatever might be said about their own little band, it was a strange fact that bodies of human beings were able to produce, by union, a condition far above or far below the average of their separate values. … Chance had brought them to pass, and they refused to answer to the call of a less learned magician. (Caird 224)

[36] Richardson refers to both Bateson and Weismann on the vast and baroque state of heredity discourse by the 1890s. Although these scientists did not share unity in theory, they did share the sensation of the beginnings of big data. Bateson was hopeful in his proposal that Mendelian genetics could "definitely" "elucidate" heredity phenomena. Weismann was a bit more hesitant when he described heredity phenomena as being "of such extraordinary complexity that we might well despair of ever completely understanding it" (Richardson 8, 9).

This passage demonstrates a conscious stratification of talent in statistical terms. The professors gleefully appropriate language from statistics discourse to describe their intellectual minority status: averages, standards, values, and chance. Parallel to this statistical language appears a (slightly mystified) usage of scientific concepts: the double entendre of "bodies of humans… able to produce, by union" suggests biparental inheritance as much as it suggests a meeting of great minds. Finally, chance is personified as "a learned magician", suggesting mystification and even worship of probability theory and the explanation it offered for biometrically imagined intelligence. That this faith in probability is articulated by the self-proclaimed scientific elite of the novel's community is recognition of the scientific intelligentsia's (such as Galton and Pearson, among others, represented) growing faith outside the novel. By introducing mystifying language and by keeping the conversation between the professors, Caird is, perhaps cynically, suggesting that even the popularisation of statistical theory and language cannot make comprehensible the complexity of data and the government of chance in heredity outside scientific specialist discourse.

The Pathology of Female Genius: Vocation and Morbidity in George Gissing's *The Whirlpool*

If *The Daughters of Danaus* engages with themes of heredity, probability and female genius using appropriated statistical vocabulary, Gissing's *The Whirlpool* approaches these same themes using a pathological, consciously medicalised vocabulary. William Greenslade rightly classifies previous critical attention to Gissing's work as focused on urban marginality in class and gender (Greenslade 509-510). But Greenslade agrees that *The Whirlpool* lends itself to a sociology of scientific knowledge reading because of its sustained engagement with scientised conceptions of degeneration in 1890s London. Greenslade helpfully

approaches my own reading of *The Whirlpool* by identifying the biologically-determined "neurasthenic and hysteric state" of women in the novel (Greenslade 510). In reading *The Whirlpool*, I aim to synthesise contemporary pathology of "natural" womanhood with Gissing's pathology of genius, arguing that protagonist Alma Rolfe (nee Frothingham) represents the conflict of musical vocation and domestic womanhood in medicalised terms.

The Whirlpool is saturated with the medical and evolutionary semantics of fitness. Unlike *The Daughters of Danaus*, biosocial maternal fitness in *The Whirlpool* is narrated from a masculine focalisation as bachelor Harvey Rolfe enters into an "experimental" marital arrangement with musical talent Alma Frothingham (Greenslade 521). Prior to the marriage plot, Rolfe (echoing *The Daughters of Danaus*) favours separating biological and social acts of parenthood: when an acquaintance absconds leaving a young family in ruin, Rolfe dismisses this as "a natural revolt against domestic bondage" (Gissing 13). Bachelor Rolfe holds recognisably Darwinian opinions on child mortality: "I see nothing to grieve about. If a child dies, why the probabilities are that it *ought* to die; if it lives, it lives, and you get the survival of the fittest" (Gissing 13). The early financial ruination plot culminating in Alma's father's suicide establishes the life-and-death stakes of Gissing's grim pathologisation of polite society. Degenerative masculinity is sharply criticised in London urban and suburban environments in gossipy encounters between Rolfe and his social circle: "You remember that fellow Wager – the man you met at Abbott's? His wife died a year ago, and now he has bolted, leaving his two children in a lodging house" (13); "Bennet Frothingham shot himself last night" … "I know what to think when B.F. commits suicide. We shall hear that some of the others have bolted" (44). These anecdotes of masculine failure (to perform family duty, to maintain financial stability) establish a theme of male degeneration early in the novel and

cause high expectation for female sociobiological (marital/reproductive) duty to redeem British middleclass populations. But the tragic consequence of hereditary unfitness (hysteria, nervousness) across generations is embodied in the Frothingham family line (from father to daughter and on to her son). Alma Frothingham is, as David Glover writes, "very much her father's daughter, the inheritor of his pathology" (Glover 86). Glover devalues Alma's musicality as "a modest talent… little more than a means to 'a place of distinction above ordinary girls and heiresses'", overshadowed by her "emotional nature" (Glover 86). Read in combination with *The Daughters of Danaus, The Heavenly Twins* and *The Woman Who Did* (to be treated in the next chapter) Alma is recognisable in a typology of female genius. Musicality in *The Whirlpool* is both a rare phenotypic expression of hereditary genius and the symptom of hereditary unfitness.[37]

Alma's talent as a violinist is evaluated hierarchically: "It's a poor chance, I'm afraid, coming out as a violinist" (Gissing 71).[38] Musicianship is imagined as a phenotype (violinist, pianist) subject to the laws of probability. "Coming out" is a multivalent reference to public pageantry (establishing a musical career) and in combination with "chance", it suggests music is a hereditary trait which manifests at birth (a most literal "coming out"). Alma travels to Germany (as Hadria travels to France) to allow musical growth in a suitable environment, describing this time as "fallow", an agricultural metaphor suggesting artistic potential in fertility terms (73). This agricultural language suggests musical potential is an

[37] Dale Kramer distinguishes *The Whirlpool* from other of Gissing's narratives of professional women: Alma is middle class, and therefore her attempts at musical vocation are not fiscally driven. *The Whirlpool* does not, Kramer argues, establish a simple professional-maternal dichotomy. "Alma would not be a pioneer as a female professional violinist, so that her gender is not the problem… Numerous other women played in concert halls all over Europe throughout the nineteenth century, on many different instruments, and women studied at conservatories in the numerous cultural centers of Europe, just as Alma goes to Leipzig and Munich to study." (Kramer 324-5) The "problem" then is the phenotypic expression of her hysterical artistic personality which renders her an unfit mother and an unfit musician both.

[38] Alma is a pianist only secondarily.

environmentally-contingent phenotype subject to human cultivation.

As a woman musician, Alma's fitness for marriage and motherhood is unsubtly broached in didactic conversation: "Do you think that people who go in for music, art, and that kind of thing, ought to marry? … We're generally told they shouldn't. … If people mean by marriage the ordinary kind of thing" (72). This conversation (between Alma and her agent friend Felix Dymes), much like the didactic exchange in *Daughters*, serves as a control philosophy for the novel's later experiment in alternative marriage. When Harvey and Alma marry, they vow their shared domestic experience will be consciously different from their individual London life. Alma understands the incongruity of marriage and a professional musical career: "If I give up a public career – and of course I shall – there's no need to give up music. I can go on … for pure love of it, without any wish for making money and reputation" (120). By dichotomising the urban and the musical against the rural and the generally artistic, the Rolfes attempt to make a responsible lifestyle choice for the health of their future offspring.

But Alma's experimental renunciation of professional music fails on several accounts. Her talents as a musician (like Hadria's) preclude her from domestic usefulness: in the marriage home she "ran no risk of overexerting herself in domestic duties" (134). She avoids practical maternity: "It seemed to be taken as a matter of course that Alma would not nurse the baby… the little mortal was not vigorous; his nourishment gave a great deal of trouble" (135). And she is unable to practice her music non-vocationally: "she had ceased to play her violin, save for the entertainment and admiration of friends" (135). Alma's unhealthy abstinence from music culminates in the ultimate symbol of her failure of maternal fitness, a miscarriage. When Alma experiences a miscarriage as a result of "an attack of hysteria", her

husband thinks her reaction is "unnatural":

> Alma spoke as if her illness were merely natural, due to nothing in particular… [Rolfe] saw, beyond a doubt … the illness seemed to her a blessing; its result [the miscarriage], which some women would have wept over, brought joy into her eyes. This, insofar as it was unnatural, caused him some disturbance. (160, 162)

The "unnatural" refers to both the circumstances of the miscarriage (a result of Alma's own actions, however accidental) and her indifference to it. Rolfe understands "unnaturalness" in diagnostic terms (he approaches it as a problem which needs fixing) when he confronts her about "dropping" her music: Alma's growing distance from her musical vocation is a symptom of her domestic and maternal failures (166). When they leave their child with family and return to London for a "second honeymoon", Rolfe credits Alma's return to health with her renewed exposure to the urban music scene: "You are very much better, and don't you think you would be better still after another week or two? The concerts are in full swing" (171).

Alma's physical health is inextricably linked with her artistic fulfillment, and her potential vocational success is contingent upon an environmental shift back to London. Given the novel's polemic on the danger of urban environments to family health, the Rolfes' return to London represents a definitive moment after which only tragedy is narratively possible.[39] When Alma symbolically fulfills her musical potential with a public concert, she is medicated with "a little bottle of something in repute for fashionable disorder of the

[39] London is the eponymous "whirlpool" environment in which men degenerate and families suffer. Rolfe's friend Hugh Carnaby opines on the incongruity of childrearing in urban environments: "It's bad to see the poor little squalling brats in the filth and smoke down yonder, and worse still in this damned London. Great God! When there's so much of the world clean and sweet, here we pack and swelter together, a million to the square mile" (Gissing 184). This passage is one of several in the novel in which family health is juxtaposed with urban living, consistent with the theme of urban pathology in other contemporary fictions.

nerves" (305). Alma's physical act of performing music has psychosomatic (nervous) consequences:

> She played a few notes. Her hand was steady once more; she felt her confidence revive. Whenever she had performed before an audience, it had always seemed to her that she must inevitably break down; yet at the last minute came power and self-control … The greater the demand upon her, so much the surer her responsive energy. (306-7)

Alma does "break down" immediately after her concert, and retreats to bed with a case of "nerves", which she continues to medicate with "the fashionable prescription" (305). In this way, musical genius is pathologised by the novel.[40] When Alma manifests musical traits, or pursues opportunities to enact music professionally, it negatively affects her marriage, health, and maternal fitness, but when she renounces music (for example early in her marriage narratively contiguous to her miscarriage, and again after her public debut), she continues to decline: "A walk of a mile or two exhausted her; she came home from an hour's exercise with Hughie [her son] pale and tremulous" (361). The Catch-22 of Alma's profound unfitness suggests that her musicality is subject to biological determinism (biological because the text so inextricably associates it with her physical health). Like Lombroso's geniuses, Alma is inexorably determined to enact both her musical traits and her womanly duties unsuccessfully: "Musical ability is often diminished in those who, previous to their illness, cultivated this passion" (Lombroso 205). Both her health and her talent decline.[41]

Population statistics and heredity theory language appear in Harvey Rolfe's frequent opinions on education, parenting and children's developmental success. Despite ill health,

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[40] This is reminiscent of Lombroso's pathology of genius and insanity. Lombroso reports that music and sanity are incongruent: "Dr Adriani observed that musicians, under his care for insanity, almost entirely lost their powers" (Lombroso 205).

[41] Greenslade too connects Alma's pathological unfitness with Lombroso's book (with G. Ferraro), *The Female Offender*, which Gissing read before writing *The Whirlpool*.

unhappy marriage, and poor parenting (son Hugh never occupies the same physical spaces as Alma when she is making music), Alma is still valued by Harvey (if not by the narrator) for her human "worth" as a breeder: "One lesson, if one only, he had truly learnt from nature: it bade him forget all personal disquietude, in joy that he was not guilty of that crime of crimes, the begetting of children by a worthless mother" (336). Harvey is, however, suspicious of the role of parents as educators, which speaks to contemporary debates on the effectiveness of influence after childbirth: "I try to persuade myself that his [Hughie's] future doesn't really concern me at all. Why should it? He's just one of the millions of human beings who come and go. A hundred years hence – what of him and of me?" (342). Rolfe employs a rhetoric of large numbers (millions of human beings, a hundred years hence) to rationalise Alma's and his own role in their son's fate. Rolfe is less concerned about Alma's music and its attendant social and maternal failures because he believes parents impart all heritable traits to their offspring at birth: "The keen sensations which he himself had lost were his child's inheritance… The stereotyped phrase about parents living again in their children became a reality" (345). Later, Rolfe muses directly on the heredity of his sickly son: "He had no colour in his cheeks, and showed the nervous tendencies which were to be expected in a child of such parentage" (383). By "parentage", Rolfe implicates Alma; he has not displayed "nervous tendencies". However, as Rolfe seems to believe by his statistical rationalising, postnatal influence (such as "the best kind of education") is minimal or superficial (only "hardening skin" and blunting sympathies") compared with the "tendencies" imparted by birth (342).

Due to Alma's rare musical ability, the Frothingham family unit remains a social outlier (though not socially outcast) as they had originally intended by moving to the countryside

early in the novel, even when they return to the urban environment: Alma complains, "We know a hundred people or so, but we have no intimates" (344). Her musical genius is a statistical rarity in this sample "hundred" of polite London society. When she renounces music for the second and final time, she "thought she had subdued herself to an undistinguished destiny"; that is, she seeks to bring herself to a place within the population average (368). In a domestic breeding metaphor, Rolfe muses that "what he had done" by encouraging Alma to give up music and become average "was very much like the clipping of wings" (383). Alma's suburban domestic life is likened to a "barnyard", and Harvey wonders whether, in light of her innate genius, confining her to it is "a grave wrong" (383). There are two things going on here. One is the cross-species comparison of an individual woman in a population sample (like we saw in *The Daughters of Danaus* when Hubert Temperley similarly uses an animal metaphor to biologically rationalise Victorian views on women's domestic duties) to an individual animal in an agricultural (i.e. artificial, cultured, unnatural) environment. The other is an ethical criticism asking whether contemporary social structures (such as marriage and suburban life) ought to interrupt the natural expression of genius (is "the clipping of wings" really "a grave wrong"?). In didactic dialogue with family friend Mrs. Morton (as Greenslade describes her, "the reconstituted ideal of late-Victorian motherhood, a standard by which Alma's maternal unfitness is to be judged" and "an idealised portrait" of independent motherhood "opposed to the New Woman"), the artist is located outside a population average: "*Is* it reasonable for the artist to sacrifice herself because she happens to have married an every-day man? …If only one knew what is meant by the every-day man!" (Greenslande 520, Gissing 337). Alma's inherently conflicted identity as wife and musician is imagined in terms of her exclusive proximity to an average

("every-day man" and "every-day woman"), but the concept of human averageness itself is also questioned.

Gissing ultimately censures Alma's profound maternal unfitness as a talented but failed musician when she confesses her narcotics habit and has another sickly baby (several months later) in the same two pages. For a ponderously-paced novel, this rash of narrative development explicitly connects addiction pathology with reproductive failure: "the child, a lamentable little mortal with a voice scarce louder than a kitten's, held its life on the frailest tenure" (387). Despite "a loving tenderness such as she had never shown her first-born", Alma is unable to breastfeed, and the baby dies (387). Rolfe is pragmatic, "thankful… that this poor feeble little being was saved from life" (393). Alma dies soon after a drug overdose, having failed twice to produce healthy offspring (one sickly, one dead) or establish a musical career (she returned from Germany into marriage and retreated back to marriage after her London debut). With these examples of narrative doubling, of trying and trying again, *The Whirlpool* thus concludes with an "overwhelming determinism" (as Greenslade describes it) of infant and maternal death, a symptom of the irreversible degeneration of British social stock (522).

Conclusion: Heredity, Vocation, Duty

The woman genius in 1890s domestic fictions works to explore in literary terms the pathology and statistics in contemporary heredity theory. Caird and Gissing use gendered musicality to parse the fraught relationship between heredity, vocation and duty. Both novels treat musical genius as an unfortunate compulsion which interrupts and counteracts women's capacity to be mothers and wives. This conflict is enacted melodramatically when Hadria and Alma experience difficulty keeping their cooks and other domestic help, and tragically when

Alma's premature death and Hadria's domestic imprisonment "waste" their hereditary genius:

> The neglected gift was beginning to show signs of decay and enfeeblement. It had given fair warning for many a year, by the persistent appeal that it made, the persistent pain that it caused; but the famine had told upon it at last. It was dying. (Caird 478)

By metaphorically invoking nutrition and starvation as a cause of death of women's ability, or failure of women to impart talent to their offspring, Gissing and Caird attach profound biological consequences to the role of female genius. An awareness of these consequences, and the attempts of individual talented women to exercise responsible reproductive and vocational choices, are motivating factors for women characters in *The Heavenly Twins* and *The Woman Who Did*, which I will discuss in my next chapter.

Chapter Three: Choice and Chance: Biparental Inheritance, Women, and Eugenic Probability

Introduction

The role of women in 1890s social theories of "responsible reproduction" has been explored by Angelique Richardson and others seeking to explicate how novels interrogated "The Woman Question" in biological terms, and imagine women's sexual agency as a biological responsibility unaltered by socioeconomic factors. Contemporary novels attacked Victorian marriage and gendered spheres tropes with biology rhetoric, as popular ideas of heredity theory were applied to heroines' sexual choices. Grant Allen's *The Woman Who Did* and Sarah Grand's *The Heavenly Twins* critically consider paternal fitness; heroines Herminia Barton and Evadne Frayling eschew convention by foregoing marriage altogether or by refusing procreation within marriage, ideologically separating procreation from social institution. In Olive Schreiner's *From Man to Man*, an unfinished novel, heroine Rebekah makes the best of a bad situation; already married and a mother, she finds herself obliged to correct her unfaithful husband's influence on their children, thereby minimising hereditary damage. These novels reveal three ideations of conscientious parenthood informed by contemporary scientific rhetoric, interrogating concepts of masculine hereditary fitness, and the idea that women's mate choice can improve human stock or minimise genealogical damage.

Choosing the Right Partner: Women and "Rational Reproduction" in Grant Allen's *The Woman Who Did*

Grant Allen, known as a prolific popular science writer, ideologically separates marriage and parenthood in *The Woman Who Did*. Scholarship has emphasised the novel's heavy

didacticism, and justifiably connected Allen's pretensions to professional science with his literary engagement with heredity and eugenic theory. Brooke Cameron connects Herbert Spencer's ideas on evolution and individualism with Allen's essays on the New Woman:

> The social organism literally reproduces itself through the maternal body, by which he [Allen] means reproduction not nurturance. In Allen's own model, the maternal body is the mechanism of social evolution.… Women, or more specifically mothers, achieve individualism only after they willingly shoulder the burden of reproduction and thus enable the evolution of the social organism. (283)

Motherhood is not just a metaphor but a "literal" mechanism "enabling" evolution. By assigning women a mechanistic role in evolution, Cameron argues, Allen is attaching a biological imperative caveat to women's sexual agency.[42] Cameron references Angelique Richardson (*Love and Eugenics in the Late Nineteenth Century*), Sally Ledger (*The New Woman*) and William Greenslade (*Degeneration, Culture and the Novel*) in their attention to Allen's evolutionary rhetoric, arguing particularly that "Spencerian individualism" allowed "late Victorians [such as Allen] … to move beyond Darwin's empirical observations" (Cameron 282) and extrapolate social theory from biological theory. This chapter addresses this rhetoric, which Cameron and others have interpreted in light of evolutionary theory, rather in light of parent-to-offspring heredity theory. The high didacticism of *The Woman Who Did*, in the company of Allen's other New Woman and evolutionary writings, has encouraged readings which miss the importance to his fiction of ideas concerning generation-to-generation heredity and the probability governing it (such as biparental inheritance and

[42] Peter Morton notes that Allen's "notion of motherhood as destiny" was shared by all participants in "The Woman Question" discourse, including Galton and Pearson (Morton 394).

regression theories), and which focus instead on a sweeping evolutionism.[43] Partly this is because there is significant evidence from Allen's writings that he was an avid reader of evolutionary science. But there is also evidence that Allen was as familiar with and interested in Galton, Weismann and the problems of heredity theory (if not the biostatisticians of the 1890s).[44] As Peter Morton writes, "No other theme appears so often in his work: literally dozens of his novels and stories turn on the consequences of inherited habits and (particularly) vices" (230). However, as my previous chapter on Gissing and Caird has sought to advance, my study is concerned with the motivic quality and frequency of heredity, biostatistics, and frankly Galtonian language in contemporary fictions, irrespective of authors' familiarity with specific texts.[45]

My reading of *The Woman Who Did*, alongside Grand's *The Heavenly Twins* and Schreiner's *From Man To Man*, gives critical attention to the role of men in socio-biological heredity. The marginality of male characters ironically works to represent their profound

[43] Some of Allen's other New Woman and evolution-themed writings include "The Girl of the Future" (1890), *The Evolutionist at Large* (1881) and "Spencer and Darwin" (1897).

[44] In *The Academy* Grant Allen reviewed Galton's *Inquiries into Human Faculty and its Development* (1883) favourably, suggesting that although this book is "supplementary" to *Hereditary Genius*, it has found its popular moment with "fresh connexions" to advanced hereditary theory (Allen 30). Allen immediately acknowledges Galton's statistical innovation, "the habitual employment of statistical methods which have hardly ever been applied to this class of question by any other investigator". He praises Galton for reconciling Darwinian and Spencerian heredity theory, and for his conviction that heredity is an "irresistible" determinant of the individual. However, Allen thinks that Galton's eugenic program is ahead of its time, and predicts profound social dissent and resistance. Allen also reviewed Weismann's *Essays Upon Heredity and Kindred Biological Problems*, arguing that Wiesmann is an important voice in evolutionary discourse because he is "essentially reactionary… throw[ing] us back into problems we thought we had solved". The implications Allen draws from Weismann's germ plasm (that acquired characteristics cannot be inherited, and hereditary variation occurs through mutation alone) is profoundly troubling to Allen. Allen finally believes that psychological science will uphold the theory of inheritance of acquired characteristics against Weismann's argument; and we can see this debate play out in the psychological hereditary profiling performed by characters in Allen's stories (for example, "At Market Value" (1894), which directly references Galton's eugenic theory of stock improvement in the peerage through occasional judicious marriages to sturdy common women (Allen 6)).

[45] Morton is "disappointed" that Grant Allen did not harness his curiosity for and education in heredity theory to writing "pioneering" science fiction, and criticises him for "fail[ing] to extrapolate" heredity issues from science into fiction. I disagree with this assessment, which overvalues genre classification, and argue that popular fiction (especially Allen's clever subversion of the Victorian marriage plot) was the most appropriate genre within which to explore heredity themes without the formal or aesthetic conventions of contemporary scientific romance.

hereditary influence in narratives defining parenthood (especially maternity) in social and biological terms: even off the page, these lovers, husbands and fathers influence the developmental success of their offspring. Mothers, such as Herminia Barton and Evadne Frayling, physically and psychologically resemble their own fathers, suggesting that their fraught relationships with their fathers (as a result of their reproductive choices) are complicated by powerful hereditary factors.

Herminia Barton is "living proof of the doctrine of heredity" by strong intellectual resemblance to her clergyman father: "My father was a Senior Wrangler, and I suppose that implies a certain moderate development of the logical faculties" (Allen 17). Herminia also attributes her moral force of conviction to paternal inheritance: "It came to me, in listening to a sermon of my father's – which I always look upon as one more instance of the force of heredity" (25). Herminia concedes resemblance to her father by her compulsion "to know the Truth and to act upon it freely" (her "Truth" is a biologically-imagined worldview as opposed to the religious worldview of her father): "one great question of a woman's duty to herself, and her sex, and her unborn children" (26, 38).

The distinction between inheriting a worldview and inheriting a propensity for worldviewing is important here: Herminia's worldview is manifest in the reasoning skills and strong moral responsibility inherited from her father. This idea of heredity separates traits into qualities and potentialities. Passing down potentiality for traits from father to daughter is represented as certain, but directly passing down the quality of the traits is represented as contingent, reflecting Allen's cultural engagement with the mechanisms and probabilities of heredity. That Herminia inherits her father's rhetorical ability (in her case disastrously, to rationalise sex outside of marriage) is unsubtle foreshadowing of her daughter Dolores's

inheritance of her own father's traits: "A tall, sunny girl with Alan's own smile and Alan's own eyes… Chestnut hair, pearly teeth, she was Alan all over" (213).

The novel criticises Herminia's idea of equality of paternal and maternal hereditary influence. Dolores is conceived, both figuratively and literally, as "half his and half hers"; Alan Merrick's death before her birth does not diminish his strong paternal hereditary influence (106). The strength of Dolores's paternal inheritance is shown in the conservative views she shares with her paternal grandfather, despite Herminia's hereditary and educational influence, as evinced in Dolores's first meeting with her grandfather, Sir Anthony: "'She hasn't brought you up in her own wild ideas? ... She hasn't ding'd them into you.' 'She has tried to. But I will have nothing to do with them'" (214). In this dialogue, Herminia's influence is reduced to educational only, and Dolores's resistance to Herminia's strong moralism shows the innate biological influence of both her father and grandfather (Dolores inherits their conformity to social norms, rather than Herminia's radicalism). This hereditary reckoning is Galtonian in its appeal to regression theory: Herminia's radicalism is tempered by the Merrick family's more moderate nature, and Dolores ultimately resembles her grandfather in her conservatism. Galton's (incorrect) regression theory explains why children can resemble relatives further removed than their immediate parents:

> The child inherits partly from his parents, partly from his ancestry… the further his genealogy goes back, the more numerous and varied will his ancestry become, until they cease to differ from any equally numerous sample taken at haphazard from the race at large. (252)

According to Galtonian logic, the irony of Herminia's careful sexual selection is that Dolores has a higher probability of resembling her grandfather (in their shared ideological

conservatism) than resembling Herminia herself. Galton's law of ancestral heredity (as outlined in *Natural Inheritance*) states that "the son, on average, is less exceptional than his mid-parent"; Dolores is probabilistically less "exceptional" (radical) that Herminia (97).[46] Galton is pragmatic on the benefits of regression theory, arguing that offspring are just as likely to manifest less exceptionality than the parent, as they are to manifest less desirable traits:

> The law is even-handed. It levies an equal succession-tax on the transmission of badness as of goodness. If it discourages the extravagant hopes of a gifted parent that his children will inherit all his powers, it no less discountenances extravagant fears that they will inherit all his weakness and disease. (106)

The rhetorically endemic use of male pronouns in Galton's prose is both criticised and validated by novels such as Allen's, in which women speculate about the effects of their reproductive choices and then fail to exert any hereditary influence whatsoever. Although Galton writes about mid-parental heredity in terms which imply an equality of both parents, his rhetorical execution assumes this in theory only, as the power of fatherhood prevails.

The Woman Who Did is shamelessly didactic on women's sexual selection and the role of physiology and bodily awareness in that selection. Herminia is utopic on the role of women as essentialist mother-figures; she claims that "every woman should naturally wish to live her whole life, to fulfill her whole functions; and that she could do only by becoming a mother, accepting the orbit for which nature designed her" (73-4). This essentialist conflation

[46] The mid-parent, by definition, is a theoretical equal blending of mother's and father's qualities, created by Galton for the purposes of modelling the heredity process. In the case where female and male influence is not the same (for example, in stature, as Galton acknowledged women to be, in general, shorter than men), Galton accounted for this by creating an equation: "In every case I transmuted female statures to their corresponding male equivalents … The factor I used was 1.08, which is equivalent to adding a little less than one-twelfth to each height" (Galton, *Regression Towards Mediocrity in Hereditary Stature,* 247).

of maternity and womanhood excludes marriage and renders Herminia's body a narrative driver in and of itself. This novel's critical "New Woman" identity acknowledges its scandalous and didactic qualities, but I am interested in reading representations of female sexuality for their scientised sexual-selectionist agenda, not as others have already successfully done – reading this novel in eugenic and evolutionary terms – but to explore the immediate biological motivations of women's sexual choices and constructions of paternal fitness. Herminia confidently chooses her mate by bodily reaction, specifically blushing. Her body is always described (by lover Merrick) in profoundly sexual terms; Merrick and Herminia consciously select each other: "She was tall and stately, but her figure was well developed, and her form softly moulded" (17). Herminia trusts the physiology of blushing as a sign that Merrick is an appropriate sexual partner: "A wave of conscious pleasure broke over Herminia's cheeks" (19). Herminia explicates her blushing: "Nature put that thrill in our souls to cry out to us with a clear voice when we had met the soul she then and there intended for us", upon which Merrick's "face flushed like her own" (36-7). Later, in a sexually-charged scene in which Merrick attempts to convince Herminia of the merits of marriage to socially sanction their sexual relationship, Herminia "held out her hand to him with parted lips and a conscious blush" (57). Herminia continues implicitly to trust her physiological responses to Merrick when she reasons, "The moment I saw you my heart beat quicker; my heart's evidence told me you were the one" (61). By interpreting the "evidence" of her physiological reaction to Merrick, Herminia rationalises her sexual attraction to him, irrespective of marriage.[47]

[47] In Allen's 1886 *Fortnightly Review* essay "Falling in Love", he is skeptical about "modern biology's" reduction of love to sexual selection, or "the latest, highest, and most involved exemplification, in the human race, of that almost universal selective process which Mr. Darwin has enabled us to recognise throughout the whole long series of the animal kingdom" (453). He argues instead that it is "far more specialised, far more

The dramatic irony of Herminia's inevitable social downfall is referenced in her "gift" for "idealising" a universalised (cross-species) concept of masculinity:

> He feels and acts. He mates, like the birds, because he can't help himself. A woman crosses his path who is to him indispensable, a part of himself, the needful complement of his own personality; and without heed or hesitation he takes her to himself, lawfully or unlawfully, because he had need of her. This is how nature has made us. (30, 31)

Herminia believes she is naturally choosing the best person with whom to procreate but the novel's narrator critiques Herminia's pretensions to scientific rationalism by describing Merrick as an everyman: "He did not count among the finger-posts who point the way that mankind will travel" (30). Herminia, "accused of genius", holds herself accountable to "point the way" (as Merrick cannot):

> "Just because the man or woman of genius stands raised on a pedestal so far above the mass have we the right to expect that he or she should point us the way, should go before us as a pioneer… There are poor souls born into this world so petty and narrow and wanting in originality that one can only expect them to tread the beaten track." (143, 30,102)

This forms part of a longer passage spoken by Herminia, an "ardent revolt" against her interlocutor's (a clergyman) pathologisation of genius as a "palliation … of much that seemed wrong and contradictory … in the lives of so many great men and women" (101). Moreover, she sees the born genius as biologically impelled to lead the ordinary masses of

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individualised, far more cognisant of personal traits and minor peculiarities" than the eugenic program suggests (453). Allen emphasizes as evidence of this the complex biological imperative of love at first sight, and of the attraction of opposites: "An instinct so conditioned, so curious, so vague, so unfathomable … must be natures guiding voice within us, speaking for the good of the human race in all future generations" (457). Herminia Barton's implicit trust in her own sexual attraction to Alan Merrick, then, is a scathing criticism of "modern biology" and reductionism.

people away from "the beaten track", and the "original" products of genius (she herself is a writer) as inspiring at best and instructional at least. In this way, *The Woman Who Did* is critical of the relationship between the genius and her society, by questioning the measurable success of genius (Herminia's book is published pseudonymously) and hedging about whether genius is a pathology (she dies young) or a paragon (of women's sexual freedom).

Herminia is profoundly Galtonian in her belief that by procreating with (everyman) Merrick, she will raise a "child who was born to free half the human race from aeons of slavery" (155). Her purely biological reproductive choice (untempered by marriage) is, as Angelique Richardson describes, a "eugenic feminist" experiment in breeding an exceptional child in her own image (163). The novel is skeptical about Herminia's maternal eugenic ambition, given the ultimate influence of father-figures. In *English Men of Science,* Galton single-mindedly focuses on masculine carriers of genius in family trees (fathers, grandfathers, uncles) to the exclusion of education and wealth (64-7).[48] Grant Allen (like Caird and Gissing) explores, and ultimately upholds, this conceit by positing Herminia as a failed hereditary influence on her own offspring. But this gendered failure is explained by Galton's regression theory (in which the influence of one parent's exceptionality is compromised by the other parent's mediocrity, and by the mediocrity of the family tree in general). According to *The Woman Who Did* conscientious sexual selection alone is not a probabilistic determinant of eugenic success (to produce a daughter on whom rested "the hopes of half the world" from an extra-marital sexual encounter) (Allen 151). Rather, the

[48] In *Hereditary Genius* Galton is a bit more inclusive of women in his catalogue, but even less invested in education as a signifier of success. In his chapter on "Literary Men", he consolidates his position on the respective powers of education and heredity on exceptionality: "It is a striking confirmation of what I have endeavoured to prove … – that the highest order of reputation is independent of external aids – to note how irregularly many of the men and women have been educated whose names appear in my index" (162) Galton cites the Bronte family, Henry Fielding and Jonathan Swift, among others, as evidence for hereditary exceptionality irrespective of education.

inexorability of paternal influence betrays the power of hereditary regression. Dolores does not manifest her mother's radical traits or her grandfather's staunch conservatism, but rather a general (as Herminia sees it, heartbreakingly ordinary) conformity to the social standards which the circumstances of her own birth sought to challenge.

Choosing the Wrong Partner: Women and Eugenic Abstinence in Sarah Grand's *The Heavenly Twins*

If *The Woman Who Did* speculates on an offspring's chance of inheriting maternal qualities, Sarah Grand's *The Heavenly Twins* is not so naïve. Grand, like Allen, narratively separates marriage and reproduction: the three female characters in this novel, Evadne Frayling, Edith Beale and Angelica Hamilton-Wells, all marry, but only Edith bears a child, which dies of hereditary syphilis (Edith has been infected by her husband). This criticism of marriage as an unsuccessful human reproductive institution is founded on a belief in the hereditary degenerative qualities of husbands. This ignores the long-since established theory of biparental inheritance: as Michael Bulmer writes, "Biparental inheritance was generally accepted by the middle of the nineteenth century, though it was not confirmed by cytological evidence until toward its end" (104). Bulmer acknowledges a complex relationship between bipaternal inheritance theory and overt paternalism in popular culture: "Galton accepted this view in 1865 and suggested that one reason for sons being on average less distinguished than their fathers was that the contribution of the mother was not taken into account" (104). *The Heavenly Twins* reiterates the privilege of paternal over maternal heredity: although women and their marital choices are central plot points, it is the inexorability of paternal heredity which determines these women's reproductive successes.

Grand's Evande Frayling and Allen's Herminia Barton provide a comparative study in

female reproductive choice: both are educated, autonomous women who espouse maternal essentialism, and both value their freedom to select their mates sexually based on physiological experience. When Evadne meets soon-to-be husband George Colquhoun, "Her heart bounded – her face flushed. This was the sign, she was sure of it" (Grand 53). Colquhoun is also a blusher: "a big blond man, with a heavy moustache, and a delicate skin that flushed easily" (53). The "thrill" Evadne feels in Colquhoun's physical presence is paralleled mere pages later, in the "thrill" she feels when holding an infant: "a delicious thrill through every fibre of her body, a first foretaste of maternity" (53, 58). Evadne denies her maternal essentialism (refuses to procreate) when she learns of Colquhoun's early-life profligacy. Like Herminia, Evadne mistakenly selects a mate based on "an affair of the senses", or a "natural" attraction in which both characters invest educated trust (78). Evadne regards Colquhoun's sexually transmitted disease as evidence of his paternal unfitness, and exercises her reproductive right to abstain from motherhood based on the probability that any offspring will suffer Colquhoun's character defects, untempered by her own good qualities: "Marrying a man like that… is countenancing vice and … *helping to spread it*" [author's emphasis] (79).

Another similarity between Evadne and Herminia is their emotionally and hereditarily ambiguous relationships with their fathers. Both characters mature under the educational and moral direction of their fathers. Evadne's mother (while not absent like so many other Victorian mother-characters) imparts no formative influence. The formative influence of father-characters, however, is described with great similarity in *The Heavenly Twins* and *The Woman Who Did* (recollect that Herminia herself is "living proof of the doctrine of heredity" (Allen 17)):

> In almost every instance it was her father's influence which forced Evadne to draw conclusions in regard to life quite unlike any of his own, and very distasteful to him. He was the most conservative of men, and yet he was continually setting her mind off at a tangent in search of premises upon which to found ultra-liberal conclusions. (Grand 11)

Paternal "influence" in these and other 1890s novels is not a simple matter of nurture (i.e. Mr. Frayling's selective, sexist education of Evadne and her resultant catholic self-education). In 1890s discourse, the term "influence" when applied to parent-child similarities signified a mix of hereditary and non-hereditary transmission of personal, physical and ethical qualities. Despite the wide-ranging examples of parental "influence" either manifest (Dolores Barton's facial features, Edith's syphilitic baby) or feared (Evadne's "sexual non-compliance", as Marilyn Bonnell describes it, with the terms of her marriage to Colquhoun) in *The Heavenly Twins*, *The Woman Who Did* and other novels considered in my study, the overwhelmingly paternal sources of heredity are consistent across all texts (468). Bulmer refers to Galton's equation for determining parental hereditary influence over generations: "The father transmits, on an average, one-half of his nature, the grandfather one-fourth, the great-grandfather one-eighth; the share decreasing step by step, in a geometrical ratio, with great rapidity" (Galton quoted in Bulmer 104). Galton's employment of masculine subjects is not, then, a mere rhetorical default. Rather, it affirms a patent privileging of paternal heredity, exploited in popular narrative tropes such as the marriage plot.

While these novels do not represent the gender-blind randomness of biparental inheritance, they do advance the role of female hereditary exceptionality to mitigate paternal influence and regression. Like Herminia (who imagines she has inherited her father's force of conviction, if not his actual convictions), Evadne exemplifies hereditary exceptionality. An

American book review from 1893 introduces Evadne as "the unconventional daughter of commonplace parents", echoing the novel's suggestion that "it never occurred to her … that there might be in herself the making of an exceptional woman…she was too unconscious of herself as a separate unit" (*The Critic* 219, Grand 14). Evadne's exceptionality is both attributed to her heredity (she is influenced by her father) and represented as a hereditary discontinuity (she has no faith that she will pass this on to her own offspring, and neither does the novel at large).

Both *The Woman Who Did* and *The Heavenly Twins* punish their protagonists for separating childrearing from marriage. Herminia dies abruptly of sadness and failure at not rearing a messiah for women's rights, and Evadne's abstinence slowly affects her mental and physical health. The last Book of *The Heavenly Twins* is narrated by Dr. Galbraith, who diagnostically assesses Evadne in social situations before becoming her physician (and later, her second husband). In Galbraith's "Impressions", he guesses that Evadne and Major Colquhoun's marriage is sexless: "He [Colquhoun] made no special inquiries about his wife's condition, and never went near her" (581). Evadne's mental health declines – "My impression was that she enjoyed being ill. I never saw a symptom of depression the whole time…" – and Dr. Galbraith diagnoses her with "Hysteria!" (582, 627). Dr. Galbraith (like the Professors in Caird's *The Daughters of Danaus*) exists to explicate the scientific bases of events and actors in the novel; the scientist takes narrative control of the novel's end ("The Impressions of Dr. Galbraith" is the last Book) and effects a didactic summation of Evadne's chaste and childless marriage:

> That was her nature. But nature thwarted ceases to be beneficent. She places us here fully equipped for the part she has designed us to play in the world, and if we, men or

> women, neglect to exercise the powers she has bestowed upon us, the consequences are serious. (645)

The consequence of childlessness is a reduction in Evadne's intellect, described by her new husband, Galbraith, as an acquired brain injury: "Her mind had changed, alas! or rather, … it had been injured by friction and pressure of the restrictions imposed upon it" (662). Childlessness by choice is similarly pathologised as infertility. Galbraith's marriage to the damaged Evadne is described by another scientific figure, Sir Shadwell the psychologist, as a course of treatment: "You should have explained that your sole purpose was to make a very charming young lady healthy-minded again and happy": marriage is here proposed as cure for the ill health brought on by childlessness (677).

William Greenslade writes that "the ideology of hereditary determinism exacts a passive subjection" over Evadne (168). Despite avoiding procreation with Colquhoun, she fears that her children by the stainless Galbraith will inherit her mental health problems: "I wish my children had never been born! The suffering! The awful needless suffering!" (677). However, as the novel's inexorable paternalism establishes, this fear of maternal heredity is itself a figment of Evadne's mental health problems; in her more lucid moments she acknowledges the dominance of paternal heredity, when she beseeches Galbraith, "do look at yourself in miniature!" in reference to their son (676). In this way, the *The Heavenly Twins* reinforces eugenic abstinence as the only reproductive choice for women (insofar as they have any choice at all from within a marriage), and effectively dismisses the potential for women to exert hereditary influence over their offspring (pass on their traits).

A Corrective Influence: Women and Moral-Behavioural Modeling in Olive Schreiner's *From Man To Man*

Olive Schreiner wrote *From Man To Man* (1926) over forty-five years, from 1873 to 1918 (Schreiner Vol I xix – xxxii). This New Woman novel explicitly depicts prostitution within marriage and socially-sanctioned women's suffering caused by men. *From Man To Man* represents women's (limited) ability to enact corrective influence upon their offspring differently from *The Heavenly Twins* and *The Woman Who Did* because in Schreiner's novel, the husband, Frank does not engage in extra-marital sexual behavior until after marriage and parenthood: protagonist Rebekah is thus unable to separate marriage and parenthood (as Herminia and Evadne do). A very pregnant Rebekah confronts her unfaithful husband, and in so doing, worries about the effects of their conflict on her unborn baby: "The child – oh, the child – my duty towards the child! I – don't – do – my duty – towards – the – child!" (Vol II 17). When Frank leaves without resolving the conflict, the immediate narrative consequence is the long and difficult birth of "a seven-months' [i.e. premature] child" (Rebekah's fourth, after several miscarriages). The baby is described as "…a tiny morsel of flesh, eyebrowless, hairless, with a small wizened face… His other children… had all weighed ten or twelve pounds, and people had called them prize babies... For this sorrowful, tiny thing he had a feeling of horror, almost of loathing" (79). The "wizened" baby reveals Frank's hereditary unfitness. His extramarital affair (impregnating their domestic servant) results in the ill health of Rebekah's baby, compared with their older children conceived and born when he was faithful. Sexual infidelity is pathologised in Rebekah's miscarriages, symbolising marital dissatisfaction. The premature baby is a biological metaphor for the breakdown in marital fidelity.

Rebekah's family unit is a study in physiological heredity:

> The eldest, a tall fair-haired lad, with delicate features and eyes that would have exactly repeated his mother's had they not been so pale. … His brother, … tall and very powerfully built, his face and features repeating, with a curious exactness, his father's. …Bertie, the youngest of the boys … his cluster of brown curls spread out on the pillow, his delicate rosebud mouth and tinted cheek and round eyes shaded by long lashes recalling an aunt who had never seen him, and whose name he bore. (Vol II 182)

By indicating physical resemblance between child and aunt Bertie, the novel gestures to the phenomenon of wider familial inheritance (beyond parental); a gesture, rather than a commitment, as the other two children "exactly repeat" their parents' physical features, but boy Bertie's features only "recall" aunt Bertie's traits. Rebekah adopts Frank's love-child (Sartje) who is compared meaningfully with her son Bertie:

> Between the face on the pillow and the little dark wizened face of the girl … there was a likeness; her forehead was drawn up with wrinkles, … as if from some pre-natal and inherited anxiety, while his was smooth … but both had the same low, broad outline; in both the hair grew directly up from the forehead in a long, straight line; her lips were blue and pouting and her black eyes wrinkled between narrow lids; but both had the same perfect oval outline of face and the same rounded chin indented by a dimple – the likeness between a figure carved in alabaster and the same cast roughly in brown clay; but it was there. (Vol II 183)

This indicates an ideological trust in the physical expression of familial heredity, and in the probabilities of biparental influence: in each subsequent child is a maternal resemblance, a much stronger paternal resemblance, and a symbolic familial resemblance. Sartje's racialised

"wizened" face repeats the description of Bertie's face as a neonate, and the shared chin cleft seems to suggest that their shared paternity is strong enough to overcome perceived racial differences ("alabaster" compared with "brown clay") between the two children.[49]

Rebekah responds to such inexorable paternal influence (though limited by marital entrapment) by educating the children with didactic and utopic narratives, proposing harmony with other species as a metaphor for successful gender relations. We know that Rebekah is interested and educated in science, as her marriage home is decorated with "a tall wooden cabinet she had had when she was a girl to hold her fossils and insects … on a ledge in front her microscope stood" (Vol I 178). She also owns "books of poetry, science, history, and travel; all of them much-worn cheap editions except one handsome new copy of Darwin's *Variations of Plants and Animals under Domestication* bound in calf" (Vol I 180). The journey of the fossil cabinet and microscope from her childhood farm to the marriage home, and the comparative luxuriousness of the Darwin book (which is explicit in its domestication theme) reinforce Rebekah's role as advocate of human-animal coexistence. Her earnestness in explaining social phenomena with trans-species metaphors recalls William Bateson's case-based approach to heredity in plants and animals. Bateson's *Materials for the Study of Heredity* contains 886 examples of discontinuous heredity in different species and, as Nicholas Gillham explains, the rhetorical value of this multi-species data accumulation was in finding as many points of similarity between species as possible (Gillham 1386). In analysing diverse data, Bateson (like Rebekah) sought to link heredity and evolution (or in Rebekah's case, link Frank's exact hereditary transmission and broader formative biparental influence over generations). Early in the novel she rationalises Frank's infidelity by locating

[49] The cleft chin is a powerful symbol of the sibling relationship because it is an example of genetic penetrance, a gene which has an associated phenotypic trait. Even before popular knowledge of Mendelian genetics, this phenotypic trait was recognisably hereditary.

it in a wider field of animal instinct: "I can understand, I can almost sympathise with, a wave of black, primitive bestial desire surging up at some moment in life in a nature otherwise pure and lofty… the resurrection of that long-buried animal past" (Vol II 55). As a way of metaphorising their differing attitudes to marriage, Rebekah describes the different way that she and Frank relate to "wild animals", ultimately wondering, "What if for you a woman is only sport?":

> You care for wild animals.… You will creep on hands and knees over rough koppies [small hills] or through the mud of vleis [shallow lakes] to stalk a buck… I have cared for wild animals too. I had a wood-dove that the Kaffir boys had caught and crushed in their stone trap; I bought it from them … and I nursed it and cured it. (Vol II 58, 61)

While Frank's careful hunting efforts are a metaphor for his ingenuity in taking lovers (such as the housekeeper and Mrs. Drummond), Rebekah's self-proclamation of saving the animal mirror her attempts to save her marriage and children from dysfunctional (domestic) environmental influences. Her educational children's stories also use the metaphor of human-animal relations as an indicator of behavioural or societal advancement:

> The bloody flesh of our fellow creatures which we feed on, the roots we dig out of the grounds too, the milk drawn out of the bodies of other living beasts, … these [are] as horrible and unclean as we think the grubs and entrails on which the Bushmen feed. And our clothes – the skin of dead creatures … the jackals' and bears' and skunks' skins … the feathers of birds … the shreds of hair and wool from animals' backs, the threads from the insides of little worms … [are] disgusting. (Vol II 189-190)

This radical vegan futurism (including similar pale aliens) is reminiscent of H. G. Wells' *The Time Machine*, in which the Traveller is appalled by the idea that humanity has evolved into

a predator-prey relationship (represented by the Morlocks and the Eloi). Both Wells and Schreiner use this predator/prey metaphor to signify profound social breakdown. Schreiner suggests that healthy social relationships exclude that of predator/prey, when Rebekah connects radical veganism with progressive and humane behaviours. By contextualising human behaviour in the wider animal kingdom, Rebekah appeals to a utopia of biosocial relations to mitigate Frank's sexist and racist influence, and to salvage her post-partum influence on their offspring. Mei-Fang Chang identifies the "futile … utopian heterosexuality" of *From Man To Man*, whereby the maternal essentialism of women is protected by morally-improved men (Chang 106). The "futile" (according to Chang) vision of improved gender relations, compared with the futility of human-animal relations, is always articulated by the enlightened mother-(nature)-figure of Rebekah. Like Herminia and Evadne, Rebekah's maternal essentialism is compromised by the failure of marriage.

From Man To Man was posthumously published and unfinished. The arcing generational tragedy of Frank's flawed hereditary influence upon his four sons is eclipsed by the immediate tragedy of sister Bertie's prostitution and sickness. However, in the last pages of the novel, Rebekah engages in a long didactic discourse with her neighbour on the metaphorical relationship between human biosocial (for example, marriage, procreation and the maintenance of the family unit) and animal biosocial (in this case, bee colonies) models:

> You argue with the bee in vain, a four-sided cell is better; she builds it six; and, if you ask her why, she says she must… Her whole cell is meaningless unless you realise the storing of the honey and the bees that have yet to be born whom she has never seen and who will feed on the honey – but she builds. (Vol II 243)

The bee's instinctive labour in the colony (like the mother's instinctive labour in the family unit) is unrecognisable until many generations later; Rebekah cannot know whether her educational influence has corrected her husband's damaging inheritance; she can only trust that her isolated efforts will build a functioning social model of harmonious gender relations in future generations.

Conclusion: The Inexorability of Paternal Influence

This chapter has sought to show how parental fitness and the institution of marriage were treated as profound incongruities in New Woman fictions, and how authors employed the discourse of heredity to criticise specifically the fitness of father figures. In particular, the complex relationship between prostitution and marriage provided rich material for eugenically-charged speculation about gender roles in childrearing and consequences for the future of society. As we have seen, the New Woman novel was responsible for perpetuating a cultural misunderstanding of power in favour of paternal influence, despite established contemporary theories on biparental inheritance which attributed hereditary influence to mother and father equally. This misunderstanding can be linked with ostensibly benign rhetorical usage of male pronouns (such as Galton employs frequently in his writing on heredity case studies), and also with obviously unscientific ideations of paternal power (for example, the problematically traditional paternalistic family and marriage roles which entrapped New Woman protagonists).

It is not possible to write about Olive Schreiner and heredity theory without acknowledging her friendship with Karl Pearson. In my next chapter, I look at the shift in heredity scientific inquiry and methodology and over the course of the 1890s from family trees and generational mapping (popularised by Galton's many studies since mid-century), to

wider theoretical population studies, made possible by Pearson's advances in statistical modelling. Schreiner and other authors in my study enacted biometry in narrative comparisons of sisters and peers. I examine the shift from sibling biometry to population sampling, and how narrative considerations of the mechanisms and probabilities of heredity were simultaneously chronological (parent-to-child) and spatial (individual-to-population).

Chapter Four: The Statistical Imaginary: A Biometric Approach to Heredity in Fiction

Introduction

In reading 1890s British popular novels so far, I have focused on two emergent literary motifs engaged with two aspects of contemporary heredity theory: artistic genius, concerned with the question of qualitative theory (what is inherited), and biparental inheritance, concerned with quantitative theory (in what measure). Common to both motifs is a conscientious authorial effort to engage with and criticise patriarchal assumptions underpinning heredity theory. These novels speculate on the probability of women exhibiting artistic exceptionality, and hereditarily influencing the generation following, relative to their male co-parents. This final chapter looks to the scientific-philosophical shift to biometry over the course of the 1890s to explain the appearance and function of population studies in contemporary novels. As Ian Hacking, Stephen Stigler, William B. Provine, and others have established, this systemic mathematisation transformed the methodology of heredity studies from individual case analysis to broad population sampling.[50]

In the early 1900s, the schism between individual heredity and population heredity studies was enacted dramatically and publicly in an exchange of letters between W. F. R. Weldon (a close colleague of Karl Pearson), and William Bateson (an early Mendelian). Historians of science ascribe the failure of population and individual heredity studies to

[50] See Ian Hacking, *The Taming of Chance*; Stephen M. Stigler, *The Rise of Statistical Thinking* and *The History of Statistics: The Measurement of Uncertainty before 1900*, and William Provine, *The Origins of Theoretical Population Genetics* for comprehensive histories of the gradual refinement of biostatistical methodology in heredity studies, from Galton's early gestures towards sibling biometry and anthropometry to Pearson's product-moment correlation coefficient in promoting the strong case for considering heredity studies on the larger scale of population studies. These texts agree that by the 1890s, Galton was effectively a statesman in the scientific community, and that Mendelians and Biometricians both acknowledged his broad cultural influence on their own theoretical positioning despite their divergence.

"synthesise" (until well into the 1930s) to a personality clash between these men and their coteries.[51] The grounds for division between the Mendelians and the Biometricians were both methodological and ideological: questioning whether generational heredity and evolution was due to mutation ("saltation") or to continuous variation (natural selection). In this chapter, I discuss how the generational shift from Galton (by this time a respected elder of biological heredity science) to Pearson (who approached heredity studies from disciplines outside biology) over the 1890s was manifested in ideational traces of population studies in contemporary fictions, inspired by Galton's family trees and anthropometry, and consolidated by Pearson's universal statistical imaginary. I employ the phrase "statistical imaginary" in the sense shared by Tim Rowse and Tiffany Shellam ("The Colonial Emergence of a Statistical Imaginary") and Guy Davidson ("Sexuality and the Statistical Imaginary in Samuel R. Delany's *Trouble on Triton*"), all of whom reference Ian Hacking's thesis in *The Taming of Chance* that "in modernity and postmodernity statistical thinking is a significant determinant of selfhood: in important respects, people understand both their own identities and those of others in terms of statistical categories or types" (Davidson 104).

Before I begin my exploration of fiction engaged with the statistical imaginary, let us recall my earlier discussion of Galton's anxiety (or at least his deep reflection) in *Hereditary Genius and Natural Inheritance* about choosing *le mot juste* in his writings, and exercising the decision of when to appropriate an already-existing word (such as "genius", "mediocre" and "germ") and when to neologise (for example, "stirp", "percentile" and "eugenics").

[51] See Provine, *The Origins of Theoretical Population Genetics*, Froggatt and Nevin, "The 'Law of Ancestral Heredity' and the Mendelian-Ancestrian Controversy in England, 1889-1906" and Cock and Forsdyke, *Treasure Your Exceptions*. Provine's (1971) meticulous account of the disciplinary formation of biometry still reigns as the definitive interpretation of the Mendelian-biometician debate, reverentially referenced in all future scholarship I have come across on the subject. Froggatt's and Nevin's article, also of 1971, is a time-constrained explication of the published exchanges between the Pearson and Bateson factions. Cock and Forsdyke give a voice to Bateson, who has otherwise been pronounced a failure (comparative to Pearson, from whom we have the correlation coefficient) by his sole legacy as a Mendel populariser.

There are some emergent keywords from heredity theory in the last decades of the nineteenth century which were ambiguous and had an uncertain etymological fixity, for example, "Normal". This word refers to both the case-based biological sense of establishing an anthropometric standard for classifying human phenotypes, and the statistics-based sense of seeking a uniformity of data distribution across populations. In the novels under consideration in this chapter, I am interested in the characterisation of normal (or "average"; in these texts the meanings are not always clearly demarcated), especially among women protagonists. In the texts, descriptions of average qualities are juxtaposed with descriptions of special qualities, and a standard of normalcy emerges from this. I am also interested in the literary conceptions of sample populations within which to compare protagonists. During the decade in which these novels were written, "normal distribution" (arguably still dominant in the statistical imaginary today) simultaneously increased in cultural influence (in disciplines such as psychology and other human or social enquiries) and received ideological criticism, by Pearson and others who questioned such neat (and easily illustrated) representations of the human condition.[52]

The statistical imaginary in the human sciences emerged in 1890s fiction in the comparison of siblings (biometry), and in the relation of an exceptional individual to a

[52] Another example is "Correlation": Stigler notes that Galton originally employed the neologism "co-relation" to differentiate his specific message on hereditary regression (in his 1888 paper to the Royal Society on stature across generations of families) from the sense in which it was already in use in mathematics and physics from mid-century (as yet unrefined by "Pearson's Product-Moment Correlation Coefficient") (297). Stigler reports that "within a year, however, the spelling had reverted to correlation" (298). Further, Stigler recalls Galton's feedback to Pearson that he should print his breakthrough on the correlation coefficient because "It wd be too dull to read" the work aloud at a Royal Society meeting (Galton, quoted in Stigler 344). This etymological anecdote, together with other of Galton's self-reflective writings, referred to earlier in this thesis (his hesitation over using "average", his regret about using "genius"), is evidence of the close semantic and rhetorical attention invested in heredity writing at this time.

normal population (theoretical population sampling).[53] Both narrative tropes are informed by a Galtonian "normal" ideal. M. Eileen Magnello connects the shift from Galtonian to Pearsonian concepts of human populations with an increasing ambivalence about the universal application of the normal curve:

> That Pearson would go on to create a new type of statistics was to a large extent in response to the unshakable conviction, held by so many vital statisticians, mathematicians and philosophers, that the normal distribution was the only feasible distribution for the analysis and interpretation of statistical data. Such was the tyranny of the normal curve, that by the end of the nineteenth century, most statisticians assumed that no other curve could be used to describe data, but this monolithic view was challenged by Pearson in the last decade of the nineteenth century. (Magnello, n.p.)

Galton delighted in envisioning his vast biometric data as neat normal distributions, but Pearson (with his superior mathematical methodology) believed in a diversity of distribution shapes. To argue that contemporary fictions of the 1890s mirrored Pearson's skepticism of the universality of normal distribution might be a stretch. However, there is evidence of ambivalence about the role or efficacy of population sampling and sibling biometry in measuring heredity. The debate between the biometricians and the Mendelians (articulated in the inflammatory exchange between Weldon and Bateson) was at heart a methodological conflict between discontinuous and continuous heredity theories. Bateson supported discontinuous heredity theory by accumulating case studies to explain the mutational

[53] These 1890s novels differentiate themselves from exceptional women narratives written earlier in the century (*Jane Eyre*, *Vanity Fair*, *The Mill on the Floss*, etc.) by discoursing on later-century developments in heredity theory (as opposed to earlier-century ideas which conflated Darwinian evolution and heredity) and by the unsubtle construction of urban or town typologies in sample populations. As I will discuss, the language of the statistical imaginary includes references to "normal", "chance" and of course "heredity".

mechanism of generational change in offspring. Pearson's "Mathematical Contributions" supported continuous heredity theory and large-scale theoretical studies of populations over time, in which "multiple correlation … enable[d] the biologist to combine all effects into a single analysis"; although, as Porter writes, "unusual traits, appearing in isolation, would indeed tend to return to the mean, the characteristics of exceptional parents should be preserved in the offspring with very little regression" (Porter 258). Readers of *The Heavenly Twins, The Whirlpool* and *The Woman Who Did* are encouraged to question the validity of "normal" and the probabilities of heredity in siblings and exceptional women characters, by witnessing characters subject to multiple correlation (of factors including genius, tragedy, siblinghood, and marriage) in sample populations and through generations.

Sibling Biometry and Twin Studies

Late Victorian fiction has many examples of sibling biometry and an especial fascination with twin stories.[54] Galton wryly notes in the opening to his "History of Twins, as a Criterion of the Relative Powers of Nature and Nurture" (1876), "The exceedingly close resemblance attributed to twins has been the subject of many novels and plays, and most persons have felt

[54] Shawn Salvant writes about the relationship between Mark Twain's literary interest in twins and Galton's case-based twin studies. Chang and Eng became the subject of Mark Twain's short sketch "The Personal Habits of The Siamese Twins" (1869), and the unfinished novel *Those Extraordinary Twins* is understood to be based on two conjoined Italian teenagers (Salvant 387). Robert A. Wiggins identifies the Italian conjoined twins as Giovanni and Giacomo Tocci, who toured Europe publicly in 1891 (Wiggins 355). Grant Allen channels Galton's twin case studies in his short story, "The Two Carnegies" (1885). Twins Ernest and Harold share medical symptoms but two weeks apart, "We're like two clocks wound up to strike at fixed moments; only, we're not wound up to strike exactly together. I'm fourteen days in advance of Harold, so to speak, and whatever happens to me to-day will happen to him, in all probability, exactly a fortnight later." Allen didactically repeats Galton's ideas about the inexorability of heredity in this story, as twin Ernest explains: "Consider that every one of us is born with a certain fixed and recognisable constitution, which we inherit from our fathers and mothers. In us, from our birth upward, are the seeds of certain diseases, the possibilities of certain actions and achievements. One man is born with hereditary consumption; another man with hereditary scrofula; a third with hereditary genius or hereditary drunkenness, each equally innate in the very threads and strands of his system. And it's all bound to come out, sooner or later, in its own due and appointed time." (293-4)Not only are "disease" and "genius" subject to heredity, but "the possibilities of certain actions and achievements". These "possibilities" are explored and measured with Galton's anecdotal methodology, as the twins compete to marry the same woman. Despite becoming totally estranged after Harold's marriage, their inexorable hereditary link triumphs when they die, two weeks apart, of the same disease.

a desire to know upon what basis of truth those works of fiction may rest" (905). By prefacing his twin studies with a fictional origin, Galton rhetorically positions his study as a response to a cultural curiosity and popular trope. By invoking a nature/nurture dichotomy, and by a scholarly assessment of familial resemblance, he establishes a methodology of sibling comparison, subsequently picked up in 1890s and other late Victorian fictions.

Galton recognised the utility of twin studies in testing for "mental heredity", but similar things might be said of sibling studies: uniquely shared environmental factors (nurture) and inheritance (nature) render their resemblances or differences measurable by familial origins. Galton wrote a "history"– that is, a narrative approach to the science of twin studies. Data is presented as a series of amazing anecdotes, some of which Galton acknowledges to be unreliable, but even these qualify as useable: Galton both assesses twin phenomena, and acknowledges twins as a useful metaphor for imagining human nature and nurture, family difference and similarity.

Galton establishes a case for the similarities unique to twins with anecdotes of pathological phenomena: twins who share mental illnesses, toothaches in the same tooth, identical suicide attempts. Analysing similar and dissimilar twins, identical and non-identical, Galton believed that the power of shared genetics outweighs the power of shared or individuated experience: "My only fear is that my evidence seems to prove too much and may be discredited on that account, as it seems contrary to all experience that nurture should go for so little" (911). He emphatically concludes two things. Firstly, that "nature is far stronger than nurture", with the caveat, however, that "education seems to create the most permanent [mitigating] effect" (910). Secondly, that statistical method in twin studies is possibly selective and definitely revelatory: "We have only to take reasonable care in

selecting our statistics, and then we may safely ignore the many small differences in nurture which are sure to have characterised each individual case" (910). By "taking care" to emphasise shared phenomena, rather than focusing on individual case specifics, Galton championed a method of heredity science which privileges the population study over the case study, while at the same time setting a precedent for narrative in twin studies.[55]

So what features of twin phenomena and twin studies were tested or explored in 1890s fictions? How, if at all, did a statistical ideation of sibling comparison manifest, and to what end? The three novels I look at here all use twins and siblings metaphorically, as symbols of shared environmental and hereditary circumstance, whose fortunes are determined by probability (of inheriting exceptionality) and chance (at success in life).[56] Sarah Grand's *The Heavenly Twins* employs twins allegorically to criticise the politics of gendered education; in doing this, the novel describes twin phenomena reminiscent of Galton's twin studies. Mona Caird's The *Daughters of Danaus* considers sisters Hadria and Algitha relative to their male siblings, and with reference to their perennially disappointed mother; Caird here articulates the complexity with which siblings manifest differing traits. And Olive Schreiner's *From Man To Man* compares the diverging domestic fates of sisters Rebekah and Bertie; the inevitable fallen woman trope acknowledges how shared upbringings (Galton's nurture) fail to protect the individual woman from misfortune.

[55] An interesting early statistical innovation of Galton's was the "Galton-Watson Tree", a study on the "extinction" of family names, not connected with his heredity studies. This Galton-Watson Tree, so coined by both Galton and Reverend Henry William Watson in 1874, is an example of how statistical models were being applied to population data, irrespective of heredity. (I choose the word "innovation", because Galton and Watson did not invent this formula; Irenee Jules Bienayme derived this in 1845. (Bacaer 2011))

[56] Karl Pearson first used the term "Sibling" in 1903 to refer to multiple offspring of the same parent. Before Pearson's appropriation in *Biometrika*, this word meant kin generally (OED online, n.p.). I have employed the term anachronistically to describe comparison of sisters' and brothers' traits, and with generations earlier (parents, grandparents). The appropriation of "sibling" in 1903, however, seems extraordinarily delayed, as the boom in both scientific and fictional studies of heredity in family groups seems contemporaneous to Galton's "family tree" work in the mid-century. (It is interesting that this concept remained nameless during such a discursive peak as the 1890s.)

Gender studies scholarship on *The Heavenly Twins* has focused on the "Interlude" (a rich stand-alone section in which Angelica disguises her gender in order to enjoy a platonic affair with her fellow-musician neighbor) because of the shameless didacticism about contemporary domestic sex and gender issues in the rest of the novel. Angelica and Diavolo Hamilton-Wells are an unsubtle metaphor for the nature-nurture sexual politics of the 1890s, with Diavolo portrayed as smaller, weaker, and less motivated than his sister, and yet offered beneficial educational and life opportunities denied to his sister. Angelica explains:

> You see, I'm the eldest, but Diavolo's a boy, so he gets the property because of the entail, and we neither of us think it fair; so we fight for it, and whoever wins is to have it. I won the last battle, so it's mine just now. (Grand 28)

Angelica's meritocratic explanation (physical fighting, traditionally a masculine gendered activity) of how their material inheritance will be distributed is an ironic allegorical example of how New Woman idealism is at play with the dual concept of inheritance. In light of Galton's "History of Twins" article, the allegorical work enacted by these twin anecdotes is worth exploring; while acknowledging the themes of male privilege generally and the educational disenfranchisement of girls specifically, I argue that this twin narrative draws on late-nineteenth-century standards in sibling biometry. Like Galton, Grand introduces the twins to the reader in a series of character vignettes. Angelica confirms their shared musical talent strictly using the plural pronoun: "Oh, yes, we can sing… We've a decided talent for music… We'll sing you an anthem one day" (to which Diavolo replies: "The spirit does not move us") (30). This shared musicality is diagnosed as "the ineffectual genius of the nineteenth century … which betrays itself by strange incongruities and contrasts of a violent

kind, but which is otherwise unproductive" (31).[57] It is pathologised as a symptom of their decadent late-century, imagined as an instance of cultural heredity (Galton's nurture), and evidence of their shared genesis (Galton's nature). The proposed fix for this "ineffectual genius" is education, as Galbraith says: "You'll be able to make a good deal of that boy, or I'm much mistaken. As for Angelica, why, when she is at the head of an establishment of her own, she will require all her smartness" (32). In this quotation, Diavolo's education will "make a good deal" of him, suggesting improvement, but Angelica's education (in running a household) will employ the trait she already has ("smartness"). (We know that Angelica is not cured of her musicality because she goes on to annoy her husband with piano practice, and befriend a local musician while in drag.) Galton argues that the shared experience of twins can be interrupted by education but little else, but Grand knew that women were practically excluded from formal education after childhood. The twins' mother, Lady Adeline, seeks counsel from the local Dr. Galbraith, for "fear" that "they are going to take after some criminal ancestor there may have been in the family … and go bad together" (137). As the novel's voice of scientific knowledge, Dr. Galbraith reassures her he observes "no sign of any positive vice in either of them", and assumes that Angelica's character alone will "develop… as fine when it is formed as it will certainly be unusual" (137). The twins are further "diagnosed" by Dr. Galbraith later in the novel, when he observes "they always endeavor to adapt themselves to the people with whom they happen to be" (166). That the twins share this inclination to social adaptation suggests it is innate to them, as opposed to

[57] This grim assessment recalls Lombroso's pathology of genius discussed in Chapter Two, and also recalls William Greenslade's discussion of degeneration as a social theme connected with heredity. Likewise, Daniel Pick's "recognition" of "the formation and dissemination of amedico-psychiatric and natural-scientific language of degeneration" in late-century European texts (3).

culturally acquired in upbringing or education, because this quality is unique to them.[58] *The Heavenly Twins* reiterates Galton's biometric approach in its anecdotal portraits of Angelica and Diavolo, and in its metaphorical employment of twins to question social structures (like education and marriage). Angelica and Diavolo are equal (but not always identical) in talent and personal traits, due to the strength of their shared heredity, which is systematically measured throughout the novel by the scientist-figure, Dr. Galbraith.[59]

Mona Caird's *The Daughters of Danaus* takes a biometric approach to siblings Hadria and Algitha, by setting up narrative moments of comparison between them. The novel begins with all the siblings, Algitha, Hadria, Ernest, Fred and Austin, engaged in ritualistic dance (evidencing shared musicality), and philosophical debate over the relationship between fate and will. Their siblinghood is illustrated by their physical resemblance to each other with reference to their diversely-manifested ancestry of "southern colouring" and "northern features" (heredity instanced through genealogy), and to their strained relationship with their parents and community, from whom they share a general alienation (heredity instanced through population sampling):

> Mr. Fullerton was too exclusively scientific … to sympathise with the kind of speculation in which his children delighted, while their mother looked with mingled pride and alarm at these outbreaks of individuality on the part of her daughters, for

[58] Dr. Galbraith's interlocutor, the bishop Beale, agrees: "they are very singular little people… very singular!" (166). Since the twins can never be "singular," this moment is ironic. However it also emphasises the uniqueness of the trait in Morningquest's (their community's) standards of intellectual and behavioral normalcy against which the twins are always measured. The town of Morningquest constitutes a sample population from which the twins are distinct outliers.

[59] Grand engages with systemic scientific sexism by writing Angelica and Diavolo as true equals. This perhaps suggests that the strength of twins' shared heredity is greater than social constructions of gender.

whom she craved the honours of the social world. In this out-of-the-way district, society smiled upon conformity.[60] (Caird 13)

The siblings oxymoronically "share" individuality; this is imagined in probability terms ("chance", "fortune", "fate"): "Yet by some freak of fortune, the whole family at Dunaghee had shewn obstinate symptoms of individuality from their childhood, and, what was more distressing, the worst cases occurred in the girls" (12, 13). Individuality, which renders the Fullerton siblings outliers in their population sample of Dunaghee, is pathologised (the word "outbreak" recalls disease) as a result of hereditary probability; female siblings are more affected (susceptible) than male. Broadening sibling comparison from parents to community ("district") recalls the shift in heredity studies from family data to population sample (broadly speaking, a shift from Galton's model of sibling biometry to Pearson's model of theoretical population studies).

Caird directly discourses on nature/nurture and the cause or origin of Hadria's individuality:

> There appeared to be more here than mere heredity could account for. But science had never solved this problem; originality seemed always to enter upon its career, uncaused and unaccountable. It was ever a miraculous phenomenon.... Still the heritage was rich enough, in this case. Heredity might have some discoverable part in the apparent marvel. Each member of the Fullerton family had unusual ability of some kind. (59-60)

This passage hints at traits which are "uncaused and unaccountable", not the product of heredity but of mutation. Environmental influence also can "account for" personal qualities which can't be easily recognised as hereditary: "Daily surroundings … were the very

[60] "Conformity" in this context can be read as a biological as well as a social construct; by describing the Fullerton siblings' personality traits in hereditary terms, the novel is biologically determining their struggle with social conformity.

material and substance of character; the push and impetus, or the let and hindrance" (60). Therefore nascent familial traits are subject to influence by environment, for example, only when Algitha leaves rural Scotland for London does her fate differ from Hadria's, unhappily married and artistically thwarted. The parallel narratives of Hadria and Algitha exemplify sibling biometry in fiction, because these characters are introduced comparatively with all male siblings. Further, the novel systematically predicts and explores the probability of the happiness, success, and vocational fulfillment, of each character. The expression of characters' traits and vocational aptitudes is measured first in a small data sample (their family unit), and then in broader samples (Dunaghee, London). In short, *The Daughters of Danaus* engages with population studies by creating sample communities and groups of characters against which Hadria (and Algitha, to an extent) are individuated. The constant authorial choice to reference heredity, environment and chance throughout the novel is a reminder of the changing linguistic terms of heredity studies in the early 1890s (*Daughters* was published in 1894), and the increasing interest in statistics as a way to explain social patterns of heredity.

Hacking writes that Francis Galton oversaw the semantic loading of the term "normal" in the concept of the "normal curve" (what we now call the bell curve): "The match between the word and the curve was waiting to be consummated" (184). Prior to this, Hacking suggests, "normal" was synonymous with "typical" (frequency only, not range); however it was Galton's preoccupations with deviation (as opposed to earlier stochastic innovator Quetelet, who was more concerned with the mean) which imbued the word "normal" in statistical concepts with both frequency and range (184). I see this merger of sociobiological and statistical conceptions of normal in definitions of deviancy in the novels considered in

this chapter: sisters and female peers are placed in population control groups, and their characteristics are measured in terms of their deviancy from biological (e.g. secondary sex characteristics), psychological (e.g. behavioural idiosyncrasies, instincts, personality) and social (e.g. marriage and parenting) norms.

Critical attention to Olive Schreiner's *From Man to Man* has focused on the sexual double-standard in late nineteenth-century marriage, as Rebekah's philandering husband and Bertie's young seducer remain unpunished and both women are judged for their sexual partners' wrongdoings.[61] The shared narrative fatalism of sisters Rebekah and Bertie invokes contemporary heredity theory and method, not only in the assumed heritability of sexual misfortune, but also in the construction of a sociobiological normal against which to compare individuals. By contextualising the novel in heredity discourse's emergent statistical imaginary, I argue that biological determinism is as strong a theme as sexual morality in Schreiner's novel.

"Little mother" Rebekah and "Baby" Bertie superficially represent different types of femininity. By cataloguing the sisters' misfortunes, this novel emerges as a sibling comparison. Their parallel stories of life after seduction, ostensibly opposite (Rebekah marries, has children, and espouses a quiet and accomplished domestic life, Bertie does none of these things), actually share enough features to amount to a parable of hereditary

[61] See Anne McClintock's *Imperial Leather* for a discussion on the "limits" on expressions of feminism in colonial South Africa, and Mei-Fang Chang's "Narrative Decomposition for Utopian (Re-)Composition: The New (Wo)Man in Olive Schreiner's *From Man to Man*" for discussion of prostitution within and without marriage. Interestingly, Chang brings attention to the "Quasi-Musical Narrative Devices: The Prelude, the Interludes, and the Postlude", which structure Schreiner's novel, and also echo the narrative structures in Grand's *The Heavenly Twins*. The invocation of musical terminology in tandem with heredity terminology in these novels I believe owes something to the late-century rise of writings on hereditary artistic ability (popularised by Galton). In the novels under consideration in this thesis, music is shown always to be an unsophisticated metaphor for human exceptionality, and its structural application to these narratives of young females into their adult lives is a metaphor for culturally and hereditarily-determined human growth and development. Chang also notices that Rebekah is a "mother-artist", like Allen's Herminia Barton, with literary aspirations to "write a book something like the bible!" (Schreiner quoted in Chang 108).

misfortune. Both are introverts (Rebekah is a homebody, Bertie a spinster aunt), both are exploited and incarcerated after the sex act (Rebekah in marriage, Bertie outside of it) and both migrate to urban adulthood, to which they adjust poorly. When the sisters are understood as a family unit, they are isolated from a spectrum of normalcy populated by other exemplars of late Victorian wealthy white colonial womanhood, including their cousin's wife, Veronica and their neighbor, Mrs. Drummond.

Bertie transgresses normalcy by having sex before marriage, which limits her social trajectory from scorned lover to spinster to prostitute. Rebekah's "mannish" quality is "not Rebekah's mother's fault, as she was quite a sweet womanly woman" (Schreiner 163). This trait not inherited from her "little mother" is anomalous, attributed to discontinuous inheritance (sudden mutation, rather than gradual change) rather than upbringing, or even "the father's" hereditary influence. The strength of the sisters' respective deviations from normal privileged South African suburban womanhood is a matter of hereditary bad luck and relative risk. Much like the Fullerton sisters of *The Daughters of Danaus*, who shared the raw hereditary trait of "individualism", the probable risk of it manifesting to tragic effect is apportioned unequally in *From Man to Man*. The textual evidence for reading the sibling comparison in this way is supported by Judith R. Walkowitz's description of the connection between Olive Schreiner and Karl Pearson, and Carol Barash's evolutionary reading of the novel. Schreiner met Pearson in the late 1880s as a member of his Men and Women's Club. Walkowitz identifies the Club's core agenda as "the deliberative discussion of [heteronormative] sexual mores and sexual passion" in late Victorian Britain (37). As Walkowitz discerns from her reading of meticulous Club records, Pearson's identity as a mathematician and eventual eugenicist meant that "the state management of human

reproduction" drove his academic interest in heterosexual gender relations: "Pearson was sympathetic to a positivist variant of Darwinism; he was eugenicist in his sympathies before he had espoused eugenics as his life's work. Biology had absolutely determining power for him; but he was searching for new ways to guide it, to shift the theatre of evolution from nature to society" (39). Carol Barash acknowledges Pearson's and Schreiner's shared sexual-political agenda is traceable in Schreiner's fiction, especially in the increased probability of prostitution as a fate for both Bertie and Rebekah. Barash reads Rebekah's ongoing loveless marriage as a clear metaphor for evolutionary theory (a "very Darwinian bind"): "although the individual knows that culture changes over time, in a single lifetime, culture is experienced as fixed" (337). An evolutionary reading also supports my reading of theoretical population studies into the novel: sisters Rebekah and Bertie are individual victimised rural women who are brought into a larger sample population of suburban and urban pathologised marriages and sex relations. In this way, *From Man to Man* frames Schreiner's profound criticism of gender relations and the marriage contract as a comparative sibling study, and a biometric study in normal (maternal) heredity.

Peer Biometry and Sample Populations

I turn now from sibling to peer comparisons in reading statistical ideations in populations and heredity. In *The Heavenly Twins*, Grand overtly compares Evadne with other characters on two scales: one-to-one comparison (with neighbours and peers Edith, and Angelica Hamilton-Wells); and one-to-many comparison (with fictional hamlet Fraylingay and Maltese army encampment). Naomi Lloyd identifies purposefully constructed dichotomies of chance between the female characters:

> Grand's novel has been read as a social purity (and more recently, a eugenic) treatise on sexual selection, in which the clear-headed rationalism of Angelica Hamilton-Wells is shown to trump the religiously inflected sensuality of Edith Beale and Evadne Frayling. (Lloyd 181)

Evadne and Edith are compared with each other in mirror narratives of exercising marital choices leading to sickness and doom. These comparisons are unsubtly engineered, and privilege biometry as a major thematic concern, for example when Major Colquhoun teases Evadne, saying: "It is rather curious… you [and Edith] should both have shied at the parsons, seeing how very particular you are" (Grand 238). In contrast, Angelica's less disastrous marriage choice (from within which she may express an ostensibly chaste yet profoundly sexual freedom, in the form of cross-dressing and cavorting with her musician neighbour) is the outcome of her mother's "tainted new notions" about the power of women's education to overcome the likelihood of being "fatally deceived … in the matter of marriage" (2:1 in *The Heavenly Twins*): "Instruct! Instruct! … A girl must find out for herself if she is not taught" (41). In this way, Angelica represents the outlier in the small sample population constituting herself, Evadne and Edith, and exemplifies the advantage of growing up in an environment shared with her brother (Galton's nurture).

> The abiding heredity theme in the novel is introduced with Evadne herself, on page one: It was a need of her nature to know… Ages of education, ages of hereditary preparation had probably gone to the making of such a mind… For generations knowledge is acquired, or, rather instilled by force in families, but, once in a way, there comes a child who demands instruction as a right, and in her own family Evadne appears to have been that child. … Her mother said she was her most satisfactory child. (3)

This passage is particularly rich in heredity and population-statistics references. "The need of her nature" suggests the inexorability of human nature over social influences (recall that Galton's "nature" was only modifiable by education, and only in some cases). The repetition of "ages" reveals a long view of heredity (not just parent-to-child), and clarifies the dichotomous relationship between education and heredity (nurture/nature). The vacillation between "acquired, or, rather, instilled" evokes the ongoing imaginative challenge to describe the mechanism of heredity. The clarifying gesture of moving from one word choice (harking back to the theory of "acquired characteristics") to another (suggesting the more fashionable "nurture") encompasses Evadne's intellectual pedigree of parental and previous generational influence. Seemingly in juxtaposition, "once in a way" refers to Evadne's anomalous intelligence in her family. By directly following this with sibling comparison (her mother's "most satisfactory child"), the novel establishes its business with sibling biometry, chance and heredity, and a statistical approach to historical and intra-generation comparison.

In Chapter 3, I explored the symbolic work of the heroine's father in 1890s fictions, with especial attention to her hereditary and ideational influence on her progeny. When Evadne's father discounts "exceptional" clever women as statistical anomalies, he articulates the established sexism Grand's novel criticises, and the idea of quantifiable intelligence on a limited scale (excluding outliers). The clever woman is not evidence of female intelligence because she falls outside an arbitrarily determined average range: "'But some women have been clever,' … 'Yes, of course; exceptional women. But you can't argue from exceptional women'" (11). Evadne (herself exceptional) overcomes her father's bigotry with her realisation that the probability governing hereditary intelligence does not discriminate between sexes: "By degrees, as her reading extended, it changed its form … and led her

rapidly on to the final conclusion that women had originally no congenital defect of inferiority" (13). She updates her father's sexist statistically-supported rhetoric with fundamental biological language ("no congenital defect"). This allows her, and the novel as a whole, to consider an intelligent individual woman as an exception, yet rightfully within a given sample population (Evadne is a hereditary rarity; she is not a mutant). It also signals the power of statistical rhetoric in gendered heredity discourse.

The combined appearance of statistical rhetoric (such as Lord Frayling uses) and population sampling (in the narrative construction of peer groups around the female characters) encourages my reading of this novel, already so concerned with heredity studies, as an example of the rise of statistical thinking in fiction. Evadne's new husband, Major Colquhoun, judges her "worse than mad. She's clever." Colquhoun here comically articulates a difficult conceptual link between madness (pathology) and cleverness (exceptionality) in women. Evadne's mother muses, "I don't know where she got them [her views]… for I am sure I haven't any" (103); it is not the quality of Evadne's views, but rather her capacity to have and express them given her family history, at which her mother wonders. This implies that Evadne's intelligence springs from deeper sources than direct inheritance (she takes after neither father nor mother), and appeals to the rarity of hereditary chance which produced her.

The novel establishes Evadne as a moral and intellectual anomaly in her community and family with anecdotes about childhood and subsequent narrative developments (for instance, morally abstaining from marital sex). When she leaves Fraylingay's sample population for Malta's sample population, her newlywed friend Edith follows. The established population of army wives acknowledge that "it does not do to be singular" in the closed culture of the military camp, showing a shared mistrust of outliers, and defining acceptable averages of

behaviours and appearances (198). The camp is populated with a limited range of character types from which Evadne either conceptually distances herself, or is distanced by her peers. This sample size is already set before Evadne arrives as a social outsider, and Edith as an assimilator:

> Society in Malta during the sunny winter is very much like the society of a London season, only that it is more representative because there are fewer specimens of each class, and those who do go out are like delegates charged with a concentrated extract of the peculiarities and prejudices of their own set. (206)

Grand deliberately composes a sample population, an assembly of various and vivid "specimens" representative of British polite society, their qualities amplified or "concentrated" in the expat environment. The bio-statistical imaginary is revealed in word choices "specimens", "class" and "set", all of which share social and biological connotations. Evadne is an outlier on two accounts: she is "rather peculiar in appearance" (compared with the "true beauty" of Edith) and she says "things that *no* woman should have said" (compared with Edith's "spiritual" and "warming" public speech on "the presence of those who love us … in the other life") 209, 198).

A statistical imaginary is also evident in the lived experience of the army community, for example when Major Colquhoun develops a mathematical formula for assessing truth in gossip:

> It was his habit to tell her [Evadne] such club stories as were sufficiently decent, and what "he said" and what "she said" of each other, upon which he would strike an average to arrive at the probable truth. (204)

By humourously applying an equation to camp gossip, he imagines his community as a data sample open to interpretation. Later, Evadne is described as an outlier to "the blockhead majority", another invocation of the community as a largely homogenous population to which the exceptionally clever woman represents an anomaly (564). The source of this anomalousness is certainly hereditary; so much of the beginning of the novel is devoted to genealogically sourcing Evadne's precocity, and the end of the novel to her "fragility" of health (566). In this way, *The Heavenly Twins* demonstrates rhetorical connections between medical, heredity and theoretical population statistics discourses to critically engage issues of genius and gender.

Statistical Frequency in Theoretical Populations

So far I have read individuals' hereditary exceptionality in terms of a pathological deviation from a population norm, in relation to the construction of those populations and the definitions of exceptionality in the texts. I now examine how novels create populations to imagine the exceptional woman as either a statistical outlier or rare occurrence within a normal curve of traits expressible in a population. Further, I make the radical claim that theoretical populations in fiction function as a theatre for the discontinuous vs. continuous heredity debate of the 1890s, which latterly engaged Karl Pearson and the Mendelians.[62] Two

[62] I have found the prefaces of scientific works (and other non-scientific works by scientists) to be most illuminating: these short and candid opening remarks betray anxieties and broad cultural assumptions which the authors (here Pearson, previously Galton) position themselves in relation to. For example, Pearson's preface to his reverential *Life, Letters and Labours of Galton* immediately quotes William Bateson's attack on Darwinian theory, with reference to a growing awareness of population studies in heredity science:

> Today the work of Darwin is being largely undermined by a new view of heredity. We are told that "the transformation of masses of population by imperceptible steps, guided by selection, is as most of us now see, so inapplicable to the facts, whether of variation, or of specificity, that we can only marvel both at the want of penetration displayed by the advocates of such a proposition [Darwin, Wallace, Huxley, etc.] and at the forensic skill by which it was made to appear acceptable even for a time". (Pearson, Bateson quoted in Pearson, vi)

Pearson's choice of quotation betrays the "mass of population" as a key antagonism in the debate between the Mendelians and Darwinians. (As outlined in Chapter 1, Cock and Forsdyke, Provine, and Froggat and Nevin agree that Bateson's approach to heredity science was case-based and generationally linear. Bateson publically

iterations of the statistical imaginary in 1890s Victorian fiction are the threat of inheriting exceptionality from either continuously- or discontinuously-imagined heredity. Continuous or discontinuous heredity is differentiated in the protagonist's relationship to a constructed social group, or theoretical population sample. Pearson writes in the introductory remarks of the first issue of *Biometrika* (1901) that the identification and measurement of difference in a species is "the first condition necessary" to understanding heredity (and by extension, Natural Selection):

> The first step in an enquiry into the possible effect of a selective process upon any character of a race must be an estimate of the frequency with which individuals, exhibiting any given degree of abnormality with respect to that character, occur. The unit … is not an individual but a race, or a statistically representative sample of a race; and the result must take the form of a numerical statement, showing the relative frequency with which the various kinds of individuals composing the race occur. As it is with the fundamental phenomenon of variation, so it is with heredity and with selection. (1)

These novels iterate contemporary heredity theory, because they articulate a shift away from case-based genealogies towards theoretical population studies, and construct typologies of characters who have inherited deviant or extreme traits precisely within "statistically representative samples" of British white middle class society.

Alma Frothingham, of Gissing's *The Whirlpool*, distinguishes herself from society by her musical vocational choices. The novel locates her firmly within a population sample of society-woman peers (Sybil Carnaby, Mrs. Strangeways, Mary Abbott); her talents are rare

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objected to Pearson's (et al.) theoretical population statistics approach of measuring masses in one historical moment (rather than tracking individual cases over generations) for hereditary phenomena.) By positioning this statement in the preface of a popular biography in 1914, he defines the two previous decades of fraught scientific debate about heredity on a population scale or a family scale.

but not without precedent in her population. She socialises with other artistic types; her agent, Felix Dymes, has other lady clients, Mrs. Rayner Mann and Miss Ada Wellington (Gissing 195). Herminia Barton of Allen's *The Woman Who Did*, in contrast, never belongs to any social group (she is alienated from parents, an only child, and has no friends as a result of her unusual abstinence from marriage) and so is only ever considered, physically and philosophically, outside the spectrum of normalcy: her sexual ethics, ascribed to misplaced (mutated) intellect inherited from her father, render her a statistical outlier from the normal (limited) curve of women's possible sexual and other life choices.[63] In contrasting their heroines psychologically and physically with their social groups, Gissing and Allen (like Grand and to an extent Caird) define female exceptionality by its frequency in human populations.

Greenslade identifies Gissing's "fictional world" as a "territory of marginality" (509-10). He argues that, although narratively motivated by marginality, Gissing invokes a contrast between the mass environment (the city) and the "marginal" heroine. Alma Rolfe (*nee* Frothingham)'s social and innate qualities (poverty, musicality, hysteria) indicate her marginality to "the hub itself – fashionable, moneyed London, the epicentre of the demimonde" (Greenslade 136). The mass/marginal juxtaposition is an example of a theoretical population study, in which Alma is a minority pathologised by her inability to cope in the whirlpool of urban life. Greenslade notices that Alma and Harvey Rolfe's marriage troubles are affected by radically moving house from Europe (Alma) to the countryside (both) and to town (Alma first without, and later accompanied by, Harvey); but

[63] It is important to distinguish that these novels articulate the interiority of women's artistic experience much less than they articulate the reception of their behaviours by husbands, fathers, friends and peers: their life stories are allegories about how female exceptionality is understood in and by populations rather than how hereditary anomalies experience their own rarity.

only Alma's health and social status are affected by her movement into different populations. Gissing enacts the statistical imaginary by morbidly imagining Alma's increasing probabilities of failure throughout different sample populations, by pitting Alma's character (elsewhere ascribed to heredity) – her compulsion to make music, her reluctance to mother, her hysterical tendencies – against the relatively thriving social groups around her.

As Pearson writes in *Biometrika*, "The statement that certain characters are selectively eliminated from a race can be demonstrated only by showing statistically that the individuals which exhibit that character die earlier, or produce fewer offspring, than their fellow[s]" (2). Alma Rolfe and Herminia Barton share traits: both are doomed artistic geniuses who die early, as discussed in Chapter 2 of this thesis, and both have one living child who does not inherit their genius or pathologies, as discussed in Chapter 3.[64] But by considering their differences, we see how these characters' relationships to society are framed by the statistical imaginary. If the whirlpool of London society is a normal curve, Alma is in the ninety-ninth percentile (metaphorically speaking), pathologised by musicality, emotional weakness, and drug abuse. Herminia suffers a series of narrative isolations from the vast theoretical population of late-Victorian urban middle-class society; first philosophically by her sexual ideals, then physically by her travels on the continent, and finally financially by her status as an unwed mother. Such systematic isolation from defined population samples (her peers, England, the middle class) suggests that she is not the rare result of a continuous hereditary history, but rather an even rarer mutant, outside the normal curve: Herminia is in a different

[64] Pearson (and Mary Beeton) observe, in "Inheritance and the Duration of Life" in the first issue of *Biometrika*, a dearth of public or private data on infant mortality (exact ages of death), causing some guesswork in their studies (52). This lack of cultural attention to exact circumstances of infant mortality is consistent with the treatment of infant death these novels (*The Whirlpool* and *The Heavenly Twins*) as an extension of the female deviancy narrative rather than as a life event in its own right (the infants only die because of the hereditary insufficiency of their mother).

"world", on a different "level", and "morally ahead of [her] contemporaries" (Allen 80, 85). Like Alma, Herminia moves forward through the novel into population samples of increasing size: from the parochial Bower Lane, to the Italian countryside, and thence to a liminal bohemian existence in London. In London, Herminia's hereditary influence on her own daughter is scientifically invalidated by the paternal grandfather, a physician, when he welcomes Dolores into his family. Thus Herminia's deviant traits (sexual freedom, inflammatory literary talent) are imagined as a rare regressive mutation in the largest theoretical population of the novel. Herminia does not fit on the normal curve of British womanhood, her rare traits neither strong enough nor useful enough even to be passed to the next generation, let alone to achieve fixity as a broad liberation for Victorian women of the comfortable classes.

Conclusion: *Biometrika* and the Beginnings of Big Data

In the first part of this chapter, I sought to connect Galton's anthropological rubric for explaining differences between siblings, especially twins, in terms of mutation from a small group norm (the family unit) in the fictions of Caird, Grand and Schreiner. In the second part, I argued that Pearson's gaining ground in statistical applications explains the appearance of individual women characters in fictional theoretical populations, especially peer groups, in Allen's, Gissing's and Grand's novels, and explored how these representations of gendered exceptionality reiterated but also challenged theories of mutational heredity. The statistical imaginary as a framework for understanding human difference through populations and time is realised in *Biometrika*. It was first published in 1901, later than any of the novels here discussed; thus I have treated any fictional engagement with statistical methodologies as a sign of parallel scientific and popular cultural curiosities about or criticisms of contemporary

trends in heredity methodology in the tumult of the 1890s. In this first issue, Galton writes an editorial effectively passing the baton of evolutionary science by heredity studies on to the biometricians:

> The primary object of Biometry is to afford material that shall be exact enough for the discovery of incipient changes in evolution which are too small to be other-wise apparent.… The organic world as a whole is a perpetual flux of changing types. It is the business of Biometry to catch partial and momentary glimpses of it, whether in a living or in a fossil condition, and to record what it sees in an enduring manner. (Galton 9, 10)

Galton is welcoming the collection, analysis and archive of big data, as Pearson envisions it, as the way forward in heredity studies. The anecdotal methods of sibling and peer comparisons, the assumption of a normal range of behaviours and traits, and the statistical demarcation of sample populations which we see in popular novels of the 1890s share the hallmarks of biometry's early exercises in treating biological data on a large scale.

Conclusion

The work of this thesis has been, first and foremost, to locate and explore Francis Galton's influence on late Victorian fiction, with particular attention to his ideas on the relationships between heredity, genius, biometry, and statistics. The discursive "overlap" (as Gillian Beer terms it) between popular fiction and scientific writing was an occasional cause for consternation among the professionally scientific, as Galton, Weismann, Bateson, Pearson, and others shared semantic anxieties about the appropriation of heredity terminology in non-scientific genres, and invented neologisms both to describe newly-discovered phenomena and to demarcate their ideas from a curious and voluble popular discourse.

My choice of popular novels for analysis was directed by their candid engagement with Galtonian hereditary theory and methodology in linguistic, thematic and ethical terms. Several unmistakable tropes emerged, the recapitulative strength of which marks them as a genre apart: for example, the multivalence of musical ability as a metaphor for human exceptionality, the exploitation and lament of exceptional women characters who exert (or attempt) eugenic reproductive choices, and the biometric definition and measurement of "types" among siblings, peers, and theoretical statistical populations. As Galton's contributions to heredity science, including "The Laws of Heredity", regression theory, and twin studies, were enhanced by the statistical innovations of Karl Pearson over the course of the 1890s, novelists including Allen, Caird, Gissing, Grand, Schreiner critically explored problems in the state of heredity science, especially gender bias against women in ostensibly egalitarian "biparental" inheritance, armed with an aesthetic attention to chance, probability, and population statistics.

The field of Victorian literature and biology scholarship is long established, and the textual relationships between evolution, heredity, gender politics, and the marriage plot have been gracefully and profoundly articulated by Gillian Beer, George Levine, Peter Morton, William Greenslade, Angelique Richardson, and others. Finding my own entry point into this much-mapped scholarly territory, a daunting task, became possible when I discerned, unique to the 1890s, a philosophical shift in heredity science methodology (practiced by Galton and Pearson, among others) from the case-based and familial, to the population-based and theoretical, concurrent with a fierce factional debate between the biometricians and the Mendelians (exemplified in Karl Pearson and William Bateson) about whether evolutionary change is due to cumulative gradual variations throughout generations, or the sudden mutational changes in individuals and their subsequent heritability. Although, as I have acknowledged, there is not significant evidence that the particulars of this debate were read by audiences outside the discipline of heredity science, the central themes under debate (what human qualities are subject to heredity, and by what mechanism) are echoed, explored, and critically examined in contemporary fictions, signifying the cultural moment in which heredity theory and fiction concomitantly acknowledged the dramatic entrance of the statistical imaginary which would go on to dominate heredity theory in "the century of the gene".

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