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**Representations of Science, Literature, Technology and
Society in the Works of Primo Levi**

by

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Contents:

Acknowledgments	p.5
Declaration	p.6
Abstract	p.7
Abbreviations	p.8
Introduction	p.9
1. The Two Cultures Debate	p.17
2. 'Le due culture': An Italian Context	p.27
3. Levi and Science	p.36
4. Dialogues and Boundaries	p.40
Part I: Levi's Dialogues	p.49
Chapter 1: Cultural Dichotomies in Postwar Italian Culture	p.50
1. 'Umbrella Culture' and its Fractured Underpinnings in Postwar Journals	p.51
2. <i>La cultura dimezzata</i> : Responses to the 'Two Cultures' Opposition	p.56
3. 'Scrittori e industria': The Struggle for a New Literary Style	p.65
4. Primo Levi and Postwar Cultural Debate	p.73
i. <i>Literature and Science</i>	p.75
ii. <i>Division and Labour</i>	p.84
iii. <i>Ethically Informed Science and Technology</i>	p.87

Chapter 2: Dialogues with Created Communities	p.96
1. Constructed Communities	p.99
2. Dialogues with Scientists	p.111
3. Textual Communities	p.120
Chapter 3: Interactive Dialogues: Levi and Calvino	p.135
1. Critical Attention to the Relationship	p.138
2. Personal and Professional Dialogues	p.141
3. Literature-Science Narratives	p.157
Part II: Science and Society, Humans and Machines	p.175
Chapter 4: Communication, Knowledge and the Public Intellectual	p.176
1. Language and Communicability	p.179
2. Knowledge of Knowledge: 'Conoscere'	p.198
3. Levi as Public Intellectual	p.210
Chapter 5: Machine Bodies, Hylozoism and Anthropomorphism	p.219
1. Contained Bodies	p.222
2. The Tool as Bodily Prosthesis	p.231
3. Hylozoism, Anthropomorphism and Projection	p.237

Chapter 6: Technologized Bodies: The Posthuman Progeny of Progress	p.258
1. Marvellous Machines	p.263
2. Encounters with the Technologized 'Other'	p.268
3. Mergers and Acquisitions	p.279
<i>i. Bureaucratized Bodies</i>	p.283
<i>ii. Docile Bodies</i>	p.295
4. Some Conclusions	p.308
Conclusion	p.312
Appendix: Germaine Greer Interviews Primo Levi (1985)	p.320
Illustrations:	
Fig. 1: reproduced from <i>La ricerca delle radici</i>	p.332
Fig. 2: reproduced from Giuseppina Santagostino, 'Destituzione e ossessione biologica nell'immaginario di Primo Levi'	p.333
Bibliography	p.334

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Declaration:

I declare that this thesis is my own work, and that its contents have not been submitted for a degree at another university. Revised sections of Chapter 5 have been presented at academic conferences and an article developed from these presentations, entitled 'Primo Levi: Lively Machines and Machinic Bodies', has been accepted for publication by *Arachnofiles* (the refereed online journal hosted by the School of European Languages and Cultures, University of Edinburgh: <<http://www.selc.ed.ac.uk/arachnofiles/>>).

Abstract:

The thesis tackles two main issues. Part I explores Levi's engagements with the 'two cultures' debate concerning the relationship between literature and 'science' in postwar culture. Building on existing scholarship, I provide a more comprehensive view of his project to combat the two cultures divide. I contextualize the literature-science debate in Anglophone and Italophone culture, and then investigate dialogues between Levi and his contemporaries (for example, the writer Italo Calvino; the physicist Tullio Regge). Among other theoretical frameworks, I draw on critical approaches to the literature-science relationship and Bahktinian dialogics.

Part II analyzes Levi's portrayals and critiques of science and technology as they impact on human life and freedoms, especially his problematizations of relationships between humans and machines in a post-industrial society. This aspect of Levi's work, particularly his representations of bodies and embodiment in a technologized age, has received little critical attention to date. I evaluate Levi's engagements with such issues, focussing also on gender dynamics in his writing about technologically-mediated embodiment. Given the absence of sustained Italophone critical reflection on these questions, I analyze Levi's work in light of recent Anglophone theorizing on posthumanism. I also refer to psychoanalytic approaches to the self.

Considering Levi's approach to a series of perceived cultural dialectics—the relationships between science and literature, science and society, human subjects and machines—I argue that his work is characterized by contradiction. He asserts the need to break down cultural and disciplinary boundaries while simultaneously revealing his personal tendency to conceptualize literary and scientific activities, for example, as distinct practices. I conclude that by embracing such contradictions his work highlights areas of difficulty, and, without attempting to offer falsely universal solutions, reminds us of our capacity to maintain—or reclaim—corporeal and epistemological sovereignty of ourselves and our society.

Abbreviations:

The following abbreviations are used throughout the thesis:

Primo Levi, *Opere*, ed. by Marco Belpoliti, 2 vols (Turin: Einaudi, 1997); the collection from which citations are drawn (unless otherwise indicated), is referred to throughout the thesis as *I* and *II*;

Primo Levi, *Se questo è un uomo* (Turin: De Silva, 1947; 2nd edition, Turin: Einaudi, 1958), is abbreviated as *Se questo*;

Primo Levi, *La ricerca delle radici* (Turin: Einaudi, 1981), is abbreviated as *La ricerca*;

Belpoliti, Marco (ed.), *Primo Levi: conversazioni e interviste* (Turin: Einaudi, 1997), is abbreviated as *Conversazioni*;

Ernesto Ferrero, *Primo Levi: Un'antologia della critica* (Turin: Einaudi, 1997), is abbreviated as *Antologia*;

Italo Calvino, *Romanzi e Racconti*, ed. by Mario Barenghi, Bruno Falchetto, Claudio Milanini, 3 vols (Milan: Mondadori, 1992), is referred to throughout the thesis as *RR I*, *II*, *III*.

Introduction

Primo Levi's status as a unique cultural figure in postwar Italy remains unchallenged. Since his death in 1987, interest in his life and work has remained high both within and beyond Italy, as the legacies of his writing and personal qualities are considered and celebrated. His numerous novels, essays, short stories, poems and journalistic articles remain popular in the academic community as well as with the general public, have been awarded a range of important literary prizes and are translated into many different languages.¹ In the past decade, thanks largely to the work of Marco Belpoliti, Italy has seen the publication of the latest revised and amplified edition of his works, as well as numerous critical texts, conference proceedings, collections of interviews and transcripts of conversations.² In France too, there have been several significant publications, including *Le double lien*, the proceedings of a 1999 conference on Levi held in Strasbourg.³ In the UK, Levi's work continues to excite interest: in addition to translations of Levi's *La ricerca delle radici* and the collection of interviews

¹ For the most comprehensive bibliography of Levi's published works, including his many interviews, see *Opere*, 2 vols, ed. by Marco Belpoliti (Turin: Einaudi, 1997), *I*, pp.ciii-cxxvi. For information about the publication and translation details of Levi's works, see the notes in *I* and *II*. Literary prizes include the 1963 Premio Campiello for *La tregua* (Turin: Einaudi, 1963), the 1967 Premio Bagutta for *Storie naturali* (Turin: Einaudi, 1966), the 1975 Premio Prato for *Il sistema periodico* (Turin: Einaudi, 1975), and the 1979 Premio Strega for *La chiave a stella* (Turin: Einaudi, 1978).

² The fullest edition of Levi's works to date is the 1997 Einaudi edition. Significant texts in Italian include: the collection of interviews, *Primo Levi: conversazioni e interviste*, ed. by Marco Belpoliti (Turin: Einaudi, 1997); *Primo Levi*, ed. by Marco Belpoliti (Milan: Marcos y Marcos, Riga, 13, 1997); *Primo Levi per l'ANED: l'ANED per Primo Levi*, ed. by Alberto Cavaglioni (Milan: Franco Angeli, 1997); *Primo Levi: un'antologia della critica*, ed. by Ernesto Ferrero (Turin: Einaudi, 1997); *Primo Levi: l'atopia letteraria. Il pensiero narrativo. La scrittura e l'assurdo*, ed. by Fabio Moliterni, Roberto Ciccarelli, and Alessandro Lattanzio (Naples: Liguori Editore, 2000); Enrico Mattioda, *L'ordine del mondo: saggio su Primo Levi* (Naples: Liguori Editore, 1998).

³ *Primo Levi: le double lien*, ed. by Walter Geerts and Jean Samuel (Paris: Ramsay, 2002); see also Daniela Amsallem, *Primo Levi* (Paris: Ellipses, 2000); *Shoah, mémoire et écriture: Primo Levi et le dialogue des savoirs*, ed. by Giuseppina Santagostino (Paris: Harmattan, 1997); Françoise Carasso, *Primo Levi: le parti pris de la clarté* (Paris: Belin, 1997).

Conversazioni e interviste, Robert Gordon has published a monograph that re-examines Levi's works and his ethical probing of the human condition.⁴ Furthermore, two much publicized biographies, by Carole Angier and Ian Thomson, have also been attracting widespread attention both in the media and among researchers.⁵

For many people Levi is known as a survivor of the Holocaust, as 'il testimone privilegiato di una delle maggiori tragedie di questo secolo'. He is also known as a chemist, or more precisely, as 'un chimico che scriveva': a hybrid scientist-author with an eye for innovative linguistic practices and a deep belief in epistemological cross-fertilization.⁶ It is this second aspect of his work and thought that is considered here, although, as has been noted, echoes of his testimonial writings resonate through his entire oeuvre.⁷ Levi wished his writings to be considered as a choral work that opened connections and bridges between individuals:

ho desiderato che i miei scritti [...] fossero letti come opere collettive, come una voce che rappresentasse altre voci. Più ancora: che fossero un'apertura, un ponte fra noi ed i nostri lettori. (II, p.1351)

⁴ *La ricerca delle radici* (Turin: Einaudi, 1981), trans. by Peter Forbes as *The Search for Roots: A Personal Anthology* (London: Penguin, 2001); *Conversazioni e interviste*, revised and trans. as *Primo Levi: The Voice of Memory. Interviews 1961-87*, ed. by Marco Belpoliti and Robert S.C. Gordon (Cambridge: Polity, 2001); Robert S.C. Gordon, *Primo Levi's Ordinary Virtues: From Testimony to Ethics* (Oxford: Oxford University Press, 2001).

⁵ Carole Angier, *The Double Bond: Primo Levi, a Biography* (London: Viking, 2002); Ian Thomson, *Primo Levi: A Biography* (London: Hutchinson, 2002). Reviews of Angier's text include: Millicent Marcus, 'Primo Levi: The Biographer's Challenge and the Reader's Double Bind', *Italica*, 80/1 (2003), 67-72; Michael Ignatieff, 'Virtue in the time of infamy', *Financial Times*, 'Books', 6-7 April 2002, p.v. Reviews comparing the biographies include: Thomas Laqueur, 'Travelling in the Classic Style', *London Review of Books*, 24/17 (5 September 2002), pp.9-15; Blake Morrison, 'A Prisoner Outside the Gates', *The Guardian, Saturday Review*, 23 March 2002, p.8.

⁶ Marco Belpoliti, 'Editoriale', Belpoliti (ed.), *Riga*, 6-8 (pp.6-7).

⁷ '[Levi] non perde occasione per mettere la propria marca [...] per ricordare cioè al lettore che chi scrive è colui che ha fatto l'esperienza e ha raccontato *Se questo è un uomo*. Levi non manca mai di farlo, anche quando parla d'altro', Giorgio Bertone, *Italo Calvino: il castello della scrittura* (Turin: Einaudi, 1994), p.182; see also Lucy Emmett, 'Re-writing the Holocaust: Intertextuality in the works of Primo Levi' (unpublished doctoral thesis, University of Exeter, 2001) which explores the resonances of Levi's writings about the Holocaust across his other works.

The concept of the bridge is a significant, recurring topos in Levi's writing,⁸ implying connections not only between his own texts, but also between different bodies or spheres: for example, between scientific and literary modes of thought, expression and being in the world; between cerebral and manual activity; between different lexicons and vocabularies; between cultures and individuals in dialogue with one another.

This thesis approaches Levi's work by examining the bridges which he perceives, constructs, hypothesizes and advocates between the scientific and the literary realms. In addition it explores Levi's treatment of scientific and technological enterprise as cultural activities that exert a particular influence on our developing, embodied subjectivities. More specifically, the thesis tackles two main issues: first, Levi's engagements with the 'two cultures' debate concerning the relationship between literary and scientific communities and enterprise in the postwar period; second, his portrayals and critiques of science and technology as they impact on human life and freedoms, especially the relationship he depicts and problematizes between humans and machines in a post-industrial society. While the first issue is discussed largely through reference to dialogues between Levi and his contemporaries, the second is explored in relation to Levi's articles and fiction that confront existing dynamics or dramatize potential scenarios in which humans and technological devices interface with one another.

Before elaborating further on these subjects, it is important at this stage to highlight the problems posed by terminology in the literature-science or 'two cultures' debate. As critics have noted, often 'science is described in the humanities as a single unified thing, with examples from, say, biology wrongly taken as paradigmatic for the

⁸ See in particular Mirna Cicioni, *Primo Levi: Bridges of Knowledge* (Oxford: Berg, 1995), for discussions of the way that the bridge functions in Levi's writing.

whole of science'.⁹ Similarly, various (mis)understandings of the word 'culture' and 'intellectual' abound as the meanings of each term often change depending on the context in which they are used, and by whom.

Accordingly this thesis seeks to discern what is understood by these terms—both by Levi in particular and more generally—and to consider how this understanding may affect engagements with various forms of cultural activity and knowledge production. Furthermore, I wish to emphasize here that I do not in any way attempt to analyse the 'scientific' validity or accuracy of concepts discussed. Levi was a chemist, and certainly spoke with some authority about his own experiences in the laboratory and the factory, but never claimed expertise in other branches of science. Indeed, discussing the work of astrophysicists in 1981 he wrote that 'profani siamo tutti, ad eccezione di un migliaio di specialisti al mondo' (*II*, p.1524). In other words, we cannot pretend to understand specialist areas of scientific or other research of which we have no first-hand experience. However, this did not prevent Levi from writing and speculating about the actual and hypothetical impact of science and technology on the human subject at the level of individual lives and group dynamics. Since such forms of enquiry rely not on an ability to grasp the minutiae of a scientific concept but on a generally informed stance as regards the social consequences of such enterprises, the validity of Levi's comments is not in question. He asks how the cultural dissemination of practices enabled by scientific and technological developments influences the individual's ability to develop his or her own autonomous subjectivity. My discussion focuses on the ways in which Levi

⁹ Daniel Cordle, *Postmodern Postures: Literature, Science and the Two Cultures Debate* (Aldershot: Ashgate, 1999), p.13.

approached his subject matter, rather than the scientific or technological accuracy and feasibility of the subject matter itself.

As regards understandings of science, the twentieth century witnessed major changes in the way that scientific inquiry is viewed and conceptualized. The epistemological certainties promised by Cartesian intellect, Newtonian axioms and the rationalist, 'truth'-driven principles of the Enlightenment and positivism no longer hold. Indeed they have been systematically dismantled by problematizations of such positions, including Karl Popper's compelling challenge to the notion that knowledge is fundamentally based on empirical evidence or observation. Popper observed that 'tracing back all knowledge to its ultimate source in observation is logically impossible to carry through: it leads to an infinite regress (The doctrine that truth is manifest cuts off the regress. This is interesting because it may help to explain the attractiveness of the doctrine)'.¹⁰ Thus he reveals how certain received scientific doctrines gain their power from their ability to conveniently smooth over hitches in the investigative process. Popper concludes that 'there are many sources of knowledge but none has any authority' (p.24).

Popper's questioning of science's traditionally revered authority is echoed across critiques that seek to rework received notions of knowledge production and objectivity, among other issues. Following on from Popper's arguments, Thomas Kuhn's theories demolished logical, empiricist perceptions of science as an objective progression towards truth and questioned cumulative scientific advancement. Kuhn provided ways in which to rethink epistemological development, and furthered opposition to

¹⁰ Karl Popper, *Conjectures and Refutations: The Growth of Scientific Knowledge* (London: Routledge, 1963), p.23.

unproblematically presented, teleological notions of ‘progress’. Levi’s writing too offers a forceful challenge to accepted interpretations of the terms ‘progression’ and ‘advancement’—further examples of often problematic words which embody a range of assumptions about the value of capitalistic development. Levi’s work provides rich material for a discussion of how scientific and technological ‘advances’ impact upon key aspects of our lives: upon communication, upon the production of knowledge and especially upon the body itself and our experiences of embodiment.

Possible effects of the interface between the human subject and technological apparatuses are set out in Marx’s notion of *Entfremdung* or alienation provoked by industrial, capitalist organizations of the workplace, such as Taylorized production lines. This has been generally understood as manifesting itself through alienation from one’s own species of human as opposed to animal, from co-workers and colleagues and also alienation of the worker from the product of his or her labour.¹¹ In the age of cybernetics and nanotechnology, related fears about human subjectivity are widespread: philosopher of science Donna Haraway laments that ‘our machines are disturbingly lively, and we ourselves frighteningly inert’.¹² Far from controlling the new technologies, philosopher John Gray argues that we are instead controlled *by* them and are subject to vast potential abuses of our enhanced capabilities:

¹¹ See Gordon Marshall, *A Concise Dictionary of Sociology* (Oxford University Press, 1994), p.10. See also Bertell Ollman, *Alienation: Marx’s Concept of Man in Capitalist Society* (Cambridge: Cambridge University Press, 1990), for a broader discussion of alienation.

¹² Donna J. Haraway, ‘A Cyborg Manifesto: Science, Technology and Socialist-Feminism in the Late Twentieth Century’, in *Simians, Cyborgs and Women: The Reinvention of Nature* (London: Free Association Books, 1991), pp.149-81 (p.152).

If anything about the present century is certain, it is that the power conferred on 'humanity' by new technologies will be used to commit atrocious crimes against it. If it becomes possible to clone human beings, soldiers will be bred in which normal emotions are stunted or absent. Genetic engineering may enable age-old diseases to be eradicated. At the same time it is likely to be the technology of choice in future genocides.¹³

As discussed below, Levi shared much of this anxiety about unethical use of technological capabilities and a great deal of his writing examined in this thesis is shot through with images of repressive devices that threaten or eclipse the freedoms ostensibly promised by western democracies. Often these threats are exerted through insidious pressures whose source is difficult to trace, allowing new procedures and ways of being to become rapidly normalized and accepted, despite their potential and often evident dangers. Technology becomes an instrument of disciplinary power as defined by Michel Foucault: a ubiquitous, invisible regulating force that 'may be identified neither with an institution nor with an apparatus', or specific infrastructure.¹⁴ Levi depicts both these miniature or 'invisible' modern machines and more conspicuous metallic devices that may encompass an individual entirely. The notable common element in his descriptions is an awareness of how these tools and forces impact on the body as a crucial site of subjective development and expression. In contrast to the 'invisible' pressures exerted upon it, the human body remains relatively concrete: 'people are nowhere near so fluid, being both material and opaque' (Haraway, 'Manifesto', p.153). Yet, as with other aspects of his thought, Levi's approach to the body's materiality is

¹³ John Gray, *Straw Dogs: Thoughts on Humans and Other Animals* (London: Granta, 2003), p.14. Sadly the recent Anthrax scare in the USA shows how close we are to such extreme danger. See 'Anthrax scare shakes US', retrieved on 01/02/04 from <<http://news.bbc.co.uk/1/hi/world/americas/1590903.stm>>.

¹⁴ *Discipline and Punish: The Birth of the Prison*, trans. by Alan Sheridan (London: Penguin, 1977), p.215.

marked by a deep ambiguity, which leads him to both celebrate fantasies of material fluidity and solubility, and seek solace in the body's protective form.¹⁵

As regards critical appreciation of Levi's work, his dual activities as a chemist who also wrote have been widely noted for several decades, as critics further highlight connections and analogies posited by Levi himself.¹⁶ However, the past decade has seen a marked increase in texts that tackle his response to the two cultures debate and science and technology in a more substantial manner.¹⁷ Indeed, both the proceedings of the Strasbourg conference (*Le double lien*, Geerts and Samuel (eds)), and Angier's biography *The Double Bond*, draw their titles from Levi's last unfinished and therefore unpublished work, *Il doppio legame* which was conceived as a 'twin' book to *Il sistema periodico* of 1975—a text intended to solder together his dual careers (*I*, p.1446). However, there is as yet no comprehensive critical account that ties together the various dialogues, conversations and textual projects that constitute his contributions to the two cultures debate and attempts to move beyond a binary view of scientific and literary cultural production. Moreover, although Levi's belief in the importance of full, uninhibited embodiment for learning and individual development has received some

¹⁵ A rare discussion of Levi's descriptions of immaterial bodies is found in Jonathan Usher, 'Levi's Science Fiction and the Humanoid', *Journal of the Institute of Romance Studies*, 4 (1996), 199-216.

¹⁶ See for example, Mattioda, *L'ordine del mondo*, pp.32-36; JoAnn Cannon, 'Chemistry and Writing in *The Periodic Table*', in *Reason and Light: Essays on Primo Levi*, ed. by Susan R. Tarrow (Ithaca, New York: Center for International Studies, 1990), pp.99-111; Jean-Philippe Bareil, 'Le Système périodique, de l'autobiographie scientifique au métier de vivre', in Santagostino (ed.), pp.97-103. Levi's willingness to define himself as a 'scrittore-chimico' led to several articles on this subject: see for example Alfredo Todisco, 'La "chimica" di due scrittori', *Corriere della sera*, 1 March 1964, p.9; Paolo Milano, 'Il tecnico e la sua anima', *L'Espresso*, 21 January 1979, pp.57-58, and 'Poesia e prosa della chimica', *L'Espresso*, 22 June 1975, pp.65-66; Gabriella Poli 'Primo Levi: l'alfabeto della chimica: Lo scrittore è al suo secondo "sistema periodico"', *Tutto libri*, 4 December 1976.

¹⁷ Examples include: Giancarlo Borri, *Le divine impurità: Primo Levi tra scienza e letteratura* (Rimini: Luisè Editore, 1992); Mario Porro, 'Scienza', Belpoliti (ed.), *Riga*, 434-75.

attention,¹⁸ his approach to technologically mediated somatic experience, and indeed embodiment in general, remains critically underexplored.¹⁹ The gendered dynamics of this aspect of his work also merit proper critical consideration—an issue on which scholars have hitherto remained largely silent. The present discussion aims to provide just such an account of Levi's projects to heal the disciplinary divide which so frustrated him, and to develop this analysis through close readings of several relatively understudied texts in an attempt to shed more light on his position with regard to human experience in the technological age. I now provide a contextualization of the literature-science dynamic which provoked such debate in the postwar period.

1. The Two Cultures Debate

The number 2 is a very dangerous number: that is why the dialectic is a dangerous process. Attempts to divide anything into two ought to be regarded with much suspicion.²⁰

Although already under way in the UK in the late nineteenth-century, as Matthew Arnold and T.H. Huxley debated the relationship between science and literature,²¹ the main thrust of this discussion was provoked by C.P. Snow's 1959 Rede lecture from which the phrase the 'two cultures' derives. As both a scientist and a published literary

¹⁸ See Paola Valabrega, 'Mano/cervello', Belpoliti (ed.), *Riga*, 380-92, and Pierpaolo Antonello, *Elogio dell'ibrido: scienza, filosofia, tecnica nella letteratura italiana del Novecento* (unpublished manuscript), Chapter 5, 'La materia, la mano, l'esperimento: il centauro Primo Levi'.

¹⁹ There are a number of essays on the relationship between humans and technology but no more substantial treatment of this theme. See for example Ilona Klein, "'Official Science Often Lacks Humility": Humor, Science and Technology in Levi's *Storie naturali*', in Tarrow (ed.), pp.112-26, and 'La Science, la science-fiction et la mémoire dans l'oeuvre de Primo Levi', in Santagostino (ed.), pp.87-95.

²⁰ Charles Percy Snow, *The Two Cultures*, Canto Edition (Cambridge University Press 1993; 1st edn 1959), p.9.

²¹ For an account of the debate between Matthew Arnold, T.H. Huxley and later Aldous Huxley, which began in the 1880s, see Cordle, pp.11-33.

author, Snow's contention was that the two communities of scientists and literary scholars were both unable and unwilling to communicate with one another due to linguistic barriers and obstacles in the educational infrastructure that discouraged an interdisciplinary perspective. Snow's authority to speak on and for both areas of activity has often been challenged. F.R. Leavis for one called his literary credentials into question quite substantially, stating: 'Snow thinks of himself as a novelist' but 'as a novelist he doesn't exist' (Snow, p.xxxiv). In Leavis' view, this was due to his poor characterization and dialogues, as well as his propensity to depict academic communities as devoid of intellectual dynamism. Although his exposure to both scientific and literary circles should have enabled him to develop a broader view of epistemological issues than encouraged by the circumscribed limitations of each discipline, his writing on the two cultures divide functions in many ways to reinforce dualities between the communities. For example, he makes sweeping statements regarding the superiority of scientists' 'moral health' over that of literary intellectuals (Snow, p.xxvi).

Similarly to Snow, Levi enjoyed the relatively unusual status of simultaneously practising organic chemistry and literary authorship: he was employed at SIVA (the Società Industriale Vernici e Affini) from 1948-77 (Angier, pp.479, 575-77) and published novels, short stories, poems, essays and articles from the initial publication of *Se questo è un uomo* in 1947 until his death in 1987.²² In a further similarity to Snow—whose dual career has been seen as composed of two opposing, disconnected halves²³—

²² For a history of the publication of *Se questo*, see I, pp.1375-1413.

²³ For example, Elio Vittorini saw Snow's work as proof that 'non è possibile tentare di conciliarle [le due culture]. Si riprodurrebbe una giustaposizione. Lo stesso Snow lo dimostra quando è romanziere, perchè i suoi libri sono letterariamente vecchi, ottocenteschi, cioè antiscientifici', *La cultura dimezzata*, ed. by Armando Vitelli, (Milan: Giordano Editore, 1965), p.144.

Levi's twin activities led to his self-characterization as a hybrid being marked by a 'two cultures' split:

io sono un anfibio, un centauro [...] Io sono diviso in due metà. Una è quella della fabbrica, sono un tecnico, un chimico. Un'altra, invece, è totalmente distaccata dalla prima, ed è quella nella quale scrivo, rispondo alle interviste, lavoro sulle mie esperienze passate e presenti. Sono proprio due mezzi cervelli. È una spaccatura paranoica.²⁴

As is immediately apparent from this citation, the co-existence of these two 'mezzi cervelli' (a cerebral division that implicitly involves both psyche and soma) was not always harmonious; indeed, Levi often felt disqualified from either discipline due to his partial affiliation to both, and struggled to reconcile the diverse activities and epistemological approaches alternately required, enabled, sanctioned and discouraged by scientific and literary endeavour. However, he also insisted on the need to strengthen and establish strong connections between the two cultures, marvelling at the persistent gulf between them. In the 'Premessa' to the collection of essays *L'altrui mestiere*,²⁵ Levi takes up the topos of bridges overtly, stating: 'Sovente ho messo piede sui ponti che uniscono (o dovrebbero unire) la cultura scientifica con quella letteraria scavalcando un crepaccio che mi è sempre sembrato assurdo' (*II*, pp.631-32). Here we have a key example of one of the contradictions that marks Levi's thought and writing: his conviction that literature and science are, or should be, united bodies of inquiry and expression, versus the impossibility of reconciling the two halves of his own persona and activity.

Such deadlock is nothing new. Recent years have seen a significant increase in the number of publications analysing and commenting upon the relationship between

²⁴ Edoardo Fadini, 'Primo Levi si sente scrittore "dimezzato"', *L'Unità*, 4 January 1966; repr. in *Conversazioni*, pp.106-09 (p.107).

²⁵ Turin: Einaudi, 1985; repr. in *II*, pp.629-856.

‘science and literature’, ‘science and art’ or ‘science and culture’. These texts—which are largely motivated by a desire to break down boundaries between discipline-specific enclaves or demonstrate reciprocal influence between areas of inquiry—probe and suggest connections, analogies, differences and distinctions between what are often perceived to be opposing areas of interest.²⁶ In a postmodern age where interdisciplinary research is both fashionable and flourishing, much progress has been made in developing the field of Science and Literature Studies: for example, there is a successful Society for Literature and Science that organizes dynamic and well attended international conferences and also publishes a scholarly journal.²⁷ However, ever since the controversy provoked by Snow’s lecture, discussions of these interdisciplinary relationships have been characterized by often furious attacks on those representing the ‘other’ side. If Snow’s polarization of ‘science’ versus ‘literature’ has come under sustained attack for its rather naïve, undifferentiated portrayals of literary and scientific personalities and research activities, the rigid duality of his model has proved hard to dismantle. As recently as 2001 Trevor Pinch has written that ‘misunderstandings and distrust are widespread. The space between the two cultures seems less a gap and more a yawning chasm’.²⁸

²⁶ Significant texts include Gillian Beer, *Open Fields: Science in Cultural Encounter* (Oxford: Clarendon Press, 1996), and *Darwin’s Plots: Evolutionary Narrative in Darwin, George Eliot and ‘Nineteenth Century’ Fiction* (London: Routledge and Kegan Paul, 1983); *One Culture: Essays in Science and Literature*, ed. by George Levine (Madison, Wisconsin: University of Wisconsin Press, 1987); N. Katherine Hayles, *Chaos Bound: Orderly Disorder in Contemporary Literature and Science* (Ithaca, NY: Cornell University Press, 1990); *The Third Culture: Scientists on the Edge*, ed. by John Brockman (London: Simon and Schuster, 1995); Michel Serres, *The Troubadour of Knowledge*, trans. by Shelia Faria Glaser (Ann Arbor: University of Michigan Press, 1997) and Michel Serres with Bruno Latour, *Conversations on Science, Culture and Time*, trans. by Roxanne Lapidus (Ann Arbor: University of Michigan Press 1998); Cordle, *Postmodern Postures; The One Culture? A Conversation about Science*, ed. by Jay A. Labinger and Harry Collins (Chicago and London: University of Chicago Press, 2001).

²⁷ See <<http://sls.press.jhu.edu/info.html>>. The society was established in Berkeley, 1985, and has published the journal *Configurations* since 1993.

²⁸ ‘Does Science Studies Undermine Science?’, in Labinger and Collins (eds), pp.13-26 (p.17).

In his lecture, Snow called for clearer communication and improved dialogue between those involved in literary and scientific activities, famously lamenting the fact that many scientists had not read any works by Shakespeare and numerous literature specialists did not know the second law of thermodynamics (Snow, pp.14-15). Although this provocative statement has attracted criticism—for example George Levine takes issue with Snow's criteria, asserting roundly that 'these are not the terms of a serious debate'²⁹—other aspects of his argument have inspired constructive discussions. As implied by the relationship between the 'contrasting' phenomena of 'science and culture' cited above, one of the issues central to debate is our understanding of what constitutes 'culture' and 'cultural' education or activity. Snow defines culture as both 'intellectual development, development of the mind' and as an anthropological term used to describe a group of individuals linked by their shared environment, habits and practices (Snow, pp.62-64). He points out that scientists are often excluded from groups of 'cultural' practitioners, as if their activities were in some way beneath the lofty works of more aesthetically inclined writers, and attacks this dismissal of scientists' contributions: 'if we are to use "culture" in its refined sense at all, it is only lack of imagination, or possible blank ignorance, which could deny it to scientists' (p.63).

Likewise, in Snow's view, the term 'intellectual' has been appropriated exclusively by literary authors who refuse to recognize scientists' right to such distinction. As he sees it, research communities have become split:

Literary intellectuals at one pole—at the other scientists, and as the most representative, physical scientists. Between the two a gulf of mutual incomprehension—sometimes (particularly among the young) hostility and dislike, but most of all lack of understanding. They have a curious distorted image of each other. (p.4)

²⁹ George Levine, 'One Culture: Science and Literature', in Levine (ed.), pp.3-32 (p.3).

Part of this split is due to a perceived distinction between theory and praxis, or between the kinds of knowledge synthesized into Aristotle's tripartite notion of *scientia* (speculativa, activa, factiva),³⁰ now seen by some as irrevocably divided and incompatible. Identifying a further dialectic, Snow remarks:

I believe the intellectual life of the whole of western society is increasingly being split into two polar groups. When I say the intellectual life, I mean to include also a large part of our practical life, because I should be the last person to suggest the two can at the deepest level be distinguished. (Snow, pp.3-4)

Just as Pinch's remarks on the persistent nature of the two cultures divide testify to a stagnation within debate, Richard Dawkins reiterates Snow's point about those eligible to claim the title of intellectual, indicating that the epistemological stalemate has not yet been dissolved. Dawkins complains about 'a hijacking by literary people of the intellectual media', lamenting further that 'the very word "theory" has been hijacked for some extremely narrow parochial literary purpose—as though Einstein didn't have theories; as though Darwin didn't have theories' (Brockman (ed.), p.23). Dawkins claims that scientists are not simply technicians but they also conceptualize and develop complex abstract theories; Snow asks that we understand practical activity as embodying an intellectual component. Both are concerned to improve the standing of scientific inquiry in all its modalities; indeed, Stefan Collini observes that for Snow and the majority of positive respondents to his lecture, 'the pressing problem was to raise the status of science and to increase the scientific literacy of the non-scientists rather than vice versa' (Snow, p.xxx).

³⁰ See Max H. Fisch, 'Vico's *Pratica*', in *Giambattista Vico's Science of Humanity*, ed. by Giorgio Tagliacozzo and Donald Philip Venere (London: The John Hopkins University Press, 1976), pp.423-30 (pp.424-25).

Levi too wishes to improve the way in which science is perceived and to highlight its wider relevance to human activity and experience; *Il sistema periodico* was intended to show that ‘una scienza o una tecnica può essere non solo soggetto di un libro, ma anche scuola al pensare e quindi allo scrivere’.³¹ Similarly, Levi considers the relationship between practical and cerebral activity to be of great importance. Like Snow, he is frustrated by the prevalent view—also widespread in Italy, as discussed below—that manual activity is somehow baser and less worthy of respect than more abstract scholarly pursuits. Reflecting on his positive early experiences of laboratory in contrast to classroom work he states, ‘la mano è un organo nobile, ma la scuola, tutta presa ad occuparsi del cervello, l’aveva trascurata’.³² Throughout his writings he insists on the importance of physical and sensorial development to our quality of life, striving to undo the polarized views which shaped his own experiences of education. However, we again see how his thought is marked by a central ‘spaccatura’ when he is asked what the phrase ‘essere un intellettuale’ means to him. Levi replies:

È un etichetta che non mi entusiasma. Dopo l’esperienza del Lager ho fatto il tecnico, il chimico, per trent’anni. Le domando e mi domando se un tecnico che fa vernici, come ho fatto io, è un intellettuale oppure no. Le e mi rispondo: nell’esercizio delle mie funzioni di tecnico di fabbrica ho forti dubbi che la definizione di intellettuale si attagli. Mentre invece si attaglia a quello che era il mio secondo lavoro, quello di scrivere. Non c’è dubbio che questo mio primo libro che lei ha citato [*Se questo*] è opera di intellettuale, se per intellettuale definiamo colui il quale si esprime preferibilmente per iscritto, che pensa alle cose che scrive, e non pensa di fare un mestiere scrivendo, fare opera professionale sì, come qualità, ma non legata a un guadagno. Se lei accetta questa definizione allora dico che sì [...] a tempo perso sono stato un intellettuale e tale sono tuttora, ma nelle ore non lavorative, alla sera, alla domenica o durante le ferie.³³

His insistence on the distinction between laboratory or factory work and literary

³¹ Giorgio De Rienzo and Ernesto Gagliano, ‘La ragione non può andare in vacanza’, *La Repubblica*, 24 January 1979; repr. in *Conversazioni*, pp.115-22 (p.117).

³² Primo Levi and Tullio Regge, *Dialogo* (Turin: Einaudi, 1984), p.20.

³³ ‘Primo Levi. Conversazione con Alberto Gozzi’, transcript of RAI radio interview, 7 January, 1985; repr. in Belpoliti (ed.), *Riga*, 91-101 (p.92).

authorship reveals the strength of the contradiction within him; on the one hand he makes a case for the nobility of manual work which should be considered as having comparable merits to more philosophical pursuits, while on the other he fuels the argument for a sharp distinction to be drawn between this and his activity 'di scrittore, di intellettuale' (Gozzi, p.93). In *I sommersi e i salvati* Levi provides a further definition of an intellectual:

La persona colta al di là del suo mestiere quotidiano; la cui cultura è viva, in quanto si sforza di rinnovarsi, accrescersi ed aggiornarsi; e che non prova indifferenza o fastidio davanti ad alcun ramo del sapere.³⁴

He asserts that the category 'intellectual' should include mathematicians and philosophers of science, acknowledges that the term holds different connotations in different cultural situations, but primarily, in this chapter 'L'intellettuale ad Auschwitz', he distinguishes between manual work and intellectual reasoning, reflecting on Jean Améry's treatment of this issue.³⁵ Here Levi defines himself uncomfortably as a potential intellectual at the time of writing (1986), but asserts that in the Lager he was too young to be considered as such, pointing out that there it was vital to develop more applied skills such as finding bread and shoes, in order to survive (*II*, p.1108). Yet although this chapter ends by affirming the importance of practical coping strategies, Levi does admit that his intellectual culture, specifically his literary culture, served and perhaps even saved him (*II*, p.1100).

As implied by Snow's remark cited above, a dialectic can prove unhelpful and

³⁴ *I sommersi e i salvati* (Turin: Einaudi, 1986), repr. in *II*, pp.995-1153 (p.1095).

³⁵ Jean Améry, 'At the Mind's Limits', in *At the Mind's Limits: Contemplations by a Survivor on Auschwitz and its Realities*, trans. by Sidney Rosenfeld and Stella P. Rosenfeld (London: Granta Books, 1999; 1st edn 1980), pp.1-20. The book grew from a radio talk Améry was invited to deliver on German radio in 1964, entitled 'Encounter of the Intellectual with Auschwitz' (p.107).

even pernicious as a heuristic model, and is also an extremely stubborn opposition to dismantle. In Levi we see attempts to break down perceived dualistic hierarchies within cultural activities, as he asserts 'il fatto che le culture siano due è già nociva in partenza. Dovrebbe essere una sola'.³⁶ Yet statements such as these are offset by an unwillingness to integrate his own practices as united either by their common intellectual character, or by overlapping properties shared by both, due to experiential factors. Recent responses to Snow's argument have experimented with the possibility of dissolving the dualistic deadlock. Brushing aside the two cultures model, Levine directs his attention instead to the discursively constructed nature of literature and science. Although his 'one culture' approach does not seek to collapse literature and science into a unified phenomenon, he argues that literature and science are fundamentally 'modes of discourse' that are understood and developed through the cultural context in which they are embedded, and which 'can and should be studied as deriving from common cultural sources' ('One Culture', pp.3-4). Distinctions remain to be drawn, certainly, but these relate principally to the difference in language as employed within either discipline. Thus the debate moves into the sphere of constructivism, in which rather than referring to 'the classic dichotomies between, for example, the world of value and the world of fact, the subjective and the objective, or the intuitive and the inductive',³⁷ theorists are informed by a Foucauldian perspective in which discourses are no longer treated as 'groups of signs (signifying elements referring to, contents or representations) but as practices that

³⁶ Giuseppe Grassano, 'Conversazione con Primo Levi', in Grassano, *Primo Levi* (Florence: La Nuova Italia, 1979), pp.3-17; repr, in *Conversazioni*, pp.167-84 (p.174).

³⁷ Thomas S. Kuhn, 'Comment on the Relations of Science and Art', *The Essential Tension: Selected Studies in Scientific Tradition and Change* (Chicago: University of Chicago Press, 1977), p.340, cited in Levine, 'One Culture', p.4.

systematically inform the objects of which they speak'.³⁸ As a consequence, Derrida asserts, 'any science [...] comes about within the element of discourse'.³⁹

With this in view, critics have pressed for proper analysis of the cultural and ideological positions that impact upon the formation of scientific discourse, and for rigorous exploration of 'the processes of encoding by which assumptions shared *beyond* science are built into scientific statement'.⁴⁰ However, this strand of deconstructive analysis and the challenge to scientific objectivity have also come under attack from scientists, notably Alan Sokal and Jean Bricmont whose infamous critique of French philosophers was motivated by a desire to refute the 'epistemic relativism' which asserts that science is merely a myth or a social construction.⁴¹ Since Levi wrote several of his works before the interpretive possibilities enabled by poststructuralist theorizing became widely disseminated, and his writing does not display an overt enthusiasm for innovative theoretical positions, it is hard to determine what his view of Sokal and Bricmont's argument might have been. What Levi does tell us is that far from being a stand alone phenomenon, science is shaped, driven and often abused by those who manage its branches; moreover, attempts to further 'scientific knowledge' without due consideration for the potential implications of this 'knowledge' may have disastrous consequences for human freedoms.

³⁸ Michel Foucault, *The Archaeology of Knowledge*, trans. by Alan M. Sheridan Smith (London: Routledge 1992), p.49.

³⁹ Jacques Derrida, 'Structure, Sign and Play in the Discourse of the Human Sciences', in Lodge (ed.), pp.89-103 (p.93).

⁴⁰ Gillian Beer, 'Science and Literature', in the *Companion to the History of Modern Science*, ed. by R.C. Olby and others (London: Routledge, 1990), pp.783-98 (p.783).

⁴¹ Alan Sokal and Jean Bricmont, *Intellectual Impostures* (London: Profile Books, 1998), p.ix. For works that problematize understandings of science as a rational, empirical discipline see, for example: Kuhn, *The Structure of Scientific Revolutions*; Paul Feyerabend, *Against Method* (London and New York: Verso 2000); Mary Midgley, *Science as Salvation: A Modern Myth and its Meanings* (London and New York: Routledge, 1992); *Science and Beyond*, ed. by Steven Rose and Lisa Appignanesi (Oxford: Blackwell, 1986).

Having sketched some of the key issues raised by the two cultures debate in Anglophone circles and related these briefly to Levi's thought, I now turn to Italy, and endeavour to provide a more immediate cultural context in which to situate Levi's work.

2. 'Le due culture': An Italian Context

Italy has a history of high profile thinkers whose work touches significantly on the relationship between literature and science. Dante's eclectic and syncretic approach to different areas of knowledge has been widely noted, as has his ability to conjure poetry from scientific concepts.⁴² Similarly, Leonardo da Vinci's wide ranging research took him across the spectrum of what have become quite discrete epistemological fields.⁴³ In contrast, towards the end of the sixteenth century, Galileo Galilei was deliberately, consciously employing literary rhetoric to present his scientific findings to a courtly audience. Struggling against the controlling power of the court that rewarded philosophers more handsomely than mathematicians and demanded that scientific matters were couched in literary discourse, Galileo was forced to create a new dual role in court society; that of the philosopher-mathematician.⁴⁴ However, as Levi maintains (*II*, p.632), perhaps Galileo did not see or feel the 'divario' between science and

⁴² *Dante e la scienza: atti del convegno internazionale di studi 'Dante e la Scienza'*, Ravenna, 28-30 May 1993, ed. by Patrick Boyde and Vittorio Russo (Longo Editore, Ravenna, 1995); see especially Francesco Mazzoni, 'Dante "Misuratore dei mondi"' (pp.25-53), and Lino Pertile, 'Poesia e scienza nell'ultima immagine del Paradiso' (pp.133-48).

⁴³ See *Leonardo da Vinci: Selected Scholarship*, ed. by Claire Farago, 5 vols (New York and London: Garland Publishing Inc., 1999), V, *Leonardo's Science and Technology: Essential Reading for the Non-Scientist*.

⁴⁴ See Mario Biagioli, *Galileo Courtier: The Practice of Science in the Culture of Absolutism* (University of Chicago Press, 1993), p.3.

literature present in modern consciousness, since during that period ‘science’ relied more heavily on speculation than empirical evidence.⁴⁵

As regards the status of cultural activities, many twentieth-century scientists are angered by the pervasive assumption that literary or humanist culture is naturally superior to scientific methodology: ‘doing’ or Aristotle’s concept of *praktikê* (human production), is transcended by creative making, or *poiêtikê*. However, such assumptions are not new: René Descartes’ theories valuing rational thought above the irrational, unreliable, treacherous body set up a hierarchy that lingers to this day, privileging mental over manual activity.⁴⁶ Giambattista Vico also valued the metaphysical over the physical, lauding the former as ‘la scienza sublime, che ripartisce i certi loro subbietti a tutte le scienze che si dicono “subalterne”’.⁴⁷ For Vico, metaphysics is a truth of which the other (lesser) sciences form component parts; they are partial and are surpassed by the comprehensivity of a metaphysical investigation or awareness. In contrast, the *philosophes* of the ‘Enlightenment’, or ‘Age of Reason’, were seen to stand for the possibility of total and true knowledge, based on experiment; a position that was later roundly criticized by the Romantics who accused them of being ‘shallow and mechanical thinkers’.⁴⁸ Science remained the underdog, reliant on the lyricism and ‘divagazione’ of literary writing to temper what are felt to be its brittle, dated errors.

⁴⁵ See Albert Einstein’s foreword to Galileo’s *Dialogue Concerning the Two Chief World Systems*, trans. by Stillam Drake (Berkeley and Los Angeles: University of California Press, 1967), pp.vii-xxvi (p.xvii).

⁴⁶ For a helpful discussion of the nature and influence of Descartes’ work see Susan R. Bordo, *The Flight to Objectivity: Essays on Cartesianism and Culture* (New York: State University of New York Press, Albany, 1997).

⁴⁷ Giambattista Vico, *Opere*, ed. by Fausto Nicolini (Milan: Riccardo Ricciardi Editore, 1953), p.497.

⁴⁸ Roy Porter, *The Enlightenment* (London: Macmillan, 1990), p.2. Porter does point out that this view is rather narrow, and that in fact many thinkers of the time wished to distance themselves from the rationalist, systematic approach of Descartes and Leibniz, for example.

According to this view, scientific writing and thought can never hope to move beyond their condition of unimagined blockages to human relations with nature.

In the late nineteenth century, contemporaneously to Arnold and Huxley's debates, Francesco de Sanctis argued that 'chimica, storia naturale, anatomia, fisiologia, patologia non erano più studi speciali ma facevano parte della cultura generale', which influenced literature, art and 'persino la vita comune'.⁴⁹ However, his view was sidelined by that of the philosopher Benedetto Croce, who famously and influentially championed the 'pure' philosophical concept that resulted from theoretical cognition, over the 'pseudoconcetti' produced by the more practical, empirically oriented aspects of consciousness.⁵⁰ According to Croce, in the wake of the Counter Reformation, Romanticism had forced sciences into the cultural background, where they belonged due to their limited nature: 'rinserrò nei loro limiti le scienze naturali e matematiche e le correlative forme mentali'.⁵¹ Croce argued that after the Enlightenment, dominated by literary intellectuals and philosophers, the new science of 'Estetica' was established, consisting of a theoretical and speculative approach, embodying the fantasy, passion and spontaneity lacking in the sciences. Croce asserted that the sciences were inferior to humanist thought, and were only valid as an initial mode of schooling: 'per le scienze i filosofi [...] pensarono, dapprima, a trattarle come "prefilosofia" o preparazione alla filosofia'. Far from advocating any interdisciplinary interaction, his conviction regarding the need for a clear division between disciplines drove Croce to lament any so-called

⁴⁹ De Sanctis quoted in Ezio Raimondi, *Scienza e letteratura* (Turin: Einaudi, 1978), p.5.

⁵⁰ M.E. Moss, *Benedetto Croce Reconsidered: Truth and Error in Theories of Art, Literature and History* (Hanover and London: University Press of New England, 1987), p.26.

⁵¹ Benedetto Croce, *Filosofia, poesia, storia: pagine tratte da tutte le opere, a cura dell'autore* (Milan: Riccardo Ricciardi Editore, 1955), p.988.

‘stravaganti cosiddette Filosofie della natura, che non sono né scienze né filosofia’, indicating a clear desire to maintain a disciplinary dialectic.⁵²

Although he drew a sharp, apparently unshakeable distinction between the pure concept of art and more practically derived ‘pseudoconcepts’—a stance which led him to become known as ‘il filosofo dei distinti’—Croce also insisted that human beings should be rounded individuals rather than ‘dimidiati viri’ (Moss, p.32); that is, rather than advocating a society composed of ‘uomini pratici e uomini teoretici’ as two contrasting sub-species, he argued that ‘l’uomo pratico è anche l’uomo teoretico’ (Croce, *Filosofia come scienza*, p.5). However, this recognition of the benefits derived from integrating complementary activities has been overshadowed by the strength of Croce’s support for epistemological distinctions which has proved pervasive in later conceptions of his work. For example, Levi represents Croce’s followers as admonishing severely: ‘Tu giovane crociano, tu giovane cresciuto in questa Italia, non avvicinarti alle fonti del sapere scientifico, perché sono pericolose’. Levi subsequently admits ‘non ho mai letto Croce su questo argomento’, but states that he has come to understand Croce’s demeaning of ‘pseudoscienze, faccende tecniche, utili per la vita ma non per la comprensione del mondo’ through their longstanding impact on Italian culture and educational institutions (*Dialogo*, p.12). When Levi was at university in 1941, however, Croce’s standing was perceived to be so unshakeable that Levi and his peers set Crocian dictums on a par with other distinguished ‘authorities’: ‘la Bibbia, Croce, la geometria, la fisica, ci apparivano fonti di certezza’ (*I*, p.783). Clearly some significant re-evaluation of Croce’s arguments took place for Levi after his university career ended.

⁵² Benedetto Croce, *Filosofia come scienza dello spirito: filosofia della pratica* (Bari: Laterza & figli, 1950), p.56.

Levi links Croce with the latter's contemporary, the philosopher Giovanni Gentile. The friendship and subsequent rupture between the two men is well documented,⁵³ but despite the rift that grew between them as Gentile accepted and Croce refused the post of Education Minister under Mussolini, there are similarities in terms of their legacies. For example, just as Croce is recognized as having separated theory from practice, Gentile is known for his school reforms that valorized classical over scientific subjects. This tradition became so deeply entrenched within the institutions of education that by the late 1940s, when the physicist Tullio Regge was attending the liceo scientifico, ironically 'li veniva insegnato di tutto, fuorché la scienza. Anzi, la scienza veniva insegnata così male da scoraggiare anche i meglio disposti' (*Dialogo*, p.14).

Both Levi and Regge reveal that they felt like the victims of a conspiracy, as if important sectors of learning and thought were being denied to them. Levi says:

Avevo una curiosa sensazione: che ci fosse una congiura ai miei danni, che la scuola e la famiglia mi tenessero nascosto qualcosa [...] per esempio la chimica, o anche l'astronomia. (*Dialogo*, p.13)

Regge corroborates this theory, recalling how in the final year of his scholastic career at the 'liceo scientifico', fewer teaching hours were devoted to scientific subjects than to the humanities. In addition to discrepancies in timetables, however, value judgements regarding the importance of the disciplines were also rife and openly articulated. Levi remembers with outrage how, bolstered by the 'congiura gentiliana', in an outburst which confirmed the existence of such a plot, his teacher for Italian literature dismissed science as inferior to literary subjects: 'Quando ha detto pubblicamente che le materie letterarie hanno valore formativo, e quelle scientifiche solo valore informativo, mi sono

⁵³ See Sergio Romano, *Giovanni Gentile: la filosofia al potere* (Milan: Bompiani, 1984), and Gabriele Turi, *Giovanni Gentile: una biografia* (Florence: Giunti, 1995).

rizzati i capelli in testa' (p.14). Although there are of course productive elements in the philosophies of both Croce and Gentile—for example the stand they both took against the positivism of Herbert Spencer and Cesare Lombroso (Moss, p.13)—their rather short-sighted dismissal of all science as useful, but inherently limited and limiting, had far-reaching effects on the way that scientific subjects were taught, learned and conceptualized within Italian culture for many decades. If discourse creates its own object, the discourses spawned by their theories led to engagements with science that were characterized by misguided and blinkered attitudes, and therefore resulted in a science that fell far short of its own potential and responsibilities.

Reacting against these divisive positions, Antonio Gramsci flung aside romantically disembodied speculative voices to declare that 'non si può separare l'*homo faber* dall'*homo sapiens*'.⁵⁴ Gramsci criticized the idealistic philosophies of Croce and Gentile which isolated both natural and exact scientists from the cultural hemisphere. He blamed these trends, the cold efficiency of the Counter Reformation (*Gli intellettuali*, p.38) and the regained status of the Catholic church, for the 'denutrizione' of scientific activity, which was unable to develop at a comparable rate due to its isolation from popular culture (p.46). To counteract this schism, Gramsci suggested a 'nuovo intellettuale' who would move actively from the ineffectual realm of eloquence into the 'vita pratica, come costruttore, organizzatore' (p.7). The aim was to become a kind of new Universal Man, as glorified by Pico della Mirandola, Castiglione and Alberti (among others) in the Renaissance, but this time for an industrial age. The 'nuovo intellettuale' was to combine specialist with political knowledge, and transcend the

⁵⁴ *Quaderni del carcere*, 6 vols (Turin: Einaudi, 1964; 1st edn 1948), II, *Gli intellettuali e l'organizzazione della cultura*, p.6.

boundaries of cloistered academics who had lost touch with the physical world. For Gramsci, science is an element of culture which is open to promotion or disregard by those who administer the cultural pages. He defines a *rubrica scientifica* as a space in which to expose and criticize new scientific ideas, alongside an analysis of their implications on culture and ideology, in order to promote science as a fundamental and formative basis for the 'nuova scuola' (p.149). However, the *quotidiani* which he encounters lack the expertise of scientific analysts, whose place is taken by the work of 'un corpo notevole di giornalisti specializzati per la letteratura economica, letteraria ed artistica' (p.163).

Gramsci's delineation of the new intellectual was intended to dissolve the 'aura' of intellectual work, and to show that intellectuals could no longer remain apart, protected from the physicality of life by 'una superiore saggezza o sapienza o neutralità'.⁵⁵ This (re)integration, would, he asserted, lead to the organic production of intellectuals particular to each social group, in addition to the more 'tradizionale' image associated with them (*Gli intellettuali*, p.11). Likewise, scientific data should be a staple ingredient in any Italian journal or newspaper (p.163), rather than left to stand alone, outdated and ineffectual, like the *homo sapiens* deprived of his alter-ego, the *homo faber*. Gramsci's arguments suggest that science is inextricably woven into culture, and vice versa; moreover, he demands that different disciplines and modes of thought can and should co-exist without artificially and ideologically imposed hierarchical frameworks. As Michel Serres has stated, 'science does not annul non-science, it rouses

⁵⁵ Romano Luperini, *Controtempo: critica e letteratura fra moderno e postmoderno. Proposte, polemiche e bilanci di fine secolo* (Naples: Liguori Editore, 1999), p.49.

and exalts it [...] as if science were [...] everywhere dense within culture, and culture, inversely, everywhere dense within knowledge'.⁵⁶

Gramsci's prison notebooks were not published until the late 1940s⁵⁷ and interestingly it was certainly this approach to an integrated culture that was ostensibly (if tentatively) sought in the postwar period—both in terms of epistemological reconciliation across the disciplines and the dissolving of hierarchies associated with notions of intellectualism and validity of subject matter or methodology. The new cultural freedoms of the mid-1940s and 1950s saw the founding of numerous journals, papers and magazines—such as *Il Politecnico*, *Rinascita*, *Società* (founded in 1944-45)—envisaged in part as fora for discussion and debate of cultural issues in general, including both scientific and literary concerns. Thus began a process of redemption for 'science', as it started to reclaim its broader significance beyond the mere informativity and limited usefulness accorded it by Croce. This process of re-evaluation and redefinition is comparable to Snow's arguments in Britain, calling for proper recognition of what he saw as science's broader socio-cultural value and potential 'moral' contributions to the development of intellectual health (Snow, p.xxvii).

The postwar period in Italy witnessed a period of economic development and large-scale industrialization that swept across socio-cultural and geographical landscapes, altering urban settlements, changing employees' experiences of working environments and revolutionizing cultural conceptualizations of the significance and potential of science and technology. Financial backing from the Marshall Plan and

⁵⁶ Michel Serres, *Feux et signaux de brume: Zola* (Paris: Grasset, 1975), pp.32-33; my translation.

⁵⁷ The prison notebooks were first published as *I quaderni del carcere*, ed. by Felice Platone and Palmiro Togliatti, 6 vols (Turin: Einaudi, 1948-51).

frenetic increases in manufacture and trade meant that between 1950 and 1970 the trading of manufactured goods increased by six times its previous levels, as companies such as FIAT and ENI flourished. Italy stepped into the European limelight as a protagonist of economic and technological development. 'Fordism (the automated mass production of consumer goods) and consumerism became the twin gods of the age'.⁵⁸ Neo-realist literature, inspired by social rather than literary motivations,⁵⁹ was supplemented by writing that sought to capture the spreading social alienation resulting from the massive growth in the number of factory employees and the consequent alterations in daily routine for many thousands of Italians.⁶⁰

As authors struggled to come to terms with and adequately represent this new reality, the relationship between 'scrittori e industria', and the figure of the 'letterato aziendale' began to excite much interest. The role of this figure was far from clear cut; this 'letterato' often walked a fine line between criticizing the harsh realities of factory work and romanticizing the novelty of industrial 'progress' (Chicco Vitzizzai, p.31). As Toscani argues, Italian literature at this time was seeking to overcome both its own tardiness in confronting the new theme of industrial life, and the relative historical tardiness of the technological revolution in Italy ('Vite e teorie', p.515). The breadth of the gap between the 'literary intellectual' and the ordinary citizen or factory employee was in some cases so pronounced that much of this writing fell into the trap of elegiac

⁵⁸ Paul Ginsborg, *A History of Contemporary Italy: Society and Politics 1943-88* (London: Penguin, 1990, pp.212-13).

⁵⁹ See Romano Luperini, *Il Novecento: apparati ideologici, ceto intellettuale, sistemi formali nella letteratura italiana contemporanea*, 2 vols (Turin: Loescher editore, 1981), I, p.669.

⁶⁰ See Elisabetta Chicco Vitzizzai, *Scrittori e industria: dal 'Menabò' di Vittorini e Calvino alla letteratura selvaggia* (Turin: Paravia, 1982); Duccio Tongiorgi, 'Letteratura e politica culturale delle aziende negli anni cinquanta: Note su *Civiltà delle macchine*', *Rivista di letteratura italiana*, 10/1-2 (1992), 193-225; Claudio Toscani, 'Vite e teorie della "Narrativa d'industria"', *Forum Italicum*, 6/4 (1972), 515-38.

nostalgia for mythical, pre-modern 'mondi lontani' where humanity flourished (Chicco Vitzizzai, p.39).

Thus the postwar period in Italy was characterized by a series of oppositions: writers and industrial workers; literature and science or science and culture; traditional values and the innovations of modern technology. When in 1964 Snow's lecture was translated into Italian, it catalysed a new debate focused specifically on the relationship between literature and science in an Italian context.

3. Levi and Science

Although actively writing in the early postwar period, Levi was for obvious reasons initially concerned to establish a testimonial voice and recount his experiences in the Lager and on the torturous journey home to Turin. As a relatively unknown writer (certainly until the republication of *Se questo* by Einaudi in 1958), and undistinguished chemist, he made no contributions to either the early postwar journals or the main journalistic debate provoked by Snow's lecture. Instead, 'si iscrive a modo suo nel dibattito degli anni Sessanta sulle due culture'.⁶¹ After the eventual success of *Se questo* and *La tregua*, he began to make inroads as a public figurehead, publishing short articles and essays in a variety of newspapers: *Il Ponte*, *L'Unità*, *La Stampa* and *Il Giorno* (I, pp.1458-51). Although at first the majority of these pieces were reflections on the Holocaust, they are, perhaps inevitably for works by a chemist, infused with commentary on developments in twentieth-century science and technology: for example,

⁶¹ Giovanni Tesio, 'Primo Levi', *Belfagor*, 34 (1979), 657-76 (p.670).

‘Deportati. Anniversario’ (1955), points out that ‘siamo vissuti in quel secolo in cui la scienza è stata curvata, ed ha partorito il codice razziale e le camere a gas’, as elements of the Nazi’s ‘gigantesca macchina generatrice di morte e di corruzione’.⁶² Thus Levi’s accounts of his engagements with science are heavily infused with moral and ethical concerns from the outset—concerns that transcended his localized activity in the laboratory and questioned the institution of ‘science’ as a global enterprise open to global abuse.

In line with arguments proposed by Snow and Gramsci, among others, Levi was a strong proponent of an integrated culture, deploring the ‘schisi innaturale, non necessaria, nociva, frutto di lontani tabù’ that he saw as dividing twentieth-century approaches to knowledge and knowledge production. Responses to this ‘abisso’ vary, he writes in 1985, in one of his most explicit comments on the science-literature relationship. Some wring their hands but do nothing to resolve it, while others act to reinforce and widen the division, ‘quasi che lo scienziato e il letterato appartenessero a due sottospecie umane diverse, reciprocamente alloglotte, destinate a ignorarsi e non interfeconde’ (II, p.632). Here, Levi’s language evokes images of obstructed evolutionary progression, and discourses of xenophobia, especially linguistic. In so doing he interweaves fields of nature and culture, entwining both anthropological and epistemological issues. Indeed, much of his writing was inspired by a desire to ‘esplorare i legami trasversali che collegano il mondo della natura con quella della cultura’ (II, p.631), indicating a profoundly holistic approach to lived experience in its radically multifaceted entirety.

⁶² I, pp.1113-15 (p.1114); first published in *Torino*, 31/4 (April 1955).

What is interesting about Levi's position even as early as 1955 are the ways in which it stands in opposition to Snow's belief in the superior 'moral health' of scientists over literary figures: Snow declared that 'the greatest enrichment the scientific culture could give us is [...] a moral one'.⁶³ Rather than concurring with Snow's naïve generalization that scientists are less likely to display racial or other forms of prejudice, Levi is more attuned to the ways in which scientific and technological capabilities may be abused by undiscerning or power-hungry individuals and groups, and asserts that scientific training and education is actually acutely *lacking* in moral and ethical frameworks within which to situate programmes of research (points explored further in Chapter 1). As a Jew who suffered under the shamelessly fallacious 'scientific authority' of Mussolini's 1938 'Manifesto degli scienziati razzisti',⁶⁴ he had first-hand experience of how subjectively appropriated 'truths' or 'facts' might be used to oppress individuals and groups, by disseminating falsely justified propaganda. Thus Levi's view is more in line with notions of science as discursively constructed and produced through human intervention than with its presentation as a methodology which obtains verifiable results by reasoning logically from observed fact. His belief is that the two cultures are not incompatible; rather, 'quando esiste la volontà buona' they enrich each other via 'un mutuo trascinamento' (*II*, p.632). Thus it is human intervention that has prevented these cultures from enjoying their implied 'natural' state as reciprocally informing phenomena.

These remarks provoke reflection on the type of relationship Levi perceived and

⁶³ 'The Two Cultures', *New Statesman*, 6 October 1956, pp.413-14; cited in Snow, pp.xxvi-xxvii.

⁶⁴ Published in the *Giornale d'Italia*, 15 July 1938. Available at: <http://www.cronologia.it/mondo23i.htm> (retrieved on 21/01/04).

desired between literature and science. He asserted that the two cultures should be one (Grassano, 'Conversazione', pp.174, 177), but since this was not the case he strove to strengthen bridges between literature and science that would allow them to cross-fertilize and exert an effect on one another. As regards his insistence that epistemological division is somehow 'nocivo' (Grassano, 'Conversazione', p.174), it might be argued that Levi's position resembles that of the biologist Edward O. Wilson, who dwells at length on many issues relating to the interrelated nature of knowledge.⁶⁵ Far from being a new word, Wilson argues that the term 'consilience' has been used by philosophers of science for over a century, and indicates the way that:

different fields [...] like Biology and Physics and the social sciences connect up at least in terms of the laws, the basic laws that they share together. It really goes back to a very old dream of the enlightenment in the 17th and 18th century when philosophers believed that you could unite knowledge. So consilience means really the uniting of knowledge at a fundamental level.⁶⁶

This perspective may seem to chime with that of Levi, especially in view of his comparably romantic nostalgia for a time before knowledge was severed: 'Galileo ne aveva una di culture'.⁶⁷ However, it is vital to differentiate Wilson's position from that of Levi. Wilson's belief in the 'unity of the sciences'—what he refers to as the 'Ionian Enchantment'—relies on 'a conviction, far deeper than a mere working proposition, that the world is orderly and can be explained by a small number of natural laws.'⁶⁸ The

⁶⁵ Edward O. Wilson, *Consilience: The Unity of Knowledge* (London: Abacus, 1999).

⁶⁶ Wilson in conversation with David Gergen, June 30 1998, for 'The NewsHour with Jim Lehrer', retrieved on 01/02/04 from <http://www.pbs.org/newshour/gergen/june98/wilson_6.30.html>.

⁶⁷ Grassano, 'Conversazione', p.174. Levi also mentions Lazzaro Spallanzani (1729-99), the founder of modern biology but also a travel writer, and Lorenzo Magalotti (1637-1712), author of both scientific essays and books on travel.

⁶⁸ *Consilience*, p.3. A similarly reductive view can be found in Wilson's *Sociobiology* (Cambridge MA: Harvard University Press, 1980), in which he outlines a theory arguing that the behaviour of social animals, including humans, is dictated by a series of rules inscribed in their genes. This theory proved controversial on several accounts; for example, its implied support for discredited racist ideologies of inherent superiority in particular groups.

dangerously reductive nature of this view is evident, yet Wilson uses it as a basis to assert the validity of his understanding of ‘consilience’, or the ‘unification of knowledge. He declares, ‘When we have unified enough certain knowledge, we will understand who we are and why we are here’ (*Consilience*, p.5). Far from sharing this inflexible belief in absolute certainties, Levi supported the destruction of prescriptive dogma, finding that this type of grand narrative raises more questions than it answers: ‘È tipico delle grandi risposte far nascere nuove grandi domande’ (*II*, p.1383).

4. Dialogues and Boundaries

Levi’s view of learning and knowledge expressed here, composed of everlasting cycles of questions and answers, implies a profoundly dialogic view of epistemological enquiry. Dialogues feature strongly in Levi’s work, perhaps most notably in the dialogic novel *La chiave a stella*, but also in his writing that engages with storytelling.⁶⁹ Dialogue has a heuristic function and animates every single interaction with others, but, as the dialogician Mikhail Bakhtin argues, even the self is dialogic—a statement that seems to apply in particular to the centaur-like Levi.⁷⁰ Michael Holquist suggests that dialogism finds its antecedent in the work of Neo-Kantian scholars striving to bridge the gap between ‘mind’ and ‘spirit’, which, post-Hegel, ‘became increasingly apparent in

⁶⁹ See for example the episode in ‘Lilit’ where Levi and Tischler are sheltering from the rain and Tischler begins to tell a story, initiating a familiar dialogical game: ‘Si andava delineando una situazione tipica ed un gioco che mi piaceva, la disputa fra il pio e l’incredulo, che è ignorante per definizione, ed a cui l’avversario, dimostrandogli l’errore, “fa digrignare i denti”. Accettai la mia parte e risposi con la doverosa insolenza [...]’; *Lilit e altri racconti* (Turin: Einaudi, 1981); repr. in *II*, pp.18-23 (p.20). In *Ordinary Virtues* (pp.236-54) Gordon draws parallels between Levi’s writing and Walter Benjamin’s argument in ‘The Storyteller. Reflections on the Works of Nikolai Leskov’, in *Illuminations*, ed. by Hannah Arendt (London: Jonathan Cape, 1970), pp.83-109.

⁷⁰ Michael Holquist, *Dialogism: Bakhtin and his World* (London and New York: Routledge, 1990), p.19.

the growing hostility between science and philosophy'. Moreover, dialogism constitutes an important trend in European thought that seeks to reconceptualize epistemology to reflect developments in our ever-changing models of the world (*Dialogism*, p.17).

With regard to Levi's work, we might consider dialogue as a type of bridge, a channel that connects different individuals representing different perspectives and carries the flow of ideas exchanged between them. In addition to his own comments about the importance of bridges between science and literature, Levi also has several of his characters comment on the growthful possibilities offered by bridges; for example, one protagonist of the dialogic novel *La chiave a stella*, Faussonne, declares:

I ponti è il più bel lavoro che sia: perché si è sicuri che non ne viene del male a nessuno, perché sui ponti passano le strade e senza le strade saremmo ancora come dei selvaggi; insomma perché i ponti sono come l'incontrario delle frontiere e le frontiere è dove nascono le guerre. (*I*, p.1039)

Bridges are productive links that enable evolution and communication—another vital human activity for Levi—which can be calm or agitated, but never obscure, since this prevents the bridging connection from forming leaving the speaker 'grida[ndo] nel deserto' (*II*, p.678). If we consider the boundaries of disciplinary fields to be permeable, penetrable by those who approach them with an open mind, a bridge offers a passage leading across to other areas of intellectual enquiry. Breaking down the stalemate opposition of literature and science, Italo Calvino wrote in 1967 of a triangular *ménage-à-trois* consisting of literature, science and philosophy.⁷¹ In his view, interdisciplinary interchange was vital if culture were to adequately confront the dilemmas of modern

⁷¹ This comment was made in an article commissioned for a discussion of the links between literature and other disciplines in *Crosscurrents*, a special issue of the *Times Literary Supplement*, 28 September, 1967; also published in *Fiera letteraria*, 43 (26 October 1967), as 'Tra idee e fantasmi'; repr. in *Saggi 1945-1985*, 2 vols, ed. by Mario Barenghi (Milan: Mondadori, 1995), as 'Filosofia e letteratura', I, pp.188-96 (p.193).

life:

Una cultura all'altezza della situazione ci sarà soltanto quando la problematica della scienza, quella della filosofia e quella della letteratura si metteranno continuamente in crisi a vicenda. (*Saggi*, I, pp.193-94)

This model valorizes both dialogical interaction and the problematization of a discipline from an external, and therefore 'new', perspective; a process that points out the kinship and difference between areas of enquiry, and, ideally, 'where the gap between the terms might be overcome [...], shed[s] light on each element'.⁷²

Moving away from the notion of discrete areas joined by a dialogical bridge, however, Levi describes the boundaries delimiting genres of writing as movable. Speaking to the physicist Tullio Regge in their 1984 *Dialogo*, Levi is on the verge of asking Regge where science ends and 'fantascienza' begins, but then realizes that 'il limite non c'è più: o meglio, è indefinito, e si sposta di anno in anno' (p.67). Similarly with regard to literary boundaries, he remarked 'non ho mai creduto ai generi letterari' (*I*, p.1198). This perspective leads to new definitions of disciplinary and textual space, and requires a re-evaluation of the relationship between traditional categories.

Bakhtin criticized the conceptualizing of people or research areas as having boundaries, preferring the terms 'field' (as in electric force field), 'elastic environment' or 'live media'.⁷³ With regard to culture, Bakhtin insisted that far from being a 'spatial whole' culture has no internal area but 'it is entirely distributed along the boundaries [...] Every social act lives essentially on the boundaries', from whence it draws its vital energy and relevance. He highlighted as a 'positive feature' of his work the fact that it

⁷² Ludmilla Jordanova, 'Introduction', in Jordanova (ed.), *Languages of Nature: Critical Essays on Science and Literature* (New Brunswick, N.J : Rutgers University Press, 1986), pp. 15-47 (p.35).

⁷³ See Gary Saul Morson and Caryl Emerson (eds), *Mikhail Bakhtin: Creation of a Prosaics* (Stanford: Stanford University Press, 1990), p.51.

moves 'in spheres that are liminal, i.e., on the borders of all the aforementioned disciplines, at their junctures and points of intersection'.⁷⁴ This view chimes significantly with the image of bridges and borders evoked by Faussonne as being a point of essential, even beautiful, productive inter-activity. In accordance with this view, Levi's idea of a 'discipline' was open, avoiding conflation between the two meanings of 'discipline' as set out by Foucault: first to control or punish, second an academic body of knowledge. As scholars of his work have argued, Foucault's definitions allow us to understand and unscramble the ways in which disciplinary knowledge works in both senses to control the direction and form of knowledge production.⁷⁵ The transversal lines Levi perceived as running between the disciplines should be allowed to strengthen and deepen, forming not a homogenized idea of learning and knowledge production, but one that is not sealed off from the rest of the world.

However, Levi's approach to disciplinary fields or literary genres as blurry and indistinct categories stands in contradiction to opinions he expresses elsewhere. Just as he declares the need to heal the gulf between literary and scientific activity whilst simultaneously insisting on the 'spaccatura' within his own self, he also contrasts his approach to fluid disciplinary boundaries with many statements asserting the eternal importance that we attach to containers. In the essay 'Una bottiglia di sole' that appears in the collection *Racconti e saggi*,⁷⁶ Levi meditates on what constitutes a human being. If one only considers those alive today, there is, he feels, no ambiguity about which beings are human and which are not; it is only when we look back into the past at the

⁷⁴ *Estetika*, p.281, cited in Holquist, *Dialogism*, p.14.

⁷⁵ Jana Sawicki, *Disciplining Foucault* (New York: Routledge, 1991), pp.5, 22

⁷⁶ Turin: Einaudi, 1986; repr. in *II*, pp.859-993 (pp.959-61).

various stages of ‘uomini fossili’ that doubts spring up regarding the point at which we became ‘human’. Was it when our ancestors began to walk upright, or when the institutions of marriage and justice were established? Rather than formulating some sort of criteria to determine the moment at which we entered the existential state we enjoy today, or entering into a Darwinian discussion regarding the continuum of life, Levi provides a curious definition of a human being: ‘L’uomo è costruttore di recipienti; una specie che non ne costruisce [...] non è umana’ (*II*, p.958). He goes on to explain that the making of recipients, or containers, is symptomatic of two vital human characteristics: the capacity to think of the future, and the capacity to predict the behaviour of material placed within these containers.

The aforementioned essay is particularly intriguing for the loose ends it leaves and the peculiar resonances it has with several facets of Levi’s oeuvre: images of containers and their contents abound in his writing relating to social interaction, disciplinary or professional fields, living environments, language, knowledge, the body and the psyche—divided into the conscious and the unconscious. The various and vastly diverse types of container that Levi lists in ‘Una bottiglia di sole’ boast a range of characteristics from openness of access (a bag or a basket) to necessary impenetrability (as for example, required by a lead capsule containing radioactive waste). It seems that Levi has deliberately drawn together a class of objects that, like animals and plants, defies the categorization we instinctively wish to impose upon it. Thus, just as it is impossible to provide a definite chronological borderline that delimits or contains the advent of human life as we know it, the containers we construct—in a process which

apparently renders us human—defy containment.⁷⁷ The infinitely diverse nature of the containers described enables them to permeate the boundaries of kind or type, sharing characteristics with the selectively permeable recipients Levi enumerates, such as mosquito nets, water filters and window blinds. Thus the category of ‘container’ acts as an epistemological meta-container which itself might form part of Levi’s list. In his conclusion, Levi states that twentieth-century life can be summed up by the image of twin doors: portentous lids that enclose or contain the space in a room. These doors may be opened to reveal, or unleash, the greatest good or the greatest harm, echoing the mythical opening of Pandora’s box and thus begging questions as to who should be responsible for the keys

Drawing on and exploring the images of bridges, perforated boundaries and uncontained containers in Levi’s work, this thesis argues that his thought and writing is profoundly marked by ambiguity and contradictory interpretations of, or approaches to, a broad range of concepts and phenomena: strands of knowledge, the self, communication through writing, science, technology and the human body. The image of the container may either stifle or protect; it may demand to be demolished for its oppressive qualities, or be praised as a safe haven. The first part of the thesis engages with containers and boundaries principally with regard to disciplinary space, knowledge and areas of expertise. It explores Levi’s writing ‘across the disciplines’, as well as endeavouring to chart the position he assumes in relation to contemporary figures and

⁷⁷ In this vein consider also Borges’ list of humorous, idiosyncratic categories dividing animals into groups defined, for example, as the fabulous; the innumerable; those included in the present classification; those that from a long way off look like flies etc. This list was cited as a key inspiration by Foucault in the Preface to *The Order of Things* (London: Routledge, 2000), pp.xv-xxiv. Foucault relished the list for the disconcerting way in which it juxtaposed ‘real’ with ‘imaginary’ categories, containing the uncontainable in the only place this tenuous containment can work: ‘in the non-place of language’ (pp.xv-xvii).

textual canons. The second part focuses on the container in relation to language and to human bodies. One key characteristic of technologically mediated bodies is that they are 'leaky'; 'the relation between organism and machine has been a border war' in which vital boundaries are breached and collapsed (Haraway, 'Manifesto', p.150). While the 'invasion' of the human body by technology is, in the majority of cases, portrayed as a negative event, here too Levi seeks a counterpoint to this undesirable situation. Foreign elements within the human body may indeed constitute a threat, but Levi characteristically seeks the latent positive potential of this 'impurity': after all, 'perché la ruota giri, perché la vita viva, ci vogliono le impurezze, e le impurezze delle impurezze' (*I*, p.768). Levi valorizes contrasting states as being essential to life: he sings 'l'elogio della purezza, che protegge dal male come un usbergo; l'elogio dell'impurezza, che dà adito ai mutamenti, cioè alla vita' (*ibid.*). This thesis explores the irresistible draw exerted on Levi by contrasting phenomena or activities. Through an exploration of his dialogues regarding and attitude towards the relations between these contrasting elements, it highlights the broader relevance of his work to all forms of social relations.

Chapter One explores the dialogues on this subject that abounded in postwar Italy, providing a more thorough contextualization of the literature-science debates by investigating the aims and success of the 'letterato aziendale' and the reception of Snow's lecture in translation. Discussion elaborates on Levi's contributions to these dialogues examining his writing about science and his statements on the relationship between the disciplines. Chapter Two takes as its subject Levi's self-location in relation to his two careers, analysing his dialogues with the physicist Tullio Regge and evaluating his personal canon of influential texts as enumerated in *La ricerca*. Chapter Three documents the relationship and dialogue between Levi and his contemporary Italo

Calvino, whose parallel interest in and approach to the literature-science relationship encourage interesting comparisons to be drawn with Levi's work.

Part II moves on to consider the relationships between science and society, and humans and machines as depicted in Levi's work. Chapter Four picks up and develops aspects of Levi's thought touched upon in earlier chapters, looking at his broader engagements with the relationship between science and social life. In particular, it looks at his use of language, his approach to knowledge and his activities as a 'public intellectual': a disseminator of information, and spur to cultural consciousness, who is often seen as a guide to the present or a vital voice of dissidence in a world of media propaganda.⁷⁸ Chapter Five considers Levi's presentation of the relationship between human bodies and technological 'prostheses', and the projection/detection of anthropomorphic features onto/in machine technology. I argue that Levi's engagement with machines works on two levels. On the one hand he projects human behavioural patterns onto machines whilst on the other he identifies profound similarities and kinships between human and mechanical entities. Chapter Six provides an analysis of Levi's ambivalent descriptions of both enforced and voluntary mergers between human bodies and technological devices, equipment and the knowledge produced by scientific and technological 'progress'. In this chapter in particular, I consider the degree to which Levi is alert to gendered subjugation through technological means, and evaluate his depictions of the ways in which science and technology affect women specifically.

The thesis argues that through alternatively embracing and problematizing the

⁷⁸ Dennis Altman, 'The Public Intellectual and Reviewing', in Paolo Bartoloni, Karen Lynch, Shane Kendal (eds), *Intellectuals and Publics: Essays on Cultural Theory and Practice* (Melbourne: La Trobe University, 1997), pp.3-27.

issues that affect his search for knowledge, understanding and existential completeness, Levi highlights difficulties to be overcome, and warns against the forces of technologized society that curtail our freedoms and ability to achieve full embodiment.

Part I: Levi's Dialogues

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Chapter 1: Cultural Dichotomies in Postwar Italian Culture

The bifurcated relationship between literature and science was so frozen, so distant, that two eternities seemed to be looking at each other like two porcelain dogs—like two stone lions flanking a doorway. (Serres and Latour, p.47)

*Industria e letteratura, vi si era detto; ed era stato senza badar molto a come siano, industria e letteratura, universi lontani.*¹

In order to further develop issues raised in the Introduction and locate them in a specifically Italian context, this chapter explores a series of debates provoked by oppositions perceived within postwar Italian social and intellectual life; debates that centred on conceptualizations of 'culture' and the relationship between cultural fields. The late 1940s and 1950s saw a two-fold approach to cultural activity: a liberating reinvigoration of cultural production that had been controlled by the regime during fascist rule, and a reintegration of the scientific and humanistic activities that had been so divisively separated by Croce and Gentile. Some intellectual figures strove to promote a unified culture that circumscribed co-existing, if seemingly contrasting, components of postwar life and thought. Others brought into relief the tensions and conflicts between discrete epistemological components, demanding acknowledgment of the incompatibilities that separated these elements in their view.

I begin with a brief sketch of issues that came to prominence in the early postwar period and an analysis of some key journals through which messages about the current or desired character of cultural life were disseminated. Having broadly established

¹ Elio Vittorini, Editorial, *Il Menabò*, 5 (1962), 1-4 (p.2). Emphasis in original.

immediate postwar concerns I next examine two prominent paired oppositions within cultural life—literature and science, and literature and industry. Focusing initially on the translation of C. P. Snow’s ‘two cultures’ lecture into Italian and its impact on debate, I then turn my attention to the relationship between ‘scrittori e industria’, as it has come to be known. These discussions interrogate and problematize both what is understood by, and the relationship between, the terms ‘science’, ‘literature’, ‘industry’ and ‘culture’. Most of these—sometimes furious—debates were carried out through articles published in newspapers and journals, in the form of a written dialogue. However, rather than interactive dialogue, these discussions often stagnated into a vicious cycle of unrealised and unrealizable integration—a ‘locked opposition of two terms’ (Beer, ‘Science and Literature’, p.792), as implied by the two citations above.

These broader observations are followed by an attempt to locate Primo Levi’s work and thought in relation to these debates; I discuss his approach to and understanding of science, literature, technology and industry, and begin to examine his work that sought deliberately to overcome the gaps and tensions between these areas of activity.

1. ‘Umbrella Culture’ and its Fractured Underpinnings in Postwar Journals

In the postwar years, as left-wing political parties fumbled to properly empower anti-fascist practices and workers fought against a scarcity of jobs and wages, Italians were struggling to rebuild a fractured identity. After the new Italian Republic was established in 1946, messages were sent out instructing Italian citizens how to relate to this development. While the Christian Democrats urged citizens to strengthen family

morality against the danger of 'atheist education',² periodicals were founded to keep the intellectually alert Italian abreast of new information. However, their additional and equally important aim was to convey, reinforce or indeed create anew a sense of collective cultural identity.³ Given the fragility and fragmentary nature of any previous national frames of reference, this was an enormous task, which left the way wide open to new definitions and constructions of culture. This task was taken on largely by left-wing intellectuals through journalistic discourse.⁴ Several notable journals sprang up in the early postwar period which tackled, among other topics, the relationship between elements of cultural life such as scientific issues and more traditionally humanistic concerns.

Il Politecnico, established in 1945 by the PCI in an attempt to reach a younger membership, was directed by Elio Vittorini, whose 'eclectic', 'brash' and 'unorthodox' approach to cultural issues rendered this a highly innovative and provocative paper (Bonsaver, *Vittorini*, p.137). As regards audience, *Il Politecnico*—a title chosen deliberately to invoke scientific and industrial life as well as to imply its multi-disciplinary character⁵—strove to reach a broad, left-leaning readership that spanned a variety of class brackets and educational backgrounds. Vittorini stated idealistically that the paper would tackle:

² 'La D.C. per la nuova Costituzione', in *I congressi nazionali della DC*, pp.29-64 (p.43), cited in Ginsborg, p.77. Interestingly the family is described as having been pulled apart by an 'invisible and silent atomic bomb', indicating anxiety towards the demonic potential of scientific progress in the aftermath of the war.

³ This echoes Massimo d'Azeglio's famous statement made in the wake of Unification: 'Adesso che abbiamo fatto l'Italia facciamo gli Italiani'.

⁴ Corrado Alvaro's article 'Sulle condizioni degli intellettuali nei nostri anni in Italia', laments the fact that left-wing papers are the only ones that publish and promote discussion of 'intellectual' issues, since the majority of other publications are overrun by Catholic sensibilities; *Rinascita*, v/3 (1948), 113-115.

⁵ The title is also a homage to the journal of the same name founded by Carlo Cattaneo during the *Risorgimento*; see Guido Bonsaver, *Elio Vittorini: the Writer and the Written* (Leeds: Northern Universities Press, 2001), p.118.

interessi specifici, ma per tutti i campi e tutti gli aspetti della cultura [...] con un linguaggio che rende tutti i problemi in egual misura accessibili a tutti e attraenti per tutti.⁶

His rather utopian dream of reaching out to the Italian ‘popolo’ *en masse*⁷ and engaging it on a vast gamut of issues met with both praise and criticism. Fabrizio Onofri (active in the PCI) initially applauded the paper’s willingness to take risks, but later bemoaned its imprecision and mutability.⁸ Moreover, Mario Alicata accused Vittorini of failing to ‘address and educate the Italian masses’ because his voice was not sufficiently ‘populist’.⁹

It seems that Vittorini’s aim to present a widely accessible ‘cultura sintetica’¹⁰ was doomed from the outset since the paper’s message remained obscure to many readers. This was partly because of *Il Politecnico*’s tendency towards wide-ranging debate whose vast scope required an unhelpful and inevitable degree of generality; ‘per quel suo modo di porre sul tappeto e di discutere generosamente ed enciclopedicamente su tutto’ (Forti and Pautasso (eds), p.31). As regards the inclusion of scientific issues, the paper adopted the strategy criticised by Gramsci, of entrusting the *rubrica scientifica* to non-scientists: despite the deliberate allusions to technical concerns in the paper’s title, the vast majority of articles on science—including a judgement on ‘La crisi della

⁶ Editorial, *Il Politecnico*, 2 (6 October, 1945), p.1.

⁷ See ‘Conoscenza di classe’, *Il Menabò*, 10 (1966), 43-47 (p.44), for more on Vittorini’s broad understanding of the term ‘popolo’.

⁸ Positive comments are reported in R. Guarini, ‘Ma Togliatti disse no’ [interview with F. Onofri], *Il Messaggero*, 23 September 1975; cited in Bonsaver, *Vittorini*, p.139. However, Onofri was already objecting to Vittorini’s approach in 1947; see *Il Politecnico*, 36 (Sept. 1947), and *Il Politecnico: antologia critica*, ed. by Marco Forti and Sergio Pautasso (Milan: Lerici Editore, 1960) p.29.

⁹ Bonsaver, *Vittorini*, p.120; see also Mario Alicata, ‘La corrente “Politecnico”’, *Rinascita*, iii/5-6 (1946), 116.

¹⁰ Editorial, *Il Politecnico*, 16 (12 January 1946), p.1.

scienza' (*Il Politecnico*, 4-5, 20-27 October, 1945)—were penned by philosophers such as Giulio Preti.¹¹

The fact that the undifferentiated phenomenon of 'scienza' is represented not by scientists willing to add their experience and expertise to debate, but by a philosopher perhaps demonstrates some resistance to real interdisciplinary dialogue on Vittorini's part. As seen in the next section, Vittorini later became much more outspoken about the need for all individuals to develop a working knowledge of scientific development; a decisive step towards a more representative version of interdisciplinary culture indicating that he clearly wished to transcend his current style but felt unable to put this desire into practice.¹² Before discourse was fully able to rise to the challenge of exploring interdisciplinary relationships and presenting a variety of epistemological viewpoints in a broadly accessible manner, new modes of expression and concepts of culture needed to develop. In the absence of these, and beset by political intrigue and hostility, Vittorini's directorship of *Il Politecnico* was short lived; his editorial style soon alienated powerful left-wing readers and contributors alike, and the paper folded in December 1947.¹³

Other journals established in the postwar years were more successful and theoretically focused. *Società*, founded in 1945 by Ranuccio Bianchi Bandinelli, channelled discussion through the lens of 'marxismo teorico'. *Rinascita*, established in

¹¹ Professor of the History of Philosophy at the University of Florence.

¹² With regard to language, Vittorini's concurrent publications take issue with the stifling, enforced 'linguaggio [...] obbligatorio [...] per scrivere romanzi'; 'Prefazione alla 1 edizione del *Garofano rosso*' (1947), in *Le opere narrative*, ed. by Maria Corti (Milan: Mondadori, 1974), pp.423-50 (p.432).

¹³ In *Vittorini*, Bonsaver provides a helpful discussion of Onofri and Togliatti's hostility to Vittorini's directorial approach, as well as documenting letters from Pavese and Debenedetti refusing to contribute to the paper (pp.118-23, 137-45).

1944 and directed by Palmiro Togliatti,¹⁴ proposed a perception of history and society founded on Togliatti's socialism and a historical materialist sensibility. Both publications portrayed a vision of cultural unity established by viewing social life through the filters of historical and (left wing) political awareness. Editions of *Società* in the 1950s published numerous articles asserting that scientific knowledge was produced alongside social relations,¹⁵ and that science is both conditioned by and determines social development.¹⁶

In *Rinascita*, Lucio Lombardo Radice¹⁷ argues that science need no longer be viewed according to the Newtonian paradigm as '*determinata, meccanica*', but instead should form part of the '*discussione generale*'.¹⁸ Lombardo Radice also points to the complex contradictions inherent both within Italian society as a whole and within the thought of individuals: he states that in addition to the widespread, peaceful cohabitation of '*dogma e ragione*', '*è normale credere contemporaneamente alle Origini delle Specie e al Genesi*' (p.866). His comments reveal that culture can and does accommodate conflicting beliefs contemporaneously, indicating that scientific concerns can form a more equal part of our shared comprehension.¹⁹ Also writing in *Rinascita*, Alicata advocates a comprehensive conception of socio-historic developments and suggests that science can transcend its reputation as consisting of dry, empirical data.²⁰ Importantly,

¹⁴ Co-founder of the PCI (Partita Comunista d'Italia) with Antonio Gramsci and others.

¹⁵ Lucio Colletti, 'Scienza e società in Marx', *Società*, 6 (Nov. 1958), 1025-37.

¹⁶ Valentino Gerratana's review of 'Ludovico Geymonat's *Filosofia e filosofia della scienza* (Milan: Feltrinelli, 1960)', *Rinascita*, xvii/9 (1960), 764-65.

¹⁷ Professor of Geometry at the University of Rome, director of the 'Guido Castelnuovo' Mathematical Institute and director of the magazine *Riforma della scuola*.

¹⁸ Lucio Lombardo Radice, 'Il posto della scienza nella cultura italiana', *Rinascita*, xvi/12 (Dec. 1959), 864-69.

¹⁹ Lombardo Radice's implicit accusation that philosophers and humanists were usurping intellectual superiority and condemning empirical knowledge is reiterated in 1998 by Sokal and Bricmont in *Intellectual Impostures*.

²⁰ Mario Alicata, 'Il Risorgimento, Gramsci e noi', *Rinascita*, xvi/6 (Feb. 1959), 421-23.

his argument implies that scientific thought can contribute to providing a methodological approach to life that questions the place of human beings in the universe, just as philosophy or literature do.

Promising as they seem however, these initial attempts to highlight similarities across the disciplines were shaken and halted by the translation of Snow's lecture into Italian, as his insistence on the differences rather than kinship between science and literature reinforced the epistemic dichotomy.

2. *La cultura dimezzata*: Responses to the 'Two Cultures' Opposition

As remarked in the Introduction, Snow's *The Two Cultures* was widely regarded as a highly problematic and far from exhaustive treatment of the topic. However, it catalysed debate in the early 1960s simply by articulating prevailing epistemic anxieties regarding cultural fragmentation. The Italian translation of Snow's lecture was published in 1964,²¹ provoking an explosive response, sparking discussions in numerous magazines and daily newspapers that continued over a period of several months.²² In his 'Prefazione al volume *Le due culture*', Ludovico Geymonat breathes a sigh of relief that the discussion might finally be released from the limited scope dictated by its English audience.²³ It was for their ease, Geymonat asserts, that Snow had presented an expository rather than philosophical argument. Now the full text was available to Italian thinkers, their more

²¹ Milan: Feltrinelli, 1964, trans. by Adriano Carugo.

²² Publications devoting significant attention to the debate include: the *Libri* supplement of *Paese Sera*, *Corriere della sera*, *Protagora*, *La Stampa*, *Fiera letteraria*, *Civiltà delle macchine*, *L'Espresso*, *Arte oggi*.

²³ Reprinted in *La cultura dimezzata*, ed. Armando Vitelli (Giordano Editore, 1965), pp.12-22 (p.16).

probing responses would elevate the standard of discussion. This flourish of assumed national superiority provides a fitting contribution to a debate fraught with polarised hierarchical value judgements relating to the origin and possession of knowledge and culture.

Concerns regarding a divided culture are not new; what has changed here is their expression and objectives. Geymonat bids his readers recall the propagators of divisive philosophical idealism, Croce and Gentile, and also to remember Gramsci's interest in integrated, flexible epistemological development, akin to Marx's conception of unified science.²⁴ Croce had argued for the independence (and implicit superiority) of art—or metaphysics—with regard to science; contributors to *Rinascita* had lobbied for new interpretations of science and its applications without sustained investigation into its relationship with the humanities. Now, however, the disciplinary division itself became the focus of debate. Geymonat's identification of the tension between 'scienza-cultura' highlights a central aporia of this discussion: that of terminology. Italians who responded to Snow's lecture threw into relief the unreliability of linguistic terms when used to convey such fundamental concepts as 'culture', 'intellectualism', 'science'. Terminology reveals itself to be inevitably steeped in value-judgements since 'in language others are always implicit, others who have used the same terms in different conditions. How then to reach new ideas, new practices, open fields?' (Beer, *Open Fields*, p.8). By contrasting science with culture, Geymonat denies the cultural significance of scientific thought and investigation, opposing it to literature and philosophy. The precise meaning of the term

²⁴ 'Natural science will in time incorporate into itself the science of man, just as the science of man will incorporate into itself natural science: there will be *one* science', Karl Marx, *The Economic and Philosophical Manuscripts of 1844*, ed. and intro. by Dirk J. Struik, trans. by Martin Milligan (New York: International Publishers, 1964), p.143.

'culture' also proved slippery: it was used by some as a catch-all to imply intellectual superiority (i.e. cultured vs. uncultured), while others argue that Snow's use of the term was ambiguous: it could refer to either cognitive or anthropological concerns.²⁵

On this subject Geymonat gives a useful synopsis of the key questions raised (but in no way answered) by Snow's lecture: What does culture mean? What does science mean? What is the purpose of specialist research? What is the link between this and 'il sapere generale'? (Geymonat, p.21). Geymonat describes the situation in Italy as having crystallised into 'l'assoluta separazione del "vero" sapere [il pensiero filosofico] dal sapere tecnico-scientifico'. Compounded by the inheritance of Crocean idealism, this produces the opinion that 'l'attività scientifica non fa parte in alcun modo dell'attività conoscitiva' (Geymonat, p.19). However, as Geymonat views the situation, philosophical thought can only be correct in affirming that 'true culture' has nothing to do with scientific research if humans are detached from the world around them and conceived as stand-alone entities. Yet, if we are understood through the world (i.e. if our lives and concerns are viewed as historically produced and embedded, as Marxist philosophy advocates), then scientific research is crucial in allowing us to develop a coherent understanding of ourselves. Although he does not make explicit reference to Marxist theories, Geymonat's position clearly coheres in significant ways with that of many contributors to *Rinascita*. 'Culture' needs to be understood as a unified (although far from uniform) phenomenon, grounded in a historical materialist sensibility, that leads towards a progressive employment of our cognitive, creative, political and practical abilities.

²⁵ See Giulio Preti's article, 'L'uomo "totale" è ormai un sogno', in Vitelli (ed.), pp.67-72 (pp.68-69).

Some initial responses to the Italian translation of Snow's work—articles published in the *Libri* supplement of *Paese Sera* between 11 September 1964 and 23 April 1965—are collected in the 1965 volume *La cultura dimezzata*, edited by Armando Vitelli, who also contributes a preface and a conclusion to these selected excerpts of the debate.²⁶ Vitelli identifies and promotes two main issues resulting from this collection of critical responses: the perils of linguistic imprecision (he accuses Snow of expressing himself poorly through unhelpful 'generici accenni'; p.26), and the need for resolution of the literature-science divide through politically informed cultural engagement, developments in pedagogy and philosophical reflection (p.203). There is a general concurrence with the premise of a significant and problematic division between the two disciplines, however this argument depends on what is understood by the word 'culture'. What is 'cultura comune', and what language does/should it use? The scientists seem to hold similar views about the humanists' assumed monopoly on culture and criticize reductive or misleading 'translations' of scientific discoveries into an accessible language, just as Gramsci commented on 'l'insufficienza del linguaggio comune' to render a specialist concept.²⁷

Contrary to Snow's judgement of British humanists as lethargic and outmoded in comparison to the progressive scientists, the physicist Alessandro Alberigi Quaranta observes that those Italian humanists endowed with a sense of 'impegno marxista' are

²⁶ 'Prefazione', pp.9-14, and 'Conclusioni', pp.201-12.

²⁷ See for example, Ernesto Mascitelli Coriandoli (a biochemist researching the philosophy of science), 'Il primato della ragione', in Vitelli (ed.), pp.82-89; Carlo Castagnoli (a physicist at the University of Turin and director of the *Giornale di fisica*), 'La barbarie della specializzazione', in Vitelli (ed.), pp.97-103. Gramsci's comments appear in *Quaderni del carcere*, I, *Il materialismo storico e la filosofia di Benedetto Croce*, p.53.

outstripping the scientists in their activism.²⁸ Quaranta refers to the comments made by Pier Paolo Pasolini, that the British lack the Marxist ideology that endows Italian writers with a sense of political motivation and conscience.²⁹ Yet this is elsewhere refuted in a curious instance of reciprocal appreciation of the 'other': whilst amongst the scientists there is a generally positive perception of humanist scholars as progressive thinkers, some notable literary figures such as Alberto Moravia and Vittorini condemn these same humanists as lacking the scientists' concern about the future.³⁰

Vittorini's article, an interview with Vitelli supplemented by his own notes, represents a complete about-turn from his earlier humanities-based approach to an all-inclusive 'scienza'. He denies the possibility of reconciliation between the two cultures outright, empathizing with Snow's articulation of the divide (Vitelli (ed.), p.144). Notably, he figures the humanities as '*la parte retriva*' of culture: 'L'umanesimo [...] è contro ogni innovazione che non sia revivalistica e restauratoria' (p.135). He asserts that any desire to bridge the gap comes from scientists and denigrates the patronizing 'scienza romanzata' of the novels of the industrial revolution that unrealistically portray 'il pittoresco della sofferenza' (p.143).³¹ However, despite these harsh words, he doesn't share Snow's opinion that all the blame goes to the *letterati*. Scientists can be reactionary too, and their irresponsible complicity is to be blamed: '[Gli scienziati] fanno la rivoluzione e la lasciano amministrare dagli umanisti' (pp.138-39). Despite the 'meravigliosa rivoluzione' taking place around them, he argues, scientists lack a

²⁸ Quaranta was Professor of physics at the University of Bologna, specialist in nuclear physics and electronics; see 'La scienza deve divenire popolare', in Vitelli (ed.), pp.145-56.

²⁹ 'Fare nostro il rischio della scienza', in Vitelli (ed.), pp.73-79.

³⁰ Alberto Moravia, 'La scienza vuole un uomo umile' and Vittorini, 'L'umanesimo tradizionale deve togliersi dalla scienza', in Vitelli (ed.), pp.35-36; pp.135-46.

³¹ Gramsci too is harsh in his criticism of abstract fantasies of science, of 'puri giochi di parole' or 'scienza romanzata', *Il materialismo storico*, p.50.

revolutionary conscience because these astounding changes have not yet penetrated the consciousness of the workers and technicians. Thus the problem is again a lack of communication, and unhelpful images of the impact of science on social life. The Copernican revolution may have taken place, he remarks, but the world has continued to be governed in a Ptolemaic sense to avoid the necessity for a new social order (p.139).

In light of this last criticism, Vittorini makes one of the strongest points so far in favour of scientific integration into cultural consciousness: the main problem is that humanists lack a modern scientific outlook and thus are prisoners to an outdated backlog of inherited knowledge. To put it plainly, taking up the analogy of disciplinary representative knowledge coined by Snow, if we cannot quote from Shakespeare we lack familiarity with elegantly expressed thoughts and opinions; if we don't know the second law of thermodynamics, we are in thrall to received wisdoms that are simply *wrong*. He declares: 'Noi siamo pieni di una vecchia pseudo-scienza che si è cristallizzata in noi al livello degli istinti'. The solution is obvious and deceptively simple: 'rimuoverla e sostituirla': yet this substitution is more easily expressed than effected (p.142).³²

Attempting to dissolve the opposition that for Vittorini seems so clear cut, the psychologist Angliola Massucco Costa reconfigures the science-literature dichotomy as democratic versus non-democratic culture.³³ She sees a gulf not between individuals or disciplines but between different structures and social ideologies. Dina Bertone Jovine—who provides Vitelli with a closing argument—is the only contributor to seriously

³² As regards the practical difficulty of changing what is theoretically easy to alter, Moi observes: 'The hypothesis is that if something is constructed, then it will be cultural as opposed to natural, and therefore easy to change by political action. But this is a rash conclusion, since it seems far easier to transform a peninsula into an island [...] than to change our understanding of, say, what is to count as giving directions to a stranger'; *What is a Woman?* (Oxford: Oxford University Press, 1999), p.51.

³³ Professor of psychology at the University of Turin; see 'Esiste una terza cultura?' in Vitelli (ed.), pp.51-58. She is one of only two women whose contributions are anthologised in this volume.

engage with Marxist theory and the ugly social reality of capitalism.³⁴ She observes that in order for the industrial revolution to be part of democratic progress, it had to take into account and combat the alienation of workers and poverty. This was achieved not through scientific or technical research but through political, literary and philosophical thought. Developments in science only become democratic progress through the mediation of political and philosophical doctrines. Science alone, she argues, does not teach us how to be more just (Vitelli (ed.), pp.158-59).

These articles represent a snapshot of opinion following the translation of Snow's lecture. Although useful as points of reference however, these journalistic pieces are characterised by their 'economia' or lack of sustained demonstration—just as Snow's lecture featured superficial 'generici accenni' (Vitelli (ed.), p.202). Vitelli acknowledges the brevity of the contributions and states his wish to initiate a subsequent, truly sustained discussion that might transcend and outlast the stylistic and spatial limitations of journalistic sensationalism. Subsequent, lengthier publications on the subject did indeed follow. Giulio Preti, erstwhile science writer for *Il Politecnico* who argues against the reconciliation of science and literature in this debate, published *Retorica e logica: le due culture* (1968).³⁵ Preti problematizes what we understand by 'science' and 'literature', protesting against reductionist Crocean notions of science as a merely useful 'tecnica' as opposed to a visionary approach to the world and knowledge. He warns that capitalist appropriation of scientific capabilities may render science servile to extraneous forces that exploit its potential as a means to achieve ends that diverge radically from its 'real' purpose: as a pathway towards knowledge of the world

³⁴ Director of *Riforma della scuola* magazine, a position formerly held by Lombardo Radice; see 'È schematica la distinzione di Snow', in Vitelli (ed.), pp.157-62.

(pp.17-18). This text was followed in 1977 by another edited anthology of essays on the two cultures, *Letteratura e scienza*, which includes translations of writings by T.H. Huxley, I.A. Richards, Snow, Leavis and Paul Feyerabend, as well as contributions by one or two Italians such as Preti.³⁶ Taking a longer view, Ezio Raimondi's *Scienza e letteratura* (1978), is a critical account of—largely Anglophone—approaches to the epistemological dialectic across the centuries.

In contrast to these texts that focus largely on Anglophone discussion, Mario Petrucciani's *Scienza e letteratura nel secondo novecento* concentrates on Italian voices such as those of Vittorini, Gadda, Sinisgalli, Calvino and Levi.³⁷ His remarks move productively beyond the pervasive and problematic essentialist conceptualization of each discipline that endows them with an innate, immutable nature. Just as Preti alerts us to capitalist appropriations of scientific capabilities, Petrucciani points out that science is animated and directed by its practitioners who shape its significance in and influence on social life: 'Non la scienza e il progresso sono in sé disumani, ma la loro gestione' (p.12). While Snow claimed to have identified universal character traits that distinguished the species 'scientist' from that of 'literary author', Preti and Petrucciani bid us recall the fundamental, but often overlooked distinction between the general features of any given cultural activity and the many *personally invested* individuals who may operate in that area. It is the management and application of science, technology and literature that animate these fields, making it imperative to discover the extraneous, subjective factors which motivate such individuals.

³⁵ Turin: Einaudi, 1968.

³⁶ *Letteratura e scienza*, ed. by Andrea Battistini (Bologna: Zanichelli, 1977).

³⁷ Milan: Mursia, 1978.

These arguments support the analysis of cultural activity as embedded in a socio-historical moment, channelled through the actions of an equally embedded subject. Performing such analysis requires an awareness of the human subject in its fullest sense, joining together the professional with the personal, the theoretical with the practical. This type of unified approach was already widely proposed by Italian critics in the initial responses to translations of Snow's lecture. For example, Bertone Jovine concludes her article with a reference to Marx's theory of unified science³⁸ asserting that the various cultures (literary, scientific, technical) cohere in the activity of work; one that includes all of human activity, be it scientific or literary (Vitelli (ed.), p.162). This relationship promotes culture as an 'attività pratico-sensibile, praxis, non come attività puramente conoscitiva'.³⁹ Importantly for the present discussion, it is thus that science is understood by Levi, as a combined manual-meditative process to discover the essence of 'materia' of which humans themselves are formed.⁴⁰ Before exploring this aspect of Levi's thought in more detail, I examine a further opposition that caused concern in postwar Italian society: that of literature and industry; of physical factory work and creative writing. This polarity too, increasingly hotly debated through the 1950s and 1960s, is discussed in relation to ideas of a common culture and linguistic difficulties and division. However, critical dialogue also tackles perceived and demonstrable differences in the writer's and the factory employee's existential trajectories.

³⁸ See note 25, in the current chapter.

³⁹ Vitelli, 'Conclusioni', in Vitelli (ed.), p.211.

⁴⁰ See *I*, p.761, and also Levi's comments on the passages he selects from the work of Conrad and Verel in *II*, pp.1414, 1444-45.

3. 'Scrittori e industria': The Struggle for a New Literary Style

As the postwar economic boom altered the Italian cultural landscape irrevocably, writers attempted to come to terms with and adequately represent the new reality of northern Italian industrialization, and its impact on social identity.⁴¹ In contrast to the Futurists' mythicization of early twentieth-century developments, as Marinetti sang the praises of mechanization and its potential to revolutionize human existence,⁴² the pervasive social alienation caused by the vast increase in factory employment inspired a literary crisis. Divisive social organization and a lack of common ground between those working within the factory environment and those affiliated with literary production complicated attempts to unite disparate experiences and viewpoints, provoking furious discussions.

Like the oppositions already mentioned in this chapter, that of 'scrittori e industria' is characterized by polarization and seemingly irremovable obstacles. Claudio Toscani argues that the tardiness of industrialization in Italy and the initial resistance shown by literary figures to narrative themes that might reflect this new reality resulted in a ponderous 'morosità incolmabile'. As a result, the relationship between the discrete processes of literary and industrial development remained 'una lunga occasione mancata', a 'continuo travisamento culturale del mondo fabbrile' (p.516). Authorial attempts to bridge the divide between the traditional literary realm and the aggressive reality of technological development are widely characterized as following two contrasting routes: Elisabetta Chicco Vitzizzai comments that some writers adopted an

⁴¹ For an account of the 'Economic Miracle' see Ginsborg, pp.210-53.

⁴² See 'Fondazione e Manifesto del Futurismo' (1909), in *Opere di F.T. Marinetti*, ed. by Luciano De Maria, 4 vols (Milan: Mondadori, 1968), III, *Teoria e invenzione futurista*, pp.7-13.

unproblematic attitude towards the speedy promotion of industrial and scientific progress, while others embraced what has been seen as a 'prospettiva vetero-umanistica' denouncing the monstrosity of a machine dominated world. She argues that the only option open to writers in the late 1950s and early 1960s was through 'l'aggiornamento tematico' (a 'factory' plot), or ideological *impegno* limited to a distantly affected solidarity with the *operaio* (p.32).

Although Chicco Vitzizzai's analysis may appear overly simplistic and binary, many other critics describe the 'scrittori e industria' relationship in similarly dichotomous terms. For example, Tongiorgi contrasts two authorial viewpoints: total antipathy towards modern technology versus a superficial, acritical approach to industrial 'progress' (p.225). Mario Boselli contrasts those authors who retain a naturalistic style but engage with an industrial context with those more experimental, avant-garde novelists who prefer to narrativize the world outside the factory, but which is contaminated and conditioned by its advent onto the cultural landscape.⁴³ The impossibility of reconciling the concerns of a factory employee with those of a literary author was widely emphasized. Toscani argues that despite attempts by novelists to engage with industrial development, the elements of factory life constitute 'qualcosa di esterno e di passivo che l'arte non riesce a far suo, un'esperienza non ricostruibile nel suo laboratorio' (p.517). Here it is worth considering two attempts to explore and overcome the 'scrittori-industria' divide: first, the projects run by various industrial centres such as Olivetti, Pirelli and Finmeccanica, which sought to promote a broader cultural awareness of accelerated industrialization and 'industria aperta, centro vitale di

⁴³ 'Narratori sotto accusa', *Nuova Corrente*, 25 (Jan-March 1962), 9-22 (pp.14-15); cited in Toscani, p.525.

attività culturale' to an audience of those 'non "adetti ai lavori"' outside the factory gates (Tongiorgi, p.199); second, *Il Menabò di letteratura*, a journal edited by Vittorini and Calvino that devoted two issues to the 'letteratura e industria' debate (4, 1961, and 5, 1962).

Turning first to the cultural projects run by industrial companies, a key figure connected with all three centres was Leonardo Sinisgalli—intellectual, poet and engineer—who directed both the widely distributed *Pirelli* and the Finmeccanica publication *Civiltà delle macchine* founded in 1953 (Tongiorgi, pp.198-99). Unsurprisingly for the director of a publication motivated by a desire to promote a dynamic picture of industry, Sinisgalli's analysis of technological development was characterized by a rather acritical focus on the new aesthetic possibilities offered by machinery. However, he was certainly an important 'operatore culturale' who organized several significant exhibitions and who, in contrast to the divisive views of other critics and intellectuals, insisted on the interdependence of art and industrial technology: in his view they provided each other with essential reciprocal inspiration and motivation (pp.200-01). In terms of opening the debate and broadening involvement, *Civiltà delle macchine* achieved a relatively substantial flow of correspondence from readers, including well known intellectuals and writers such as Ungaretti, Gadda, Moravia and Buzzati.

Despite this, discussion reached the same deadlock as elsewhere, with contributors highlighting or sympathizing with two distinct positions: enthusiasm for industrial progress and the liberating potential of machinery as opposed to the pervasive anxiety that such 'progress' would ultimately annihilate both nature and humanity. On the positive side, action was taken: in response to concerns of dehumanization as the

magazine directed ‘un appello a poeti e scrittori affinché, con la loro opera, concorrano ad umanizzare la tecnica e il progresso’. (p.202). Furthermore, the publication followed up this verbal appeal with practical schemes, proposing and organizing frequent ‘visite in fabbrica’ during the 1950s, in an attempt to create positive interaction between different areas of social and cultural activity (pp.215-17). However, these visits too seemed artificial, and resulted more often than not in a rapidly coagulating ‘iconografia stilizzata del lavoro’—a ‘*topos* letterario’ rather than a more spontaneous, representative depiction of new social realities (p.219).

Focusing now on *Il Menabò*, its special issues discussed the difficulties of reconciling the opposing elements of the ‘letteratura e industria’ dynamic. In the essay ‘Industria e letteratura’ which launched the debate, Vittorini expresses impatience that writers who engage with industrial themes continue to do so ‘entro dei limiti letterariamente “preindustriali”’.⁴⁴ He argues that, rather than take inspiration from the advantages of the new elements offered by industrial developments, Italian novelists retained an outmoded approach that produced ‘degli `squarci pateticamente (o pittorescamente) descrittivi che risultano di sostanza naturalistica’. Many of these ‘squarci’ are less contemporary than other literary texts that may not engage with factory life at all but are at least informed by the impact of industrial development on the human condition in general (Fiaccarini Marchi, p.93). As an example of texts that successfully achieve precisely this effect he cites the works of the French writers belonging to the *école du regard* (Alain Robbe-Grillet, Michel Butor, Nathalie Sarraute); authors practising a form of extreme objectivization to represent the alienation of human

⁴⁴ *Il Menabò*, 4 (1961); repr. in *Il Menabò (1959-1967)*, ed. by Donatella Fiaccarini Marchi, with a ‘Presentazione’ by Italo Calvino (Rome: Edizioni dell’Ateneo, 1973), pp. 92-100 (p.94).

subjectivity from industrial reality not through narrative, but through a spare, rigorously exact description of objects.

Thus superficial attempts to capture the deeper qualities of industrial reality failed because they were based predominantly on content, rather than being motivated by any intrinsic empathy with reconfigurations of subjective experience. As Vittorini remarked, 'lo scrittore [...] sarà al livello industriale solo nella misura in cui il suo sguardo e il suo giudizio si siano compenetrati di questa verità' (Fiaccarini Marchi, p.100). Marco Forti also sees misrepresentation and misunderstanding as negatively affecting the quality of literature on an industrial theme: if such texts are often dull and 'poco affascinante', he argues, this results in part from 'uno iato esistente tra quello che l'industria *realmente* è, e quello che l'idea e la fantasia [...] vorrebbero che essa fosse'.⁴⁵ Misperceptions produce an insurmountable boundary leading to the rather defeatist, definitive statements of 'incolmabile' social difference cited above. Several critics attempted to dismantle this perceived barrier: in discussing the 'visite in fabbrica', Boselli argued that writers should already be aware of this reality as experienced in the broader social sphere without having to make a special trip to the workplace, as if it were an utterly alien environment (Toscani, p.525); Similarly, Libero Bigiaretti called for writers to consider the impact of industrialization beyond the limited factory zone:

Andrebbe rappresentato quanto della vita industriale (e in che misura) si ripercuote sulla vita privata, nella privata e pubblica moralità, nella privata e pubblica psicologia, nel comportamento culturale, sessuale, sociale. In altri termini scoprire che la meccanizzazione e l'automatismo sono presenti anche nella vita di relazione e nella vita intima, che la frustrazione e la estraneazione si verificano anche oltre la presenza delle macchine; nel rapporto dell'uomo con gli uomini.⁴⁶

⁴⁵ 'Un duplice fronte', *Il Menabò*, 5 (1962), 25-29 (p.25). Emphasis in original.

⁴⁶ 'Letteratura e industria', *Civiltà delle macchine*, 1/6 (Nov-Dec 1963), 37-39 (p.39), cited in Toscani, pp.529-30.

In the same vein, writing in *Il Menabò*, Umberto Eco argues that alienation is experienced across a wide range of relationships, for example between ‘uomo e uomo, uomo e istituzioni, uomo e convenzioni sociali, uomo e universo mitico, uomo e linguaggio’. A holistic approach that considers society and the individual as multifaceted wholes is the only effective way in which to work through the obstructions distancing subjects from the products of their labour, from each other, and from their very means of communication—a vital concern central to questions of both integrated subjectivity and interdisciplinary dialogue. Eco explores the difficulties of communication due to our reliance on a collectively understood linguistic system, steeped in lexical and semantic conventions that at once enable and curtail expression (‘Del modo di formare’, p.214). He further discusses the problems inherent in using a language that is always already invested with meaning, especially when attempting to speak across socio-cultural boundaries, evoking Beer’s comments on the difficulty of finding uncontaminated terms and ‘open fields’ (‘Del modo di formare’, pp.222-23).

Eco’s essay usefully crystallizes key issues in the debates regarding umbrella culture and the literature-science and ‘scrittori-industria’ relationships. He remarks that a literary figure who attempts to come to terms with the alienation provoked by technologized society may well espouse a ‘linguaggio “comune” (“comunicativo”, comprensibile a tutti)’ (p.223)—a comment that resonates strongly with Vittorini’s desire to establish ‘un linguaggio che rende tutti i problemi in egual misura accessibili a tutti e attraenti per tutti’.⁴⁷ Although undertaken in good faith, this objective is inherently flawed due to its inevitable generality, and the ‘interessi specifici’ one would wish to

⁴⁷ *Il Politecnico*, 2 (6 October 1945), p.1

reflect are diluted and approximated often beyond all recognition. Furthermore, beyond issues of effective communication, generality also allows writers to assume non-committal political positions: in 1962 Vittorini warned about the disease spreading through literature that supported ‘una possibilità di tenere disimpegnativamente (per la facile virtù di un linguaggio generico) un discorso che risulti più o meno impegnato’.⁴⁸

Like the literary author, Eco observes, the specialist attempting to convey a message to a non-specialist audience, or an audience unfamiliar with new data and concepts, must often resign him or herself to the fact that the categories operative within the target cultural context are inadequate to such a task. Perhaps the least objectionable solution, he suggests, would be first, to employ analogy and paraphrase while continually reminding the reader of the extent to which this account is mediated, and second, to retain an acute awareness of the complex dialectics of the situation (p.224). However, the author’s role as mediator is complicated by other demands. As regards location and cultural embeddedness, Eco argues that the author ‘non può pronunciare il giudizio ponendosi al di fuori della situazione’ (p.227): the writer must get inside the skin of industrial life in order to represent it with any degree of validity.

The social role of literature in these debates is also open to redefinition. As regards the ‘scrittori-industria’ debate, Gianni Scalia declares that ‘il compito di una letteratura contemporanea è [...] quello di anticipare nella rappresentazione *dell’alienazione industriale, il divenire della liberazione dall’alienazione industriale*’.⁴⁹ For Eco, avant-garde literature is ‘l’arte che per far presa sul mondo vi si cala

⁴⁸ Letter to Italo Calvino dated 20 December 1963, Archivio Einaudi; cited by Bonsaver in ‘Italo Calvino e l’ultimo Vittorini: paternità e pratiche letterarie’, *Proteo*, v/1 (1999), 51-58 (p.52).

⁴⁹ ‘Dalla natura all’industria’, *Il Menabò*, 4 (1961), 95-114; repr. in Chicco Vitzizai, pp.73-78 (p.77). Emphasis in original.

assumendone dall'interno le condizioni di crisi, usando per descriverlo lo stesso linguaggio alienato in cui questo mondo si esprime', but which brings a self-awareness to this form of discourse, allowing the possibility of demystification and therefore resolution (p.228). Alienation must be fought by embracing a situation; the artist acts by 'assumendone i modi' but dominates the situation by 'portando questi modi ad evidenza [...] rendendoseli consapevoli come modi formativi' (p.227).

In the struggle to overcome the arguably artificial divisions and oppositions pervading individual, cultural and epistemological development, artists and intellectuals should work to develop an adequate mode of expression that does not simply reflect but which challenges historical modes of thinking. However, to successfully alleviate and resolve social alienation or epistemological deadlock, they must endeavour to speak from within rather than outwith a cultural or disciplinary sphere (p.234). As regards the scope of literature that communes with and represents areas of scientific or technical development, Eco suggests such works provide 'schemi senza la mediazione dei quali tutta una zona dell'attività tecnica e scientifica forse ci sfuggirebbe, e diverrebbe veramente qualcosa di altro di noi, da cui al massimo lasciarsi condurre'. In his view, the 'impegno' of literary authors consists of mediating between the poetic and the technical, the human and the cosmic, with a profound awareness of the commonalities and connections but also of the indeterminacy, irreducibility and incompatibilities of these phenomena (p.236).

Eco's views here contrast markedly with those of Vittorini: rather than criticizing humanist culture as a retrograde obstacle to 'progress', Eco highlights the implicit dangers of letting ourselves be led passively by the scientific enterprise, and tackles accumulating fears regarding social alienation, caused when human concerns fall out of

the picture at the expense of industrial efficiency and rationalization. To this end, mediation between areas of specialization is vital. Therefore, in place of continually aggravating the dichotomous opposition of two terms, be they science/culture, science/literature, literature/industry, critics should consider activity of whatever persuasion as historically and culturally embedded. This might avoid the demonization of the 'other' discipline or area of activity, and encourage productive dialogue and engagement. If a dialogue between seemingly discrete cultural elements is to be restored, they must be considered from a properly historical materialist perspective as interlinked components.

Turning now to Primo Levi, I endeavour to establish his position as regards these debates, locating his work and thought in relation to cultural critics and thinkers discussed thus far. In what remains of this chapter, I sketch out relevant key characteristics of his writing and position that are explored in more detail in subsequent chapters.

4. Primo Levi and Postwar Cultural Debate

As mentioned in the Introduction, Levi did not contribute to the main debates about the two cultures and 'scrittori e industria', preferring to comment independently.⁵⁰ Perhaps his earliest, direct, published comment on the two cultures debate dates from 1965, in a review published in *Il Giorno*. 'Diario polemico di un giovane patologo' recounts reactions to the launch in Turin of the medical student Renzo Tomatis' diary *Il*

⁵⁰ In the same vein, Levi's self-definition as an 'isolato' who chooses the freedom afforded by avoiding groups and movements is discussed in Chapter 2, below.

laboratorio.⁵¹ Levi describes how Tomatis' severe criticisms of the Italian medical academy provoked strong protests, but also points out that the comparisons he makes between American and Italian university programmes are really secondary to the deeper issue tackled by the book: '*Il laboratorio* è un documento importante perché penetra fino al cuore del moderno conflitto fra "le due culture"'. Tomatis' text, an outpouring of personal hopes, dreams and anxieties, is characterized as 'vivo e degno, leggibile da tutti, ricco di spunti da meditare [...] il fenomeno è singolare, direi rivoluzionario' (*I*, p.1138). With its honest accounts of the realities of and motivations behind much medical research it may not be a work of literary elegance, but its force 'fa impallidire molta letteratura'. In conclusion Levi pronounces that 'più che un documento scientifico è un documento morale' (*I*, p.1140).

These comments are significant for what they reveal about Levi's clear familiarity with and views on the 'two cultures' debate at that time—a year after the Italian translation of Snow's lecture was published. From his critique of Tomatis' text, we can infer several features of his approach to this debate: first, he values considerations of professional activity that are also informed by lived experience; second, he greatly esteems clarity of expression and accessibility to readers from all walks of life; third, he implies that literature which privileges rhetorical proficiency over engagement with moral questions lacks validity; finally, he values challenging, even revolutionary treatments of cultural concerns. In terms of broad-ranging accessibility of the text, Levi's views here may be compared to Vittorini's objectives in *Il Politecnico*: to make the paper's arguments 'accessibili a tutti'. Similarly, in a 1966 review of

⁵¹ *Il laboratorio* (Turin: Einaudi, 1965). Levi's article was published on 31 March 1965; repr. in *I*, pp.1138-40.

Roberto Vacca's collection of short stories *Esempi di avvenire*,⁵² Levi criticizes Vacca's specialist treatment of cybernetics and neurology which means that the stories 'non sono accessibili a tutti': indeed 'lasciano perplesso, e quindi freddo, il lettore medio' on account of their 'eccesso di tecnicismi' (*I*, p.1153).

As discussed in later chapters (especially Chapter 4), communication was vital for Levi, openly confirmed by his sense of responsibility to his 'lettore "perfetto": an inquisitive individual, who is neither 'dotto' nor 'sprovveduto', who must be able to understand Levi's meaning (*II*, p.678). In relation to the two cultures debate with its divisive dialectical emphasis on discipline-specific knowledge and language, Levi's position seems to offer a middle way: he values clarity, whatever the subject matter, and does not privilege literature *tout court* if it fails to tackle important moral questions. His attention is caught by provocative, heuristic writing and discussion that bridges disciplinary divides. To clarify Levi's position with regard to debates discussed thus far, I comment on his understandings of science, technology, literature and industry as subjects for cultural discussion, and sketch his approach to the relationships between these phenomena.

i. Literature and Science

Through his writing Levi set about redressing the disciplinary imbalance bequeathed by Croce and Gentile in two main ways: first, he insisted on the similarities between the activities which made up his career as a chemist and those he undertook as a writer;

⁵² Milan: Rizzoli, 1965; Levi's review, 'L'ingegnere-filologo e i suoi sogni proibiti', was published in *Il Giorno*, 5 January 1966; repr. in *I*, pp.1152-54.

second, he proposed a view of 'science' which required moral and ethical concerns to be addressed at every stage of scientific research, transforming it from a merely informative technical practice to an endeavour affecting all aspects of our lives and subjectivities. He advises:

Se viviamo in un mondo impregnato di tecnologia e di scienza, è sconsigliabile ignorarlo, anche perché la Scienza, con la S maiuscola, e la Tecnologia, con la T maiuscola, sono delle formidabili fonti d'ispirazione. (Grassano, 'Conversazione', pp.173-74)

To ignore these stimuli betrays an intellectual 'cecità volontaria [...]'. Vuol dire perdere la misura dell'universo in cui viviamo' (ibid. p.174). Those who ignore the discoveries of the astrophysicists assume an outmoded, retrograde attitude, he admonishes—a remark that evokes comments made by Vittorini and Eco about the importance of interdisciplinary awareness given that these forces impact inescapably on our lives and subjectivities through their ubiquitous influence.⁵³ Favouring reciprocal enrichment across epistemological fields, Levi discusses how scientific practice enhanced his capabilities as a writer; inversely, his discussions of scientific research and practice call for these activities to seek input from more philosophical modes of thought. However, despite his declarations that science and literature should be more closely linked through interaction, Levi's comments reveal a profound personal ambivalence as regards the viability of a truly proximate connection between these 'cultures'.

Considering first his engagements with the relationship between literature and science, in a much cited passage Levi characterizes chemistry as 'l'arte di separare, pesare e distinguere', three processes that are also useful to the writer. Although their

⁵³ Similarly, Levine comments that 'Literature has been unable to avoid science because science exerts an epistemological authority so powerful that it can determine even how we allow ourselves to imagine the world' ('One Culture', p.8).

primary materials differ (the abstract ‘materia’ of personal experience in contrast to more concrete substances), both writing and chemistry are acts of production that rely on these primary materials, and are thus methodologically similar as practices (*II*, pp.641-2). Elsewhere he remarks in a similar vein that the ‘mestiere di cucire insieme lunghe molecole’ provided a sort of apprenticeship for his second profession; ‘[il] cucire insieme parole e idee’ (*I*, p.1076). The chemist’s desire to understand the underlying structure, properties and behaviour of a substance, to achieve an ‘*insight*’ into its quiddity, is, Levi asserts, a gift that the chemist imparts to the writer (*II*, pp.641-42). Reasoning inversely, the experience of writing itself becomes like another ‘scientific’ activity: having progressed from his initial testimonial drive in narrating his experiences of the Lager to a more sustained interest in writing *per se*, Levi found that more creative composition gave him ‘un piacere complesso, intenso e nuovo, simile a quello sperimentato da studente nel penetrare l’ordine solenne del calcolo differenziale’ (*I*, p.873).

However, alongside this emphasis on methodological similarities between scientific and literary activity, Levi continually declared himself cognitively and epistemologically to be ‘un anfibio, un centauro’ (Fadini, p.107). With this statement (made in 1966), Levi almost invites comparison with Snow’s dual yet discrete activities as scientist and novelist—activities that elicited such damning comments from Leavis and Vittorini regarding Snow’s failure to even attempt to embody an alternative to the ‘two cultures’ rift. However, this comparison does not hold, since Snow was lambasted for writing novels that were decidedly ‘antiscientifici’, while Levi dramatizes scientific

processes, albeit from a ‘writerly’ perspective. He claims to depict ‘le proposte della scienza e della tecnica viste dall’altra metà di me stesso in cui mi capita di vivere’ (Fadini, p.107). Thus while he insists on having two separate cognitive systems, he simultaneously declares that he views each system through the lens of the other, constructing a hybrid perspective that collapses the binaries he so insists on highlighting here.

As regards the activities of other Italian intellectuals engaged in similar attempts to scale the science-literature divide, Levi openly—if briefly—solicits comparison with Carlo Emilio Gadda, Sergio Solmi and Leonardo Sinisgalli, claiming that they probably share his ‘spaccatura paranoica’ (Fadini, p.107). In so doing, he traces and inserts himself into a (fragmented) inherited tradition of dual-discipline focused activity. He evidently sees parallels between their endeavours and his own, between their torn or dual intellectual and professional affiliations and his position as a nomadic ‘scrittore ex chimico’. Hence, if we identify him with any group, it is with a select few, floating individuals, rather than with a coherent collective. Further eluding the external binary categories particular to postwar Italian cultural debate, Levi also identifies himself incontrovertibly as a ‘tecnico’, not a scientist, thus positing himself somewhat to the side of the science-literature dialectic. Indeed, as Mario Porro points out, Calvino’s *ménage-à-trois* of science, literature and philosophy becomes in Levi a triangular relationship between science, literature and ‘[la] tecnica, [il] lavoro’ (p.437), as Levi insists on the formative character of ‘faccende tecniche’—especially manual activity.

It is precisely this emphasis on manual work in Levi’s writing, inspired by his

own positive, first-hand engagements with work as a valuable formative experience, that distinguishes his position from that of many writers in the postwar period.⁵⁴ In *Il sistema periodico*, manual activity becomes a fundamental cognitive practice, one that defines human existence. Exploring the laboratory with his friend Enrico, Levi laments the untaught clumsiness of their hands, which can write and climb trees but which ‘ignoravano il peso solenne e bilanciato del martello’, for example. He states finally, ‘se l’uomo è artifice, non eravamo uomini: lo sapevamo e ne soffrivamo’. While tree climbing represents an evolutionary retrogression, a misguided ‘ritorno all’origine della specie’, manual dexterity and the use of implements as prosthetic devices to enhance our capabilities define us as human: to lack these skills is to be in a state of ‘atrofia’ (*I*, p.759-60). As Paola Valabrega has argued, coordination between ‘mano/cervello’ in Levi’s Darwinian approach to work is fundamental, since the hand functions ‘non soltanto come esecutrice, ma anche come indispensabile generatrice di idee’ (p.380). Such insistence on the vital, heuristic value of manual activity goes some way towards healing Croce’s separation of manual from mental activity, as well as challenging the legacies of Cartesian mind/body dualism that would divide our selves into the rational psyche, and the limiting, unruly, unreliable soma. For Levi, the body was a source of knowledge and fascination to be studied, explored and, above all, inhabited. This drive even influenced his love for science; when asked by Ferdinando Camon what interested him about chemistry, he replied, ‘Mi interessa il contatto con la materia, capire il mondo che è attorno a me, mi interessa la chimica del corpo umano, la biochimica’.⁵⁵

⁵⁴ For an analysis of Levi’s engagements with ‘work’ see Gordon, *Ordinary Virtues*, Chapter 6, ‘Practice, or Trial and Error’ (pp.133-48); see also Poli and Calcagno (eds), pp.58-59.

⁵⁵ Camon, *Conversazione con Primo Levi* (Milan: Garzanti, 1991), p.69.

Much of *Il sistema periodico* is concerned with the points of contact, or bridges between the body and the world around it—whether through activity in the laboratory or in the mountains. Due to the already plentiful critical analyses of this text, I do not dwell at length on its contents here.⁵⁶ However some crucial points must be made regarding its significance as a work deliberately intended to bridge Levi's twin halves. After the success of *La tregua*,⁵⁷ he made several statements regarding his desire to draw a line under his testimonial works. At the same time, he commented that although we know a great deal about the lives of miners, robbers and prostitutes—common protagonists in both news reporting and fictional texts—the 'spunti e stimoli' of the chemist's life remain unplumbed, despite their merits.⁵⁸ The stories which resulted from his desire to reveal the stimulating nature of his professional activity were written over several decades—the earliest dating from before the war (*I*, p.1447)—but discussed in tentative terms. As late as 1971 Levi wrote to the author Piero Bianucci: 'Ho in mente il progetto vago di trovare un congiungente, un meticcio fra le mie due attività (di chimico e di scrittore)' (*I*, p.1446). The resulting 'racconti' constitute, Levi tells us, not a 'trattato di chimica', nor an autobiography, but 'una microstoria, la storia di un mestiere e delle sue sconfitte, vittorie e miserie' (*I*, p.934).

Each of the twenty-one chapters is themed around a different chemical element, as Levi identifies bridges between these and individuals:

C'è fra noi chi ha legato il suo destino, indelebilmente, al bromo o al propilene [...]

⁵⁶ Reference is, however, made to the text throughout the thesis. For an account of responses to the novel see, for example: Ernesto Ferrero, 'La fortuna critica', in *Antologia*, pp. 301-84 (pp.334-39), which gives details of significant articles and reviews. See also Porro; Ruggero Pierantoni, 'Il sistema aperiodico', in *Primo Levi: il presente del passato*, ed. by Alberto Cavaglion (Milan: FrancoAngeli, 1991), pp.165-68; Bareil, 'Le système periodique'; Cannon, 'Chemistry and Writing'; Borri; Tesio, 'Primo Levi', pp.73-74; Grassano, *Primo Levi, Il Castoro*, 171 (March 1981), 92-112.

⁵⁷ Turin: Einaudi, 1963. The novel won the Premio Campiello at Venice (*I*, p.1425).

⁵⁸ Interview with Ernesto Ferrero, *Terra Nostra*, September 1963; cited in *I*, p.1445.

ed ogni studente in chimica, davanti ad un qualsiasi trattato, dovrebbe essere consapevole che in una di quelle pagine, forse in una sola riga o formula o parola, sta scritto il suo avvenire, in caratteri indecifrabili, ma che diverranno chiari 'poi'.
(*I*, p.934)

For Levi, the productive connections, or perhaps the symbiotic relationship, between ourselves and the elements are animated both by shared chemical composition and mystical bonds inscribed in a language that almost escapes us. Inebriated by the alchemical mysteries of the elements before him and forcing his way beyond the reductive versions of text book-based chemistry to which his school teachers introduced him, Levi determines to read some of these 'caratteri indecifrabili'. Declaring boldly 'capirò tutto, ma non come *loro* vogliono' (*I*, p.758), he endeavours to force a more satisfactory, more authentic answer from behind the enigmas through performing experiments himself.

In a satisfactory completion of the investigative readings begun in his adolescence, the process of compiling the last chapters of *Il sistema periodico* is undertaken as he feels the arc of his career coming full circle (*I*, p.934) and he again confronts the 'caratteri indecifrabili' of his own and his contemporaries' experiences. Factors which inspired the book's composition are openly discussed within the text itself. In a highly self-conscious episode at the beginning of the chapter 'Argento', Levi describes how he was invited to a dinner celebrating the twenty-fifth anniversary of his graduation. The invitation implies a celebration of the intellectual and existential marriage between student and discipline: 'celebreremo le nostre nozze d'argento con la Chimica narrandoci a vicenda gli eventi chimici della nostra vita quotidiana' (*I*, p.912). Although initially professing puzzlement about what exactly the 'eventi chimici' of one's life might be, Levi identifies the author of the invitation as his former peer

Cerrato, and muses on the constant characteristics of human nature (and implicitly of chemical elements), that enable us to recognize long lost individuals after significant periods of time have elapsed.

Conversing with Cerrato at the event, Levi describes his current textual project:

Gli dissi che andavo in cerca di eventi, miei e d'altri, che volevo schierare in mostra in un libro, per vedere se mi riusciva di convogliare ai profani il sapore forte ed amaro del nostro mestiere, che è poi un caso particolare, una versione più strenua del mestiere di vivere. Gli dissi che [...] avrei deliberatamente trascurato la grande chimica, la chimica trionfante degli impianti colossali e dei fatturati vertiginosi, perché questa è opera collettiva e quindi anonima. A me interessavano di più le storie della chimica solitaria, inerme e appiedata, a misura d'uomo, che con poche eccezioni è stata la mia. (*I*, pp.914-15)

This statement reveals a great deal about Levi's intentions in the book: to communicate the value of his profession to non-specialists; to identify and emphasize the connections between the process of living and chemical processes; to privilege not large-scale industry but individual endeavour and the achievements of those who confront 'la materia' of life and work 'senza aiuti, col cervello e con le mani, con la ragione e con la fantasia' (*I*, p.915). Petrucciani regards the book as 'l'esempio—forse oggi il più avanzato nel rapporto scienza-letteratura—di un processo di assimilazione straordinariamente vitale'. In his view it depicts parallel trajectories of 'crescita professionale' and 'crescita intellettuale', which fuse together so that 'la realtà della materia è realtà della mente' (p.91).

Although Levi set out with a relatively humble plan—to unveil the human stories hidden within a simple strand of chemical activity—as he admits himself, 'il libro mi è sfuggito'. Levi's readings of the elements, of himself and of those he encounters ultimately produce 'una sezione trasversale di una generazione e di una storia' (Poli and Calcagno (eds), p.78). On an epistemological level, Petrucciani argues, the text shows

how 'la scienza sta all'uomo come la ragione sta alle scelte etiche' (p.93): just as reason underpins our ethical engagements with the world, so science informs our existential experiences. Levi's achievement with this text is to show how:

l'analisi quantitativa, così avara di emozioni, greve come il granito, diventava viva, vera, utile, inserita in un'opera seria e concreta. Serviva: era inquadrata in un piano, una tessera di un mosaico. Il metodo analitico che seguivo non era più un dogma libresco, veniva ricollaudato ogni giorno, poteva essere affinato, reso conforme ai nostri scopi, con un gioco sottile di ragione, di prove e di errori. (I, p.801)

Liberating chemistry from its previous incarnation as a book-bound, informative model, Levi's experiences of working with and through chemical processes reveal them to require and to thrive on creative input from those who practice them. When asked about his choice of title, Levi recounts that he was inspired by Dmitry Ivanovich Mendeleev's table of the elements because through arranging the elements according to their atomic weights, the Russian chemist discovered previously unknown links between them. Mendeleev showed how to identify order within disorder, suddenly and radically altering understandings of the world around us:

Di colpo. Come quando si accende una lampada. Dopo Mendeleev ci si accorge che la materia è ordinata, non è disordinata e quindi si ha ragione di supporre che l'intero universo sia ordinato e non disordinato. (Poli and Calcagno (eds), p.71)

However, this discovery does not mean the reduction of life and knowledge to a 'small number of natural laws', as suggested by Wilson, for example. Rather, as with the enlivening of quantitative analysis, ordered understandings of phenomena can be applied creatively and flexibly to our constant questioning of the world. Levi's *Sistema periodico* weaves a plurality of voices, situations, practices and concerns together into an existential table, which, of course, escapes and transcends its initial framework. It is this living, growing quality that Petrucciani highlights, and which turns a text inspired by the 'locked opposition' of the two cultures debate into a journey: '[un] viaggio come

ricerca della propria identità' (Petrucciani, p.92). Levi depicts this journey in its fullest sense, encompassing and requiring input from all aspects of lived experience—professional, creative, quantitative, spiritual, personal, physical and intellectual.

ii. Division and Labour

As discussed above, Levi's depictions of work assert a fundamental coherence and reciprocally informing interdependence between mind and body—a compelling healing of existential dialectic divisions. These portrayals of the working environment also engage with discourses of post-industrial alienation as experienced in factory employment. Faussonne, one of the dialogical protagonists of *La chiave a stella*, recounts how his father wanted to name him Libero so he would be free. Defined negatively, this meant 'non lavorare sotto padrone [...] non nella fabbrica, non a fare tutta la vita gli stessi gesti attaccato al convogliatore fino che uno non è più buono a fare altro e gli danno la liquidazione' (*I*, pp.1016-17). However, Levi only focuses glancingly on such discourses, stating that rather than another novel set around a production line, he wanted to write about a different view of work:

Volevo descrivere una condizione umana che non è quella, pure assai diffusa nel mondo di oggi, di chi è costretto a un lavoro ripetitivo, ma di chi segue il destino antico, il destino di sempre, di colui il quale sa misurarsi col mondo esterno attraverso il proprio lavoro. (Grassano, 'Conversazione', pp.169-70)

Although accused of presenting 'una morale inattuale' (Grassano, 'Conversazione', p.170), and a protagonist whose professional activity is 'scarsamente rappresentativo della condizione attuale dei lavoratori' (Chicco Vitzizai, p.45), Levi counters such criticisms by claiming he was fully aware of the ways in which his employment

diverged from dominant images of the workplace, and chose to write this novel through frustration with discursive deadlock regarding interpretations of work (Grassano, 'Conversazione', p.170). Clearly opposed to the mechanics of the production line and their alienating effect on subjectivity, Levi opted not to further critique Taylorized factory conditions, but to suggest ways in which work might become a cherished and valued activity. Despite the unrepresentative setting and characterization of *La chiave a stella*, Levi's may be seen as a partial attempt to achieve Scalia's goal which was 'di anticipare nella rappresentazione dell'alienazione industriale, il divenire della liberazione dall'alienazione industriale'. Working through contemporary, if broadly unrepresentative paradigms, he seeks to unearth the cognitive, emotive aspects of manual labour, and to restore us to our 'true' condition of artisan creators as opposed to allowing us to slide backwards towards the status of our primate ancestors through confused biological devolution (*I*, p.759).

La chiave a stella constitutes a crystallization of Levi's ongoing questioning of the relationship between cerebral and manual activity, writing and chemistry, 'real' life and fantasy representation. Besides methodological similarities, he draws semiotic parallels between his and Fausone's professions: Fausone is a 'montatore' of large scale constructions while Levi is a 'chimico montatore' who also builds words into phrases (*I*, p.1077). However here, as with his descriptions of himself as centaur, he avoids a total and homogenizing collapsing of difference by distinguishing between activities. For example, Fausone reminds us that verbal (or written) hypothesizing may not match lived experience: 'la teoria è una cosa e la pratica un'altra' (*I*, p.1014).

As regards the ability to see both sides of an issue, while speculating on the difference between writing and rigging Levi tells a story that holds relevance for his

approach to the insights granted by belonging to dialectic categories in general, and which might be applied to the two cultures debate in particular. Musing that attempting to decide whether writing or rigging is preferable as a career is like trying to decide whether it is better to be born male or female, Levi concludes that ‘la parola giusta l’avrebbe potuta dire solo uno che avesse fatto la prova in tutte e due le maniere’. He then recounts the myth of Tiresias, used as an arbiter by Jupiter and Juno in their arguments as to whether men or women experience more pleasure during sexual intercourse.⁵⁹ On hearing of the gods’ dispute, Faussonne wryly points out—repeating Levi’s earlier reflection—that ‘per decidere, ci voleva uno che avesse provato che effetto fa a essere uomo e anche a essere donna, ma uno così non c’è’.

Levi then narrates Tiresias’ transformation from male to female when he encountered two snakes mating in the forest; a transformation that enabled him to experience living as both sexes (*I*, p.986-87). When Faussonne responds by asking Levi if *he* is in fact a Tiresias figure, Levi-narrator feigns surprise, and admits that perhaps he is; he has encountered warring gods and serpents who changed his condition and gave him a strange gift of speech, like Tiresias’ gift of prophecy. Chemist to the outside world, but with a writer’s blood in his veins, he certainly has two souls, ‘che sono troppe’. However, these reflections bring Levi back to the differences between rigging and writing, between being a ‘tecnico’ and a ‘scrittore’: the privilege of the writer is ‘quello di tenersi sull’impreciso e sul vago, di dire e non dire’. No high tension cables strain the verbal pylons constructed by the writer, which do not have to withstand the wind, so lightly weighs the writer’s accountability. As regards soldering incompatible elements together, Levi concludes, ‘noi, al contrario dei montatori, quando riusciamo

⁵⁹ For brief analyses of Levi’s references to Tiresias see Gordon, *Ordinary Virtues*, pp.168, 201, 247.

una tolleranza a sforzarla, a fare un accoppiamento impossibile, siamo contenti e veniamo lodati' (pp.988-89).

From these observations, it seems clear that Levi's entire thought and work are dynamically shot through by tensions between opposing elements, whether their relationship is best defined as one of clashing contradictions, of contiguity, contingency, or variegated coexistence. From his revelations in *La chiave a stella* (which although not strictly autobiographical contains much personal disclosure), we can surmise that Levi's condition as a centaur was at the very least catalysed by his experiences in Auschwitz and the 'strano potere di parola' bequeathed to him as a result (*I*, p.989). From the dynamics between men and women to the tensions between science and literature, or novelists and factory workers, his appreciation of difference is animated by a central aporia: the impossibility of knowing, or being, both parts of a paired opposition. However, although Tiresias may be a mythical figure, his own experiences simultaneously reveal that this experience of dual identities is sometimes possible. Furthermore, his synthetic approach to knowledge and self-development enables and encourages a broad ranging curiosity about all his surroundings, since they all feed into his self: a self that is socially, historically and epistemologically embedded, but one that also transcends the paradigms within which it has developed.

iii. Ethically Informed Science and Technology

Assuming the stance of 'tecnico', Levi is able to comment with the empirical knowledge and experience of a practising chemist. However, he does not allow this to limit his subject matter as he comments in his novels, short stories, essays and journalism on a

wide variety of scientific, technical, literary, philosophical, ontological, epistemological, historical and social phenomena. However, we might view this situation from a different perspective and conclude that he comments on such a range of phenomena precisely because ‘una tecnica può essere non solo soggetto di un libro, ma anche scuola al pensare’ (De Rienzo and Gagliano, p.117). Indeed for Levi, ‘la tecnica’ assumes an immeasurably greater importance than the meagre status attributed by Croce to the ‘faccende tecniche, utili per la vita ma non per la comprensione del mondo’ (*Dialogo*, pp.14-15). The impact of technical and technological development is multifaceted and ubiquitous in modern western society; however, like Petrucciani, Levi is intensely critical of the way in which it is sometimes managed. He warns that ‘la tecnica [è] come la lancia di Achille, che ferisce e guarisce, a seconda di come viene maneggiata o meglio, a seconda della mano che la regge’.⁶⁰

Commenting on developments in modern technology and politics, Levi asserts that the influence of these mere ‘faccende tecniche’ extends far beyond their apparently humble circumstances: ‘solo chi è intossicato dalle cronache politiche può non accorgersi che le gigantesche trasformazioni in corso nel mondo di oggi, buone e cattive, hanno avuto origine nei laboratori, e non nei parlamenti’.⁶¹ With this view of the power of technology in mind, he addresses technicians—those who develop new cell cultures, weapons, diseases, cures, energy sources and contaminating substances—accusing them not only of having capitulated to the demands of those in power, but also of having

⁶⁰ Giuseppe Grassano, ‘La “musa stupefatta”: note sui racconti fantascientifici’ in *Primo Levi: memoria e invenzione* ed. by Giovanna Ioli (San Salvatore Monferrato: Edizione della Biennale ‘Piemonte e letteratura’, 1995), pp.164-89 (p.176); repr. in *Antologia*, pp.117-47 (p.134).

⁶¹ ‘Vizio di forma: ci salveranno i tecnici’, interview with Luca Lamberti, *L’Adige*, 11 May 1971; repr. in *Conversazioni*, pp.110-14 (p.113). The title of this interview alludes to the title of Levi’s collection, *Vizio di forma* (Turin: Einaudi, 1971); repr. in *I*, pp.569-737.

undervalued their own potency, and misjudged ‘la misura delle trasformazioni da loro scatenate’ (Lamberti, p.113). Far from conceptualizing ‘science’ and ‘technology’ as fetishized stand alone entities with a given nature and character, driven on teleologically towards the unchallenged goals of ‘progress’, Levi sees that the orchestrators of change are the ‘tecnici’ and ‘scienziati’: individuals who brandish, interpret and apply the might and sway of implements and practices developed by human activity. Levi’s views of such individuals are decidedly more nuanced than those of Snow, for example, who asserted that all scientists were free from racial prejudice. He may generalize, but avoids making definitive pronouncements on the outcome of any situation, tending only to hope for improvement. Again evoking Scalia’s opinion on the task of modern literature as that of conceptualizing freedom from alienation from within the paradigm of alienated society—a view reiterated by Eco—Levi declares that the ‘*vizio di forma*’ he identifies in the strategies of capitulation adopted by contemporary technicians is not a permanent flaw:

Non penso che sia irreversibile, spero che tutti i tecnici del mondo comprendano che l’avvenire dipende dal loro ritorno alla coscienza: sono sicuro che una restaurazione dell’equilibrio è possibile, ed è possibile coi mezzi di bordo, senza bisogno di ipotetiche nuove scoperte, e, soprattutto, senza stragi. (Lamberti, pp.113-14)

Although his pronouncements may be read uncharitably as moralistic sermonizing, Levi is not simply preaching subjective opinion. He speaks from general exposure to modern technologized society but also from specific experience. One instance of this is a visit to the ‘semisommersibile’ the *Castoro sei*, in 1980, where he had the opportunity to observe routine on board the ship and converse with the captain and crew. Typically, Levi interweaves his reflections on empirical experience with quotations from literary classics and philosophical reflection: he compares the captain to Verne’s Captain Nemo,

cites from Pavese's translation of Melville's *Moby Dick* and refers fleetingly to Conrad and Coleridge, among others, recurrent points of reference to readers familiar with his work. Drawing together technology and imagination, he makes a series of reflections on how technical and scientific developments *require* input from creative activity and lived experience: 'La storia della tecnologia dimostra come, davanti ai problemi nuovi la cultura scientifica e la precisione siano necessarie ma insufficienti', lacking as they do 'l'esperienza e la fantasia inventiva'.⁶²

Here Levi implies that scientific and technical cultures *need* to be inventive and based on life experience, but have not yet reached this stage of broader practice which constitutes a vital step towards a unified 'scienza'. Experience is the key to learning through trial, error and correction; an important aspect of Levi's ethos explored further in Chapter 4.⁶³ In this instance, experience-based expertise is prevented from accumulating by the sheer velocity of technical developments. Trial, error and correction constitute steps in the cyclical accumulation of knowledge (akin to what Popper would call a process of falsification). This is a process that Levi has often undergone as a chemist but which also operates in many other areas of life, and which brings positive growth to those who do not abuse the patience it requires: 'Chi lo percorre con onestà ne esce maturato' (*II*, p.642). To Levi then, scientific progress need not be swift; rather it should be measured, truthful, tested and meditated upon.⁶⁴ Hence the horror of technological apparatuses that offer tantalizing gains but strip us of our freedom, such as

⁶² 'Trenta ore sul *Castoro sei*', in *L'altrui mestiere* (Turin: Einaudi 1985); repr. in *II*, pp.704-710 (p.705).

⁶³ See also the chapter 'Practice, or Trial and Error', in Gordon, *Ordinary Virtues*, pp.133-48.

⁶⁴ A comparable view was expressed by Pierre-Gilles de Gennes (Collège de France) in his contribution to the conference on Levi's work held in Strasbourg, November 1999. He says, 'Un chimiste de synthèse est très proche, dans son art, d'un sculpteur. Mais sa statue n'est compréhensible qu'après des années d'étude.' 'L'usage littéraire de la métaphore scientifique chez Primo Levi', in Geerts and Samuel (eds), pp.91-95 (pp.94-95).

the 'Torec' virtual reality device he describes in 'Trattamento di quiescenza' (*I*, pp.548-67, explored in more detail in Chapter 6).

As regards science and scientists, Levi again issues similar calls to arms regarding the dangers of current practices and the need for external input in order to true the enterprise as a whole. In his essay 'Covare il cobra' (*II*, pp.990-993), dated 21 September 1986, Levi expresses a palpable anxiety regarding our future on this planet and the need to be protected from ourselves; a concern from which he suffered most in the later years of his life. The scope of the essay is twofold: first to warn scientists, both future and currently practising, as well as the general public about the dangers of abusing scientific knowledge to further the development of nuclear weapons, for example; second to encourage those who have not yet reached an intractable level of corruption, especially those who teach and study science, to make responsible, ethical choices to work on problems that will enhance life rather than being seduced by material gain or an unethical intellectual challenge.

He likens scientific endeavour to hatching an egg which may reveal 'una colomba o una cobra o una chimera o magari nulla'. Appealing to the consciousness and conscience of this new generation of scientists, he reminds them that they are sufficiently intelligent and well educated to know what will emerge from their egg, thus responsabilizing them for their actions and refusing to accept pleas of ignorance or lapses into acritical positions. He urges forcefully, 'Non nasconderti dietro l'ipocrisia della scienza neutrale' (*II*, p.993).

As Dominique Weil points out in her contribution to *Le double lien*, 'La responsabilité des hommes de science', this profoundly felt entreaty leads to reflections on the responsibility of the researcher, which requires each individual to assume their

part but also means interrogating social relations and political motivations as they impact on this type of knowledge production. Weil sets up the opposition of scientific progress against the responsibility of scientists, which leads her to raise the issue of the relationship between science and power (Geerts and Samuel (eds), pp.280-293). Levi too was conscious of the power dynamic at work especially in political uses of scientific capabilities, as witnessed by another interview he gave later in the same year (1986) to Fiora Vincenti, Roberto Guiducci and Mario Miccinesi, all involved in the newly founded 'Club per le scienze della pace'. In the interview, published as 'Il sinistro potere della scienza', Levi denounces scientific research into destructive weapons and warns that in many countries science is 'più viva e allo stesso tempo più schiava del potere'.⁶⁵ Military forces in general, and especially those in the 'rissoso Terzo Mondo' are supported and enabled by both 'scienza, e dalle università asservite al potere politico'. There follow several comments along the same lines as those expressed in 'Covare il cobra' but the previous remarks relating to military activity inevitably increase their political impact: universities should take concrete steps to encourage a moral awareness of the potential unleashed by their activities; young scientists should choose to research new antibiotics rather than nerve gas.

Reflecting on these observations, Levi's belief that modern technical progress disallows the accumulation of experience, and his demands that scientists confront the implications of their actions, appear as linked constitutive elements of his approach to science as it impacts on both those who practice it and society in general. It is also clear that his anxiety about the abuse of scientific research heightened dramatically towards

⁶⁵ *Uomini e libri*, 112 (Jan.-Feb. 1987); repr. in *Conversazioni*, pp.58-60. See also Angier, p.687 for a brief discussion of the interview.

the end of his life. Nevertheless, even in the last interview, he distinguishes between a neutral science and one that ‘neutra non è’, allowing the possibility of both subjective, exploitative research, and (relatively) objective investigation. Although the notion of objective neutrality in scientific endeavour is roundly contested by many critics and scholars,⁶⁶ this distinction is notable for its resonances with Levi’s thought in general. It replicates the familiar dichotomous categorization of phenomena, from the activity of ‘i tecnici’ that could be redeemed from corruption to provide the vital conscience required to ‘save’ modern society, to the ‘spaccatura’ he felt in his own activity and personality—an internalized, subjective dramatization of the wider literature-science debate.

Just as Levi identified connections and denied contradictions between his testimonial works and his collections of short stories that tend towards science fiction writing, such as *Storie naturali*,⁶⁷ so he continually forged links between traditionally discrete epistemologies. With regard to the recurrence of philosophical problems and the staple elements of technical apparatuses he reflects:

come le grandi idee ed i grandi problemi della filosofia (se la materiale sia infinitamente divisibile—se l’universo sia finito o infinito, eterno e perituro; se la nostra volontà sia libera o serva), così anche le grandi invenzioni della tecnica si trasformano ma non muoiono. (II, p.705)

The emphasis here is very much on cyclical development and change. Issues do not disappear so much as mutate. This stands very much in opposition to Wittgenstein’s approach to knowledge, for example, where once the subject has climbed the ‘ladder’ of

⁶⁶ See for example texts cited by: Popper, Fox Keller, Rose and Appignanesi, Midgley.

⁶⁷ ‘Per parte mia non sento alcuna contraddizione tra i due temi e onestamente non credo di aver tradito nulla e nessuno; credo anzi che non sia difficile ritrovare, in alcuni dei racconti, i segni del Lager’, Poli and Calcagno (eds), p.37. These connections have been further investigated by Lucy Emmett.

a concept or theory, it is discarded because it has served its useful purpose.⁶⁸ Instead, knowledge remains within the cycle, in an altered form. Here, Levi's position is similar to that of Eco, who discusses the importance of respecting beliefs that were once held to be true but are now known to be false. In his view, although such views are now outmoded and anachronistic, they retain their significance, and may even lead us to new understandings of current (or recurring) philosophical problems.⁶⁹

Levi's emphasis on similarities, which are often methodological, function to strengthen bridges between literature and science, factory work and writing, technical development and philosophical reflection, manual activity and cognitive processes, social life and theory. Areas of commonality allow these fields and activities to cross fertilize and supplement one another. His belief is that the 'two cultures' or any other of these dichotomous pairs are not incompatible; rather 'quando esiste la volontà buona' they enrich each other via 'un mutuo trascinamento' (II, p.632). In addition to providing stimuli, however, interdisciplinary interaction can also function to keep potential dangers in check: just as Eco warned that we should avoid allowing science to lead us passively by the hand, Levi alerts his readers (a broad cross section of newspaper, novel and short story consumers), to the dangers of allowing certain sections of cultural life to develop autonomously without checks from other areas of expertise.

⁶⁸ See Wittgenstein's discussion of how theories lose their usefulness once they have allowed us to reach a certain point of reasoning: 'My propositions serve as elucidations in the following way: anyone who understands me eventually recognizes them as nonsensical, when he [sic] has used them—as steps—to climb up beyond them. (He must, so to speak, throw away the ladder after he has climbed up it).' *Tractatus Logico-Philosophicus*, trans. by D. F. Pears and B. F. McGuinness, introduction by Bertrand Russell (Routledge and Kegan Paul 1974; 1st edn 1921), 6.54, p.74.

⁶⁹ *Serendipities: Language and Lunacy* (London: Weidenfeld and Nicholson, 1998), p.ix.

Having set out some of the key characteristics of Levi's thought as regards issues at stake in postwar debates, in the next two chapters I examine his dialogues with contemporaries and his disciplinary affinities.

Chapter 2: Dialogues with Created Communities

The simultaneity of artistic experience and scientific study. They cannot be separated, but they do not always pass through their various stages and degrees at the same time.¹

Bakhtin's view of diachronic interdisciplinary resonances cited above takes for granted the elements common to both scientific and artistic epistemological traditions, and seems to imply that chronological separation is far from insurmountable. One way in which simultaneity might be achieved, therefore, is through transversal progression into a 'great time of culture' in which 'all times are up to date.'² However, the validity of such a perspective is challenged by recent developments in cultural studies that define culture as constructed and understood through socio-historically embedded 'lived traditions and practices'.³ Exploring the possibility of establishing a literature-science canon, a field in which to situate his dual-stranded activities, and a community of like-minded thinkers, Levi finds himself inevitably looking to the past as well as to scattered contemporary figures. In order to galvanize his stance against dominant twentieth-century disciplinary division, he seeks affirmation and inspiration in both historical and contemporary figures whose work and thought remain uncircumscribed by the two cultures divide. His personal 'canon', constructed through reference to such figures,

¹ Mikhail Bakhtin, 'Notes Made in 1970-71', *Speech Genres and Other Late Essays*, ed. by Caryl Emerson and Michael Holquist, trans. by Vern W. McGee (Austin: University of Texas Press, 1986), pp.132-58 (p.145).

² Daniel Alexandrov and Anton Struchkov interview Anatolii Akhutin and Vladimir Bibler, 'Bakhtin's Legacy and the History of Science and Culture', *Configurations* 1.3 (1993), 335-86 (p.384).

³ Stuart Hall defines culture as 'both the meanings and values which arise amongst distinctive social groups and classes [...] and as the lived traditions and practices through which those understandings are expressed and in which they are embodied'. See 'Cultural Studies: Two Paradigms', in *What is Cultural Studies: A Reader*, ed. by John Storey (London: Arnold, 1996), pp.31-48, (p.38).

might therefore be seen as constituting an unobstructed, interdisciplinary ‘great time of culture’. Relating this to other Bakhtinian theories, it might also be considered a personally defined ‘chronotope’—a fusion of space-time which encourages questions regarding the relation of human action to its specific context.⁴

This chapter explores the diachronic communities that Levi builds and evokes, and analyses the position he assumes in relation to these communities. I evaluate Levi’s engagement with the kinds of interdisciplinary interactions that may be possible between chronotopes; what Bakhtin called ‘interchronotopic’ dialogue (Morson and Emerson, p.427). Discussion explores a variety of direct and indirect dialogues—particularly his conversation with the physicist Tullio Regge—as well as the intertextual dialogues highlighted by the collection of both ‘classic’ and more recent works anthologized in *La ricerca*. I examine the elements of literary-scientific cross-fertilization within the passages he cites, evaluating texts and theoretical positions that inform his work and are elevated to the status of permanent relevance. Throughout this analysis, paying close attention to both theoretical and practical aspects of cultural activity singled out for particular comment, I explore the ways in which Levi articulates an awareness of and negotiates his inevitable cultural situatedness. Therefore remarks relate to lived experience as well as to written reflection.

A number of scholars have examined Levi’s literary influences, detailing the ways in which he interprets classic works of fiction renewing their relevance to

⁴ Bakhtin defines the chronotope as ‘the intrinsic connectedness of temporal and spatial relationships that are artistically expressed in literature. This term is used in mathematics and was introduced as part of the theory of relativity’; ‘Forms of Time and of the Chronotope in the Novel: Notes Towards a Historical Poetics’, in *The Dialogic Imagination: Four Essays by M.M Bakhtin* (ed. Michael Holquist (Austin: University of Texas Press, 1981), pp.84-258 (p.84). See also Morson and Emerson, pp.366-432 (esp. pp.367-69).

contemporary issues.⁵ These critical studies confirm the view that diachronic dialogue is a vital source of inspiration and support for Levi, and that his engagements with classic texts are original and personal, rather than dictated by deeply entrenched canonical interpretations.⁶ For the purposes of this discussion, however, I focus on the instances of science-literature intersection in Levi's dialogues with influential works, seeing these as more significant (and pertinent to the present discussion) than a writer's use of the standard repertoire of classics. Indeed, on this subject Levi states that the presence of Dante, Leopardi and Manzoni in an author's literary imaginary should be taken for granted, like the fact of having two eyes. These are 'nomi che sono (o dovrebbero essere) patrimonio di ogni lettore'.⁷ Levi's assumption and reinforcing of a standard literary heritage is not surprising: canonized authors are almost compulsorily consumed and are assumed to inform any literary dialogue simply by virtue of their status. I hope in this chapter to illustrate the ways in which this rather univocal canon is amplified and extended across epistemological boundaries, as well as being supplemented by further influential 'texts' derived from lived experiences.

⁵ Jonathan Usher sees traces of and allusions to Dante, Petrarch, Montale and Leopardi, among other writers; connections explored in 'Exercises in Rewriting: Levi and Classical Literature' presented at the conference 'Primo Levi', University of Strathclyde, November 2001, and in 'The Author and the "Scribe": Creativity and Computers in Primo Levi', *Testo & Senso*, 4/5 (2001/2002), 239-56. Judith Kelly's study *Primo Levi: Recording and Reconstruction in the Testimonial Literature* (Market Harborough: Troubador, 2000) looks at Levi's references to Dante, Petrarch, Gozzano and Coleridge.

⁶ A much cited example of this is found in the chapter 'Il canto di Ulisse' in *Se questo*, where Levi cites from Dante's *Commedia* in an effort to establish links between his existence in the Lager and his identity outside the camp. See his comments in *I sommersi e i salvati (II)*, pp.1100-01). See also Kelly, pp.67-69, and 'Ulysse et l'examen di chimie', in Carasso, pp.61-78.

⁷ Giovanni Tesio, 'Nego di essere gran lettore di classici e di romanzi', in *Nuovasocietà*, 11 July 1981.

1. Constructed Communities

Discussing Bakhtin's sense of discursive community, Anatolii Akhutin mentions the narrowing 'circles of communication' or microcommunities that surround the work of specialists. In so doing, he reminds us of the problems of disciplinary specificity raised by Snow that prevent communication due to increased precision in particular fields. Akhutin attempts to rectify this problem by stating that each discursive community of collaborating colleagues is spread 'throughout the whole world and all of history' reflecting the great time of culture mentioned above (Alexandrov and Struchov, p.383). The apparent impossibility of this diachronic interaction is waived aside by thinkers such as Michel Serres, who also champions the interconnectedness of literature and science. Serres has stressed the importance of perceiving the label 'contemporary' to be flexible and elastic, hailing Lucretius as relevant to our own time, on account of the premature acuity of his thoughts on 'flux, turbulence and chaos' and the fact that these subjects came to prominence once more towards the end of the twentieth century.

Serres' cyclical view of epistemological development dismantles the teleological assumption that the present moment constitutes the pinnacle of time and reason, which leads to the serial denial of believing oneself to be 'permanently' right (Serres and Latour, pp.45-51). By this reasoning, Levi can look both to the present and to the past and engage in an equally valid, active dialogue with any of the work he encounters. In taking this approach Levi is able to document his own literature-science tradition, and assert the authority gained from this type of intellectual genealogy.

Levi's view of contemporaneity is comparable to that of Serres. He declares that the written text should be 'un telefono che funziona',⁸ linking the author and reader in a living dialogue that can be seen to transcend time. This dialogue can be blocked by inappropriate or unhelpful introductions to a text, as exemplified by Levi's experience of Latin at school; he initially considered it 'buono per le lapidi, buono per il marmo', but later realized that it was a dynamic, spoken language (*Dialogo*, p.15). However, the dialogic potential of a text is not necessarily determined by the material in which it is inscribed as elsewhere Levi shows how stone can speak volumes, performing a dynamic reading of multiple histories from the semiological grooves time has cut on the stones of Turin. He reads the ruts worn in the cobblestones by carriages, the scars from wartime assault, deciphering a language forged by the passage of people which echoes tangibly across the centuries.⁹ Here we see that the texts which speak to Levi across time are those inscribed by 'lived experience and practices', by the physical presence of individuals marking their environment.¹⁰

With regard to Levi's status as a literature-science figurehead, diachronicity plays a large but not entirely straightforward role in his identity. He often insists on the parallels between his two professions, yet it is worth remembering that despite significant overlap in these activities he became much more prolific as a writer towards the end of his career as a chemist in 1977 and during his retirement.¹¹ After this date he emphatically described himself as 'Ex-chimico', implying a serial progression from one

⁸ 'Il suono e la mente', interview with Dina Luce, Rai, seconda rete radiofonica, 4 October, 1982; repr. in *Conversazioni* (pp.33-46), p.40.

⁹ 'Segni sulla pietra', in *L'altrui mestiere* (II, pp.685-88).

¹⁰ See Hall, 'Cultural Studies', p.38.

¹¹ See JoAnn Cannon, 'Canon-Formation and Reception in Contemporary Italy: The Case of Primo Levi', *Italica*, 69/1 (Spring 1992), 30-44 (p.33).

activity to another as opposed to the concurrent practice of both.¹² This self-categorization takes on particular significance in light of Bakhtin's remarks on artistic and scientific 'simultaneity', and discussion of contemporaneity thus far. It may be true, as suggested by Levi's words cited at the end of the previous chapter, that the great questions which haunt humanity continue to return cyclically in altered form; however, methodological practices, in contrast, can be changed irrevocably or simply disappear.

Levi is the first to acknowledge that in some fundamental ways science moves on with time, implicitly decreasing the authority with which he can speak about chemistry. In 1985 he describes himself thus: 'Io ex chimico, ormai atrofico e sprovveduto se dovessi rientrare in laboratorio' (*II*, p.642). The implications of this unfamiliarity are explored in more depth in the next section that discusses Levi's dialogues with Tullio Regge. However, rather than dismissing Levi's scientific authority *tout court*, it is important to reiterate his aim in narrativizing his experiences as a chemist. Referring undoubtedly to the project that eventually became *Il sistema periodico*, he spoke in 1963 of a longstanding ambition:

un'altra aspirazione da coltivare in segreto sarebbe quella di trovare un punto di congiungimento [...] raccontare cioè al pubblico il significato della ricerca scientifica, una documentazione fantastica, ma poi non tanto, di ciò che avviene nel chiuso dei laboratori, che è poi riprodurre sotto veste moderna le emozioni più antiche dell'uomo, le più misteriose, il momento di incertezza, ammazzare il bufalo o non ammazzarlo, trovare quel che si cerca o non trovarlo.¹³

The 'punto di congiungimento' between scientific and humanistic fields of activity is the common human element, our embedded subjectivity that inextricably colours all our actions. Here the questions and ideas that return in a different guise are related to our

¹² See the essay 'Ex chimico', in *L'altrui mestiere* (*II*, pp. 641-43).

¹³ Pier Maria Paoletti, 'Sono un chimico, scrittore per caso', *Il Giorno*, 7 August 1963; repr. in *Conversazioni*, pp.101-05 (p.103).

successes and failures, our moments of hesitation and uncertainty; issues that for Levi resonate indubitably across the centuries.

A diachronic perspective seems to grant a broader view, and may enable one to grasp the bigger picture. Similarly, membership of a diachronically dispersed community frees the individual from ‘the libidinous desire to belong’ to a large movement that tends to homogenize independent thought (Serres and Latour, pp.20-21).

Levi addresses this subject in the preface to *L'altrui mestiere*:

Se si sta in gruppo serrato, come fanno d'inverno le api e le pecore, ci sono vantaggi: ci si difende meglio dal freddo e dalle aggressioni. Però chi sta al margine del gruppo, o addirittura è isolato, ha altri vantaggi, può andarsene quando vuole e vede meglio il paesaggio. (II, p.631)

As with other areas of his thought, Levi's engagements with groups and collective identity are far from straightforward, as he strives towards intellectual freedom but also craves validation and support as a recognized member of the literary community. He locates himself on the margins of several groups, thus enabling a dialogue between the fields of literature and science, promoting communication and interaction whilst still allowing himself independence from the work, thoughts and presence of those with whom he ‘converses’. However, this liminal status also engendered inevitable tensions within his identity, leading to his self-identification as a centaur.

Levi describes himself as a chemist first, a writer second, feeling torn between being the active ‘tecnico’ in the laboratory and the reflective author. Feeling the effects of this division, he often expresses uncertainty about his status as a literary figure, declaring himself ‘troppo chimico, e chimico per troppo tempo per sentirmi un autentico uomo di lettere’. However, by the same token he feels ‘troppo distratto dal paesaggio, variopinto, tragico o strano, per sentirmi chimico in ogni fibra’ (II, p.631). As an organic

chemist, he was surrounded by ‘collaboratori, clienti, il padrone, fornitori’, and his work was largely anonymous, attributed to a team of researchers, if at all.¹⁴ The importance of teamwork in chemistry is emphasized as Levi praises the ‘lavoro d’équipe’ he experienced while working in his university laboratory, learning invaluable lessons from the fundamental experience of ‘lo sbagliare insieme’ (*Dialogo*, p.20). In contrast, as a writer he stood alone; indeed he seemed to deliberately cultivate a solitary position, choosing to eschew group identity to remain ‘al margine’—free from homogenizing herd instincts and endowed with a clear perspective on events.¹⁵ He counteracted the resulting sense of isolation by devising new, hybrid perspectives on the world that go some way towards bridging the divide between literary authorship and laboratory work;

I cite again from the preface to *L'altrui mestiere*:

Ho corso insomma da isolato [...] costruendomi una cultura disordinata, lacunosa e sapatella. A compenso, mi sono divertito a guardare il mondo sotto luci inconsuete, invertendo per così dire la strumentazione: a rivisitare le cose della tecnica con l’occhio del letterato, e le lettere con l’occhio del tecnico. (*II*, p.631)

This passage emphasizes how Levi took full responsibility for developing his personal ‘cultura’, and found his own idiosyncratic ways of moving between his two professions. The difficulties of operating alone when one does not ‘fit’ existing paradigms are shared by others who sympathize with Levi’s interdisciplinary view: Serres too complains of the difficulty of forging his own literature-science trail beyond the boundaries of established fields, and the suspicion with which he is often regarded (Serres and Latour, pp.20-21). A literature-science perspective allows writers to think across the disciplines,

¹⁴ Interview with Enrico Boeri, ‘4 chiacchiere con Primo Levi’, *Tecnologie chimiche* (Dec. 1983); repr. in *Conversazioni* as ‘Chimico’, pp.19-24 (p.23).

¹⁵ Gordon discusses Levi’s fascination with changing perspectives, enabled by this uncircumscribed freedom: see *Ordinary Virtues*, Chapter 7, ‘Perspective, or Looking Again’, pp.149-172.

but may offer little dialogical support. Hence despite Levi's professed desire for the freedom of autonomy, he also wished to construct a community; not only to demonstrate that his arguments chimed with those of many other 'contemporary' thinkers and gain credence for his work, but also out of an abiding belief in the value of human interaction.

Interpersonal relationships and collective responsibility were vital concerns for Levi. He asserts passionately that as human beings we share a common characteristic: 'una norma scritta in noi, e riconosciuta da tutte le religioni e le legislazioni, ci intima di non creare dolore, né in noi né in alcuna creatura capace di percepirlo'. Whatever our cultural identity, our duty to our 'compagni di viaggio' is to alleviate this pain: 'è strano, ma bello, che a questo imperativo si giunga a partire da presupposti radicalmente diversi' (II, p.674-75). This view, which characteristically insists on the overlap and similarities between groups and cultures often treated as distinct, led Levi to constantly forge new bonds with both his characters and readers, whether real, fictive or imaginary, out of a sense of fundamental, unshakeable kinship. In a further transcendence of boundaries and categorical divisions, as Gordon points out, among his 'friends' Levi includes objects perceived as inanimate such as metals and books.¹⁶ The resulting empathy for anthropomorphized objects is explored in later chapters; here it is worth noting how Levi enlarges his community and curtails potential feelings of isolation by acknowledging and nurturing a range of relationships with diverse individuals and texts, perhaps compensating for his oscillating self-situation on the cusp of both professions

¹⁶ Levi refers to 'metalli amici e metalli nemici' (I, p.898); the books included in *La ricerca* are there as a result of 'amicizie', and discovering a new book is described as making 'un nuovo amico' (II, p.1364). See *Ordinary Virtues*, pp.221-24.

but belonging to neither.

Levi was not an established member of scientific communities other than that of his immediate colleagues at SIVA. Indeed, despite the fact that they both lived in Turin, Levi had not met Regge until the physicist suggested the 1984 meeting which resulted in the conversation transcribed and published as *Dialogo*.¹⁷ Yet while he was not an active presence within scientific circles, neither was Levi an established figure in literary circles: until the 1980s there was scant recognition of Levi's novels among the Italian literati. Alberto Cavaglion has written about the pressure on Levi in the early 1960s to leave his testimonial 'storie deprimenti' behind and write a 'vero Romanzo' that would allow him to 'compiere il grande balzo dentro il mondo delle Belle Lettere'.¹⁸ Indeed, Levi was viewed by some as a complete outsider to literature, described as 'così fuori della mischia che non ha mai sentito parlare della neo-avanguardia' (Todisco). Giuliano Manacorda, one critic who recognized Levi's literary standing relatively early in his career, categorized him as representative of authors who forge their own way, 'quasi incuranti delle grandi o soltanto sottili dispute teoriche'.¹⁹ Levi's independence may have allowed him to 'vedere meglio il paesaggio', but he remained acutely conscious of his marginal status as a writer. Discussing his triumph in winning the Premio Strega for *La tregua* in 1963 he remarks: 'è stato il mio primo ingresso nel mondo letterario in carne ed ossa. Ma mi sono accorto di essere un corpo estraneo' (Poli and Calcagno (eds), p.17). Hence Levi's goal was not only to bridge the perceived gulf between science and

¹⁷ See text on the back cover of *Dialogo*.

¹⁸ Cavaglion, 'Primo Levi era un centauro?', in Mattioda (ed.), pp.23-32 (pp.29-30).

¹⁹ Giuliano Manacorda, *Letteratura italiana d'oggi* (Rome: Editori Riuniti, 1987), p.265; cited in Cannon, 'Canon-Formation', pp.32-33.

literature, but also to be validated by the literati for his accomplishments beyond his testimonial writing.

His insecurities relating to his intellectual validity might be seen as stemming from two sets of circumstances that affected his trajectory. The first of these is the fact that he was struggling against the sense of marginalization he experienced during his university career. The 1938 Racial Laws did not prevent him from studying for his degree, but had an inevitable impact on his sense of belonging: 'La liberazione universitaria ha coinciso con il trauma di sentirmi dire: attenzione, tu non sei come gli altri, anzi, vali di meno: sei avaro, sei uno straniero, sei sporco, sei pericoloso, sei infido' (*Dialogo*, p.20). Secondly, although seeming to glean some satisfaction from his idiosyncratic education, he was conscious that it remained 'lacunosa' rather than methodical, and this awareness may be seen to have influenced his epistemological outlook. When asked about his modesty in confronting the impossibility of reaching 'la verità', he comments:

è una mia umiltà personale. È perché ho studiato in un modo tale, talmente male—per motivi indipendenti dalla mia volontà—che non potevo altro che sentirmi umile; cioè sentirmi 'profano' nel senso etimologico di chi sta davanti al tempio e non può entrare. (Poli and Calcagno (eds), p.81)

Although here Levi portrays his education as a partial liability, it also has definite advantages of which he is well aware. This is apparent from his comments in the preface to *L'altrui mestiere*, cited above, relating to the freedom and relative objectivity enabled by non-homogeneous practices. It is precisely his slightly equivocal status within each discipline, and the disinterestedness which results from not being 'soggetto alla "routine" né ad automatismi né ad addomesticamenti ideologici', that endow him with 'il giudizio spassionato, fuori dai pre-giudizi, [la qualità] in base alla quale sono

possibili dei raccordi, delle relazioni tra i “saperi”.²⁰ Levi describes *L'altrui mestiere* as a ‘vagabondaggio di dilettante curioso’, as a series of “invasioni di campo”, incursioni nei mestieri altrui, bracconaggi in distretti di caccia riservata’—fields that he has not studied systematically and which therefore exert an irresistible draw on his ‘pulsioni di voyeur e di ficcanaso’ (*II*, p.631). Above and beyond the ramblings of a curious dabbler, however, Levi’s reflections are far from being lightweight; Elvio Guagnini characterizes the issues tackled as ‘problemi di impegno arduo’ (‘I “vagabondaggi”’, p.78), and Levi himself states that he uses this textual forum to ‘prendere posizione su problemi attuali’ (*II*, p.631).

The essays that comprise *L'altrui mestiere* are described as ‘elzeviri’, literary articles that engage with cultural issues, which appeared in *La Stampa* between 1976-84.²¹ They include reflections on his activities as a chemist and as a writer, on the practice of and motivations for writing itself, on translation, on etymological investigations, on canonical authors and texts (Huxley, Rabelais, *I promessi sposi*), on curiosities such as flea circuses, on fantastic animals conceptualized by children in the *prima media*, on the use of animals in scientific experiment and the dangers posed by our ever increasing nuclear capabilities. It is perhaps not surprising that a collection of newspaper articles should range across a variety of themes. Much more striking is the truly multifaceted nature of each article. As an example we might consider ‘Lo scoiattolo’ (*II*, pp.716-19). This article begins with Levi introducing a certain Signor Perrone to his aunts who insist on calling him ‘Prùn’, which, it transpires, means

²⁰ Elvio Guagnini, ‘I “vagabondaggi” di un “letterato curioso”: Le “culture” di Primo Levi’, in Mattioda (ed.), pp.75-85 (p.77).

²¹ Indeed, the title of the collection was to have been *Elzeviri*; see *II*, p.1554.

'squirrel' in certain areas of Piedmont. This discovery leads to an etymological quest in which we discover that 'prùn' derives from the Latin 'pronus', inspired by the animal's posture, and follow Levi's research into the word 'scoiattolo', which stems originally from the Greek 'skiuros'. Thus armed with an etymological history of the signifiers for this creature, we are made privy to Levi's encounters with a number of living examples: squirrels he has met in parks, woods, in prison and even in a laboratory where one particular squirrel was forced into perpetual movement by a turning wheel, for a series of experiments on insomnia.

Continuity in this article stems not from narrative connections between events or situations, but from semantic and linguistic links. On one level, Levi's article is merely a series of related anecdotes, joined together by etymological information. There is no apparent connection between Signor Perrone and the laboratory experiment. However, on another level the article functions subtly to encourage the development of a new perspective on the squirrel. From a 'dead', or forgotten, semantic allusion to the animal in a surname, Levi conjures the history of a creature that in classical times basked in the shade of its own tail, was a delicacy at Roman feasts, nests in oak trees, leaps fearlessly from branch to branch and will take food from your hand. Having brought the squirrel to life, he then recounts a couple of anecdotes which allude to imprisonment—both his own and that of various squirrels. Maintaining his light-hearted tone Levi concludes by making some serious points about the uses and abuses of animals in contemporary scientific experiment and describes his own intervention: he in fact turned off the electric wheel and allowed this particular specimen to sleep, ruining the experiment but releasing the creature.

Calvino's review of the collection characterizes it as exemplifying several literary genres: notably the 'voce d'enciclopedia' and the 'memorie d'un chimico industriale'. Each article is like a detective story, he remarks, but, 'nella chiusa del racconto, torna la vena del moralista'.²² Levi's skill in these articles, stories, anecdotes and reflections, is to make us see beyond the superficial appearance of the object immediately before our eyes. He encourages the reader to perform a process similar to that which he undertook with the microscope he entreated his father to buy him when he was fifteen, as he examined the marvels and monsters it revealed that were otherwise invisible to the naked eye.²³ In a book his father had bought for him from a second hand stall, Levi read that 'Nelle foglie di ogni foresta, nei fiori di ogni giardino, nelle acque di ogni ruscello ci sono mondi pullulanti di vita, innumerevoli come le glorie del firmamento' (*II*, p.801). Immediately struck by this 'detto elettrizzante, al limite fra lo scientifico e il visionario' he was driven to see whether it held some truth. On a larger scale, the elzevirs of *L'altrui mestiere* perform the same function for practices we engage in during our daily lives as Levi's microscope did for his observations of his hairs, fingertips and water he collected from a nearby river. Aside from pure detection, however, as he strips away layers of familiarity to reveal the novelties beneath, Levi's observations also function to draw together different pools of knowledge and experience, to unite the scientist and the visionary, the historian and the critic of contemporary culture.

In these articles Levi uses his position on the cusp of scientific and literary activity to wind an inquiring thread through a series of apparently discrete anecdotes,

²² 'L'altrui mestiere di Primo Levi', *La Repubblica*, 6 March 1985; repr. in *Saggi*, I, pp.1138-41 (p.1139).

²³ 'Il mondo invisibile', *II*, pp.800-04.

observations and statements, and, in the recurring tones of the wry moralist, embeds these musings in an ethically-minded socio-historical context. Despite Guagnini's identification of an 'impegno arduo' in these articles, Levi himself was quick to mitigate any tendencies towards polemic. He declared himself opposed to this form of reasoning, commenting that although the writer whose work and lifestyle demonstrates a lucid, critical sense of the world and its problems deserves praise, 'questo indirizzo non [deve] assumere la forma di una preclusione'. It is commendable to express oneself clearly and with self-awareness, but 'impegno' in writing also stems, he asserts, from the vast grey areas between purely ideological and merely entertaining writing. One can also express and encourage self-awareness through writing that is 'inconsapevole e indistinta, o consapevole e allusiva'.²⁴

Often, Levi writes, we learn more about ourselves through informal, imaginative inquiry than through controlled, 'scientific' psychological tests, for example, that attempt to impose rigid meanings on our thoughts and perceptions.²⁵ The underlying strength of this collection seems to me to derive from Levi's freedom to exercise his 'fantasia' in productive and uncircumscribed ways, and to wander between a series of communities, gathering knowledge that, as Eco argues, may not always be 'true' or 'factual', but may lead to the discovery of new revelations, or things we consider as 'truths' today (Eco, *Serendipities*, p.viii). As he wanders through the past and present, through real and imaginary spaces, Levi establishes a 'great time of culture' full of bright minds and the wonder of nature; a chronotope charged with the self-awareness

²⁴ Mario Miccinesi, 'Inchiesta sulla letteratura come contestazione', *Uomini e libri*, 18 (April 1968); repr. in Poli and Calcagno (eds), pp.51-52.

²⁵ See the article in *L'altrui mestiere*, 'Il teschio e l'orchidea', in which he launches a gentle but effective critique on psychological tests such as the famous 'ink blot' experiments (*II*, pp.823-26).

and critical consciousness of an individual who never loses sight of his own socio-cultural context.

2. Dialogues with Scientists

I turn now to Levi's interaction with contemporary scientists. In a 1984 article, Ernesto Ferrero draws together a group of Italian authors who have a strong interest and/or practical experience in scientific fields: the engineer-authors Gadda and Roberto Vacca, the physicist-author Tullio Regge, the biologist-author Ruggero Pierantoni, the chemist-author Levi and the science-inspired authors Calvino and Andrea Zanzotto.²⁶ Petrucciani's critical study of Italian authors working 'tra algebra e metafora' includes Vittorini, Gadda, Sinisgalli, Zanzotto, Giacomo Debenedetti, Calvino and Levi. Of these figures, the only ones with whom Levi established significant contact or of whom he writes at any length were Vacca, Calvino and Regge. He certainly read and also reviewed several of Vacca's books, notably *Esempi di avvenire* and *Parliamo itagliano*,²⁷ describing Vacca warmly as inter-culturally and epistemologically 'integrato, nel miglior senso del termine' but also criticizing his tendency towards an inaccessible or undeveloped writing style (*I*, pp.1152-53). His much more substantial relationship with Calvino is explored in the next chapter; here I explore his dialogue with Regge, initiated at the latter's request. It seems strange that given his sense of isolation, his willingness to be interviewed and the strength of his belief in the need to

²⁶ 'Se lo scrittore sapesse che la scienza è anche fantasia', *Tutto libri*, 21 January 1984, p.1.

²⁷ The latter text is published under Vacca's pseudonym Giacomo Elliot (Milan: Rizzoli, 1978). See 'L'ingegnere-filologo e i suoi sogni proibiti' (*I*, p.1152-54), and 'Le parole esportate', (*I*, pp.1223-26).

heal the science-literature divide, Levi did not endeavour to establish stronger contacts with or write in more depth about other Italian figures who shared his concerns. Indeed, when he outlines the community of figures with whom he identifies who have scaled the gulf between science and literature he lists: Empedocles, Dante, Leonardo Da Vinci, Galileo, Descartes, Goethe, Einstein, the anonymous builders of gothic cathedrals, Michelangelo, modern day craftsmen and physicists—a variegated crowd stretched across history but lacking any named contemporaries (*II*, p.632). However, his reviews of Vacca's work certainly promote and show solidarity with their common goal: 'vedere perforato il muro che separa le cosiddette due culture, che atrofizza entrambe' (*I*, p.1226).

Although their 'official' professions are quite different—Regge taught physics at the universities of Princeton and Turin—the two men have in common their columns in *La Stampa* and their interest in communicating the hidden or undecipherable mysteries of science to the general public.²⁸ During the conversation transcribed in *Dialogo*, which took place in June 1984, they contextualize their existential and educational trajectories, speaking of their scholastic careers, their relationships with their teachers, fathers, intellectual influences and current interests. They learn that they share a passion for philology and that they both reacted strongly against anti-scientific Gentilian scholastic methodologies. The dynamic of the conversation reveals a great deal about the topics that impassion Levi, and his degree of familiarity with recent key developments in science. His knowledge of twentieth-century physics and physicists, for example, was

²⁸ Regge's publications of this nature (some of which were published subsequent to his dialogue with Levi) include *Cronache dell'universo* (Turin: P. Boringhieri, 1981); *Non abbiate paura: racconti di fantascienza* (Turin: I libri de *La Stampa*, 1999); *Scienza e ambiente: un dialogo con Maurizio Pallante* (Turin: Bollati Boringhieri, 1996). For a web archive of Regge's columns in *La Stampa* see <<http://lgxserver.uniba.it/lei/rassegna/regge.htm>> (retrieved on 20/02/04).

far from intimate. For an extended section of the *Dialogo* (pp.23-44), Regge carries on a largely uninterrupted monologue, detailing developments in this field and enumerating his own high-profile professional acquaintances: Robert Oppenheimer, Kurt Gödel, Werner Heisenberg, Freeman Dyson. Levi's interjections are almost all questions, suggesting a sharp curiosity but also a lack of extended knowledge: for example, with regard to Heisenberg's Uncertainty Principle, Levi asks 'Era un concetto del tutto nuovo? Nessuno ci aveva mai pensato prima?'²⁹

In his identity as a scientist, Levi did not seek to align himself directly with other branches of science besides a rather traditional form of organic chemistry. He speaks of his initial romantic view of chemistry (*Dialogo*, p.13) and later takes a stance against the dehumanizing effects of mechanization, criticizing recent developments in chemistry as rendering it too 'rapida'. Although acknowledging that technical advances have convenient benefits such as enabling the instantaneous analysis of a mineral as opposed to a week-long process of painstaking investigation, Levi laments the loss to human development incurred by modern efficiency. Traditional chemical processes—'l'analisi manuale'—have *formative* value, training us to use our sensory organs and fulfil the possibilities extended to us through evolutionary development. He says: 'il mestiere di chimico ti integra nella tua funzione di persona completa, che non trascura nessuna delle sue facoltà possibili'. Becoming a chemist in the traditional sense meant learning to

²⁹ See p.26. Heisenberg was the founder of quantum mechanics. His Uncertainty Principle, developed in his uncertainty paper of 1927, stated that the more precisely the position of a particle is determined, the less precisely its momentum is known in that instant, and vice versa. His uncertainty relations revealed that the experimenter disturbs untouched nature, thus limiting what one can learn about nature 'as it really is'. Thus he revealed the inevitable inaccuracies of scientific investigation, since the observer is inevitably implicated in and distorts the observation process. See *The Uncertainty Principle and Foundations of Quantum Mechanics: a Fifty Years' Survey*, ed. by William C. Price and Seymour S. Chissick (London: Wiley, 1977).

‘sfruttare a pieno l’aiuto che possono fornire gli occhi, le dita, il naso’. In contrast, he implies, using modern technology as our ‘aiuto’ has the effect of truncating our potential capacities as human beings, and foreclosing an opportunity to cultivate patience; ‘il non aver fretta’ (*Dialogo*, pp.61-62).³⁰ Thus a traditional training in chemistry has formative value beyond its immediate goals, which facilitates holistic self-actualization. This view resonates throughout Levi’s accounts of his experiences as a chemist, as he emphasizes the ‘transferable’ nature of skills developed, opening the way for further connections to be made between laboratory work and the ‘outside’ world.

Regge shares Levi’s concerns regarding the speed at which developments are taking place; he expresses surprise at American plans for an antimissile satellite, a possibility which he believed to be ‘riservata al futuro possibile ma lontano’, and which ‘introduce un ulteriore elemento di instabilità e di folli spese in un mondo che non ne ha proprio bisogno’ (*Dialogo*, p.68). As regards the connections between scientific and other modes of intellectual inquiry, Regge sympathizes with what he terms Dyson’s heterodoxy. He describes how Dyson re-evaluated the view of philosophy as ‘un ornamento extra curriculum’, and instead argues for two key moments in scientific research: first, the elaboration of a hypothesis motivated by a desire to show that the world is made in a certain way; second, the verification of its validity through experiment (*Dialogo*, pp.50-51). Like Levi, Regge believes that science cannot be reduced to mere quantitative analysis:

A chi obietta agli scienziati che sono troppo freddi, rispondo sempre che la formula non è fredda, e non risolve tutta la scienza [...] Anche in fisica il calcolo rappresenta soltanto il punto da cui si comincia, per cercare di andare oltre. (*Dialogo*, p.51)

³⁰ Gordon discusses the emphasis on virtue in Levi’s work: see *Ordinary Virtues*, pp.54, 118-20 for his account of Levi’s views on patience.

However, although there may be similarities between their positions, there are also differences: Levi places a great deal of emphasis on the need for ethical, responsible practice, while Regge welcomes philosophical input but does not seem as interested in promoting critical self-awareness of the motivations behind new hypotheses. As regards the relationship between humans and computers, we see a similar distinction between their views. Advances in scientific practice and equipment mean that Levi's vision of science based on manual activity is being rapidly replaced by one which requires far less human input. He speaks rather poignantly of feeling overtaken by the capabilities of machines: 'sono ancora in grado di identificare a naso certi gruppi funzionali più in fretta dello spettrometro a infrarossi e dei gascromatografi' (*Dialogo*, p.62). It is obviously only a matter of time before this slim margin of superior efficiency is eroded and the machine begins to supplant human beings—a dystopia explored in many of Levi's fictions.³¹ Conversely Regge states unequivocally that he considers the computer to be merely a useful aid: 'Per me si tratta sempre di una macchina, docile, pignola ed instancabile, completamente priva di fantasia' (*Dialogo*, p.66).

Levi does not challenge these statements but elects to return to a subject discussed previously: science fiction and the future. Here he reveals himself to be rather in thrall to Regge's status as a physicist. He declares that science fiction 'proper' is 'caccia riservata, scritta da fisici e per fisici'—a comment that echoes his remarks in the preface to *L'altrui mestiere* but which disallows any adventurous drive to explore fields beyond one's specialization (*Dialogo*, p.51). Regge confirms this declaration by expressing his discomfort with fiction that defies or contravenes the known laws of

³¹ See the discussion in Chapters 5 and 6 below, and see especially the short play 'Il Versificatore', originally published in *Il Mondo* in 1960; repr. in *Storie naturali* (I, pp.413-32).

physics: he criticizes Isaac Asimov for narrating travel that supersedes the speed of light which to him, as a relativist, 'crea dei traumi psichici' (*Dialogo*, p.53). However, despite his apparent insistence on strict categories of legitimate and illegitimate approaches to science fiction, Levi then takes a more fluid view of genres of writing and modes of thought, articulating his realization that the boundary between science and science fiction is indefinable and movable (*Dialogo*, p.67). In the context of his argument, his remarks imply that physicists are writing the future, both in fictional terms and in actual fact:

I veri padroni del mondo siete voi [i fisici]; dipende da voi che cosa avverrà del genere umano nei prossimi anni. Il potere che avete è sterminato: capite più cose dei profani, e l'energia è tutta nelle vostre mani, nei suoi due aspetti, quella benefica ed inesauribile [...] della fusione nucleare e quella delle testate che cavalcano i missili intelligenti. (*Dialogo*, p.67)

This comment evokes observations Levi makes elsewhere regarding the potential for science to be used for positive or destructive ends,³² as well as his conviction that it is the astrophysicists who are leading us forward, for good or ill:

È in corso il più grande delle rivoluzioni culturali: la stanno conducendo in silenzio gli astrofisici. Il profano (e profani siamo tutti, ad eccezione di un migliaio di specialisti al mondo) non può che accettare i nuovi mostri celesti, reprimere brividi inediti, tacere e pensarci su. (*II*, p.1524)

The rather bleak mistrust that lurks behind Levi's words is expressed in muted terms to Regge, as he asks what the latter thinks of the annual meetings of physicists at the International School of Nuclear Physics in Erice. Regge's answer to this is that although some of the ideas and discussions that have taken place there have proved neither wise nor productive, the idea of uniting scientists to enter into discussion with one another is

³² Levi believes that 'la tecnica sia come la lancia di Achille, che ferisce e guarisce, a seconda di come viene maneggiata o meglio, a seconda della mano che la regge'; Grassano, 'La musa stupefatta', in *Antologia*, p.134

a positive one.³³ We do not hear if Levi responded to Regge's comments, as here the text ends.

What is striking about this conversation is the amount of space devoted to lived experience and personal interests rather than professional activity. The scope is clearly to engage with the other interlocutor in a holistic manner. However, although Regge initially introduces his recent interest in learning Hebrew, he tends to draw the conversation back to his professional activities and colleagues, while it is Levi who pointedly steers discussion away from scientific concerns asking, 'cosa ti ha dato tutto quello che è cultura non scientifica, e quindi arte, letteratura, musica?' (*Dialogo*, p.57). If in this discussion Levi is somewhat subdued as regards the uses and abuses of power in the scientific arena, he certainly seems to enjoy the opportunity to discuss a wide range of issues and problems with a scientist who shares his extra-scientific interests. Despite his social awareness, however, one important cultural issue that Levi does not tackle in any significant depth in his conversations about and reflections on science is that of gender. Here it is worth mentioning another Turinese contemporary who explored similar interdisciplinary interests to those of Levi: the Nobel Prize winning neurobiologist Rita Levi Montalcini.³⁴

These self-defined 'ebre[i] di complemento' who were not related but decided to call themselves 'cugino',³⁵ enjoyed a long friendship. They shared a family heritage that

³³ The International School of Nuclear Physics at Erice in Sicily was founded in 1974 in order to bring recognized experts and less experienced scholars together from all over the world to discuss new and expanding fields of research. See <<http://www.uni-tuebingen.de/erice>> for more information (retrieved on 20/02/04).

³⁴ Levi Montalcini won the Nobel Prize for Medicine in 1986.

³⁵ Rita Levi Montalcini, *Senzo 'olio contro vento* (Milan: Baldini&Castoldi, 1996), pp.103, 101.

Levi Montalcini recognized in the chapter ‘Argon’ in *Il sistema periodico* (*Senz’olio*, p.101), as well as a social commitment that led to their both signing a letter of protest concerning the Israeli invasion of the Lebanon in 1982 (*Senz’olio*, p.103). Scientifically, they moved in quite different directions, since Levi Montalcini specialized in what was to become internationally acclaimed research while Levi remained, and insisted on being recognized as a ‘tecnico’ rather than as a ‘ricercatore’.³⁶ Levi Montalcini discusses her response to some of Levi’s work, both in her autobiography *Elogio dell’imperfezione*³⁷ and in *Senz’olio contro vento*, a compelling account of ten individuals—including Levi—whose courageous and determined efforts at resisting the difficulties of life she wished to commemorate. Comparably to Levi, she defines herself as ‘uno scienziato che credeva con uguale intensità e fervore ai valori della scienza e della vita’,³⁸ and enjoyed a compelling lifelong dialogue with her twin sister Paola, an accomplished artist, on the connections between artistic and scientific thought and activity.³⁹

Notably, due to her experiences as a woman in a male-dominated world, Levi Montalcini held a different awareness from Levi of the patriarchal character of the institutions of science. Having followed a similar degree programme to Levi at the University of Turin a few years before him, she comments on ‘[il] burbero e misogino professor Ponzio che tu [Levi] prediligevi, e che io, per il fatto solo di saperlo misogino,

³⁶ Levi explains, ‘scienziato avrei voluto diventare, ma la guerra e il Lager me lo hanno impedito, e ho dovuto accontentarmi di essere un tecnologo durante tutta la mia vita professionale,’ Philip Roth, ‘L’uomo salvato dal suo mestiere’, trans. from ‘A Man Saved by his Skills’, *The New York Times Book Review*, 12 October 1986, first published in *La Stampa*, 26-27 November 1986; repr. in *Conversazioni*, pp.84-94 (p.88).

³⁷ Milan: Garzanti, 1987.

³⁸ *Il tuo futuro: i consigli di un Premio Nobel ai giovani* (Milan, Garzanti, 1993), p.94.

³⁹ See Rita Levi Montalcini, *Un universo inquieto: vita e opere di Paola Levi Montalcini* (Milan: Baldini&Castoldi, 2001) and Charlotte Ross, ‘Parallel Productions: Rita and Paola Levi Montalcini’, *Italian Studies*, 59 (2004; forthcoming).

odiavo' (*Senz'olio*, p.95). Ponzio is the Professor P. immortalized in the chapter 'Zinco' of *Il sistema periodico*, who Levi describes as 'scettico ed ironico, nemico di tutte le retoriche (per questo, e solo per questo, era antifascista), intelligente, ostinato, ed arguto' (*I*, p.764).

Without wishing to cast unfair aspersions on Levi's views, it is important to note his general lack of *overt* attention to the way in which science and technology impact on women in specific gendered ways. This absence is particularly notable in his journalism, which would seem an ideal forum in which to raise such issues. Feminist critics have long insisted on the importance of deconstructing and problematizing the assumed neutral character of scientific inquiry, arguing that research paradigms and ways of knowing are heavily influenced by extra-scientific factors such as race and gender.⁴⁰ Levi's remarks about the dangers of hiding behind a 'neutral' science resonate profoundly with such arguments, but he rarely comments openly about issues of gender, as is typical of his generation of male Italian thinkers. One exception is, tellingly, a short article he wrote on the occasion of Levi Montalcini winning the Nobel Prize, 'Una piccolo signora dal piglio principesco'.⁴¹ It begins:

Finalmente una notizia buona, in mezzo allo stillicidio delle notizie indifferenti o cattive! Finalmente un momento di gioia non contaminate, ma non semplice, anzi, stratificata, complessa. Gioia perchè, dopo tanti anni, il premio per la Medicina più ambito del mondo è andato a una donna. Perché è andato ad una torinese. Perché questa torinese mi onora della sua amicizia.

Although Levi does not further develop his comments on the unusual event of a woman winning such an accolade, he certainly applauds the change. Levi's portrayals of the

⁴⁰ See for example *Feminism and Science*, ed. by Evelyn Fox Keller and Helen E. Longino (Oxford: Oxford University Press, 1996); Evelyn Fox Keller, *Reflections on Gender and Science* (New Haven and London: Yale University Press, 1985).

⁴¹ *La Stampa*, 14 October 1986; repr. in *II*, p.1304.

impact of science and technology on women is a subject that remains critically underexplored. Although he may not tackle this subject significantly in his journalism, there are nevertheless many striking episodes in his fiction which evoke highly charged, gendered situations. Some of these may be seen to anticipate issues taken up by later feminist critiques of science and its impact on society, as I explore in Chapters 5 and 6 below. Having explored some interpersonal conversations and relationships, I turn now to Levi's text-based dialogues.

3. Textual Communities

Moving on now to the written communities which Levi creates, the 1981 *La ricerca*, an anthology or 'autoritratto', draws together extracts from his 'input ibridi' (II, p.1361). Works from which Levi cites date from the distant past as well as from more recent periods, as Levi establishes a 'great time of culture' which is then invested with specific socio-historical meaning and value by his interjections. Rather than focus on the absence of classic authors like Dante and Dostoevskij as some critics have done,⁴² I consider the text as constituting, among other things, a part of Levi's personal literature-science canon, integrating names from beyond the confines of literature 'proper': Charles Darwin, Arthur C. Clarke, Ludwig Gattermann and writers who contribute to scientific journals. In examining this multi-vocal text, I first analyse the dialogue produced by this integration, both diachronic and interdisciplinary.

⁴² See Aurelio Andreoli's interview 'Per Primo Levi questo è un modo diverso di dire io', *Paese sera*, 21 August 1981; repr. in *Conversazioni*, pp.123-28.

Levi's description of the sources from which he draws confirms his practical performance of a literature-science approach that enables 'contemporary' figures to enter into dialogue: he kept his favourite books together on the same shelf, singled out regardless of chronological or disciplinary provenance (*II*, p.1365).⁴³ Although Levi comments in the preface that 'i morti non cambiano più e non spingono più altre radici' (*II*, p.1365), the intertextual links he highlights between these texts create a fresh dialogue, confirming his belief that the barriers between science and literature are unnecessary. Although Einaudi was hoping to publish a series of scholastic texts chronicling major influences on various key authors,⁴⁴ Levi had not intended *La ricerca* to be used purely didactically. He hoped his readers would include 'i colleghi chimici, i lettori dei miei libri precedenti, i ricercatori delle "radici" personali e collettive, i critici [...] soprattutto i giovani' (Andreoli, p.124). The diversity of this selection mirrors that of the variegated canon in which he situates himself, and confirms his desire to unite readers across socio-cultural strata. However, as he himself admits, his selection of authors is in other ways extremely narrow. He expresses surprise that 'non si trovasse né un furfante, né una donna, né un appartenente alle culture non-europee', for example (*II*, p.1363), but does not apologise for this, leaving judgement of his textual influences up to the reader.

In his Introduction to the 1997 edition of *La ricerca*, Marco Belpoliti advises the

⁴³ This no doubt contributed to the speed at which it was produced: the manuscript was consigned in the same year as the commission—a speed almost unheard of in publishing circles. See Marco Belpoliti's preface, 'Le radici rovesciate', in the 1997 Einaudi edition, pp.vii-xviii (p.vii).

⁴⁴ Giulio Bollati offered a commission to several authors, including Calvino, Leonardo Sciascia and Paolo Volponi (who refused it) but Levi's text was the only one actually published (*II*, p.1576). This commission confirms his growing status as a recognized literary personality. *La ricerca* was primarily intended as a scholastic text, but was judged more testing ('più "alto"') than standard school editions. It was therefore released as an 'adult' version while an edited edition was produced for the *scuola media* (*II*, pp.1577-8).

reader not to accept Levi's framing of his self-portrait as 'lapidario-funerario' (p.xvi). Belpoliti's disregard of Levi's professed opinion is shown to be justified, since far from discouraging diachronic interaction, the volume self-consciously points to its own promotion of achronological interdisciplinarity. Levi juxtaposes extracts from the work of Lucretius and Isaak Babel', stating, 'Non conosco noia maggiore di un curriculum di letture ordinato, e credo invece negli accostamenti impossibili' (*II*, p.1468). Here Levi links these writers through a shared compassion for victims of violence, yet this is only one of a multitude of reading strategies. He has already suggested several alternative routes through his anthology in the form of a diagram tracing lines of thematic connections between authors on parallel paths from Job to Black Holes.⁴⁵ These parallel paths reinforce notions of the subjective nature and inevitable situatedness of the reader's response to and interpretation of the text by pointing out the possibility and validity of coexisting approaches.⁴⁶

Levi also promotes the idea of epistemological anticipation, remarking that Lucretius' work shows 'intuizioni sorprendenti' that place him on a par with the 'atomisti moderni' (*II*, p.1465); 'contemporary' in Serres' sense of the word. Thus it seems that work from the past can indeed connect with new debates. To give some examples of the intertextual dialogue Levi encourages, he cites Clarke telling us that Leonardo da Vinci would have known how to send a televised image from one place to

⁴⁵ *II*, p.1367; see Fig. 1, in Illustrations, p.332 below.

⁴⁶ This position can be related to the work of Gaston Bachelard, historian and philosopher of science. Bachelard refutes the notion of a single history of science seeing instead a variety of histories, and a variety of 'epistemological profiles'. These profiles are individual understandings of particular concepts that may retain components which are shown to be scientifically invalid, but which possess other kinds of meaning. Bachelard's view is compatible with the transposing of material from one epistemological field to another, without condemning it as semantically void. See *Le Matérialisme rationnel* (Paris: PUF, 1953), *La Philosophie du non* (Paris: PUF, 1940), and Gary Gutting's discussion in *Michel Foucault's Archaeology of Scientific Reason* (Cambridge: Cambridge University Press, 1983), pp.12-19.

another;⁴⁷ the extract by William Bragg refers explicitly to Lucretius' atomism, thus Levi allows Bragg to validate exactly the 'intuizioni sorprendenti' he saw in Lucretius' work, and which speak to modern sensibilities.⁴⁸ In this way Levi employs intertextual references that reinforce his view of literature and science as inextricably interwoven, without risking didacticism.

More specific debates are also enabled, as readers of Levi's anthology are urged to work at destabilizing polarized views of literature and science by engaging in a game of intertextual detection. With relation to his own work, they are asked to seek out 'le eventuali tracce di quanto è stato letto su quanto è stato scritto' (*II*, p.1361). The map that Levi provides encourages readers to follow the theme of 'l'uomo che dal groviglio estrae l'ordine' (*II*, p.1383), as reiterated by a variety of authors. Yet alongside a powerful sense of the interconnectedness of different types of knowledge, Levi's words function as an ominous reminder that 'there are always links between science and power'.⁴⁹ For example, as Cicioni points out, an apparently neutral passage from the American Society for Testing Materials (ASTM, *II*, pp.1493-95) regarding the resistance of certain types of film to damage by cockroaches, is used to illustrate the exponential growth in specifications that come to control our lives. This anxiety is dramatized in Levi's story 'Le nostre belle specificazioni', and echoed in another of the passages in the anthology, Hermann Langbein's *Menschen in Auschwitz* that warns against surrender to

⁴⁷ Levi cites a passage from the Italian translation of Clarke's *Profiles of the Future: An Enquiry into the Limits of the Possible* (London: V. Gollancz, 1974), *II*, pp. 1504-09 (p.1507).

⁴⁸ Levi cites from the translation of Bragg's *Concerning the Nature of Things* (London: Bell, 1925), *II*, pp.1388-92 (p.1389).

⁴⁹ See Cicioni's useful discussion of this point in *Bridges*, pp.105-07.

‘una struttura sociale che tende al dominio totale sull’uomo’ (*II*, p.1523).⁵⁰

Giorgio Bertone also comments on the ASTM passage, remarking on the effects of ‘estraniazione e di ironia e di iperconnotazione’ caused by quoting ‘scientific’ passages out of context.⁵¹ Once inserted amongst literary pieces, he states, they become ‘cosmicomiche’, losing some of their scientific rigour and authority, whilst in turn imbuing more classic narrative pieces with technical characteristics (Belpoliti (ed.), *Riga*, p.212). It is clearly noteworthy that Levi’s style is being openly compared to that of Calvino, and the implications of the parallel tendencies in their work are explored in detail in Chapter 3. What interests me here is the emphasis on plural reading strategies and the effect of removing a text from the context of its original genre which protects and validates its legitimacy.

Levi is emphatically not an unquestioning devotee of scientific ‘truth’, as demonstrated by his comments on Bragg’s ‘fiducia [...] ingenua’ in the power of science to descramble and clarify the secrets of the universe (*II*, p.1388). Indeed, the anthology provides a history of modern developments in scientific thought (‘lacunosa’ by Levi’s own admission), moving from the inspiring early hypotheses of Darwin and Bragg to the rigid ‘certainties’ of the ASTM—more threatening in the light of the Holocaust—to the spiralling vortices of black hole theory. The progression from the faith of Job to the distorting space of the galaxy reflects changes in public belief: the questioning of

⁵⁰ Levi’s story appears in *Vizio di forma* (1971: *I*, pp.661-70). Cicioni (*Bridges*, p.107) further links these concerns with Mengaldo’s observation that the death camps were the ‘coherent and almost necessary expression of the technical development and the totalitarian vocation of the modern world’: ‘Ciò che dobbiamo a Primo Levi’, in Gianfranco Folena (ed.) *Tre narratori: Calvino, Primo Levi, Parise* (Padua: Liviana Editrice, 1989), pp.89-98 (p.93). The passage from Hermann Langbein, *Menschen in Auschwitz* (Vienna: Europa, 1972), is translated by Levi.

⁵¹ ‘Antologia’, in Belpoliti (ed.), *Riga*, 210-221.

religion, the clamour for scientific answers, recoil at how they can be enforced and hesitation before the void.

Levi's interjections urge scientists to explore and exploit their imaginations. He hails Clarke as proof that 'uno scienziato moderno *deve avere fantasia*' in order to enrich his or her knowledge and creative approaches to experimentation. Similarly 'la fantasia si arricchisce prodigiosamente se il suo titolare dispone di una formazione scientifica' (*II*, p.1504). This statement could be read as his philosophy of a literary-scientific approach. If each discipline were to soften and enlarge its boundaries, there would be a more significant area of overlap: an idea similar to his image of overlapping circles of connotation and implication surrounding words when translating from one language to another.⁵² Thus Levi's position might be summed up as a desire for literature to take more inspiration from science and vice versa. However, the anthology ends with the denial of dialogue, the inadequacies of language, the indecipherability of the universe and resignation to the fact that the largest of cultural revolutions is being silently conducted beyond our comprehension, by the 'astrofisici', as discussed above (*II*, p.1524).

Levi's comments here seem intended to deliberately reinforce feelings of alienation in the face of the unknown and incomprehensible, since 'profani siamo tutti' in comparison with specialists in this area. However, he then allows Kip S. Thorne, author of the final passage in the anthology, to reassure the reader, and add weight to his tentative hope for the power of the human mind to achieve good.⁵³ Thorne describes

⁵² 'Le aree dei rispettivi significati si possono sovrapporre in parte'; 'Tradurre ed essere tradotti', in *L'altrui mestiere, II* pp.730-34 (p.731).

⁵³ Kip S. Thorne, 'The Search for Black Holes' in *Scientific American*, December 1974, pp.32-34, 43-45, translated in *Le Scienze*, xiv:viii/80 (April 1975), pp.9-11, 19.

black holes as being the most fantastical idea conceived by the human mind, which is nevertheless explicitly required by the laws of modern physics: confirmation of Levi's comments regarding Clarke (*II*, p.1525). Bertone and others have commented on Levi's confessed difficulty with saying 'io' and his sympathy with other writers, such as Conrad, who avoid speaking in the first person.⁵⁴ However, little has been said about the way in which he diffuses this obligation in such a personal anthology, by coaxing the voices of his chosen authors to speak to each other, and on his behalf. He seems to manage this complex and subtle dialogue carefully, avoiding the necessity of bald authorial statements, since the voices of other writers and thinkers can speak in his stead, from a range of vastly differing perspectives. This is a similar tactic to that used in his review of Vacca's work, showing solidarity with Vacca's attempts to diminish the barrier between literature and science (*I*, p.1226). The resulting multilayered text substantiates his claims for an unjustly ignored united culture and locates him within a coherent tradition. Furthermore, he simultaneously situates himself chronologically and culturally by causing the echo of *Se questo* to resound through his various works. Most importantly, this interdisciplinary omniscience is achieved without giving a single definitive answer, without the univocal, fascistic tendencies of single-minded thought, which is such an anathema to him.⁵⁵

Levi's position on literature-science perspectives is in some ways becoming clearer, but the practical results of his views remain undefined. The anthology works to

⁵⁴ See Andreoli. The title of Andreoli's article was undoubtedly inspired by Levi's introduction to his chosen excerpt from the work of Thomas Mann, *The Tales of Jacob* (London: Martin Secker, 1934), *II*, pp.1435-43. For Levi's remarks on Conrad see *II*, p.1414.

⁵⁵ See for example the discussion of the pure, resistant qualities of zinc in *Il sistema periodico*, and Levi's contention that 'perché la ruota giri, perché la vita viva, ci vogliono le impurezze' (*I*, p.768).

bring together writings from different disciplines, but how might one achieve this plurivocality in individual texts? Despite his advocacy of interdisciplinary inspiration, we have seen how Levi elsewhere seriously questions a literary author's authority to embark on science fiction (*Dialogo*, pp.51-53). This degree of circumscription forces an interdisciplinary genre back into the domain of the isolated specialist, while condemning mainstream production as invalid. Thus issues of academic rigour are raised regarding the extent to which exported—or imported—information should conform to the standards of its discipline of origin. It appears impossible for coexisting paradigms to merge without detrimental compromise.

Although problematized for its naivety, Bragg's work provides a relevant example of analogical connections. Bragg writes elegantly of Lucretius's theories, bringing the reader up to date with what were, at that time, the most recent positions on the behaviour of atoms, whilst also illustrating his explanations with analogies: 'Gli atomi sono paragonabili alle lettere dell'alfabeto che si possono combinare nei piú vari modi a formar parole' (*II*, p.1389). The combination of philosophical, linguistic, aesthetic and scientific enquiry in Bragg's piece speak volumes in defence of a unified vision of culture and knowledge, and resonate with many of Levi's statements on this subject. In an interview with Camon he enthuses, 'la scoperta dei meccanismi della genetica mi appassiona, il modo in cui viene codificato l'individuo, lo spezzone minuscolo il cui alfabeto è fatto di molecole' (*Conversazione*, p.69). Thus metaphorical links are forged between our biological form and our cultural-linguistic practices.

Levi articulates a similar connection between biology and cultural texts when discussing the compilation of such a personal anthology. Experiencing a certain inevitable self-consciousness, Levi states that he felt exposed in undertaking the 'opera

notturna' of tracing his influences, as if he were opening his own stomach for surgery. This is contrasted to the 'lavoro [...] diurno' of writing himself, in a characteristic highlighting of his hybridity (*II*, pp.1362-63). Belpoliti is swift to pick up on this polarity that coheres so well with the image of Levi as a centaur, or hybrid, promoted by Levi himself through interviews, and especially by Belpoliti himself.⁵⁶ In the context of the literature-science discussion, it seems strange that Levi would argue for the building of bridges between the disciplines, while constantly emphasizing his inner division. Given the complex ways in which the words of other writers inform and reinforce Levi's multi-stranded web of interconnected perspectives, this polarized dichotomy seems too simplistic. Indeed, the works speak to each other because they already contain features that resonate together. Cavaglion has criticized recent tendencies to treat the image as a 'categoria onnicomprensiva' for Levi, both in terms of his works and as an individual. He warns that this risks reducing him to 'un Levi storico [...] fantascientifico, mitologico come il Trachi eponimo', the centaur in his short story 'Quaestio de Centauris'.⁵⁷ Much as I agree with the dangers of mythicizing Levi and relegating him to the atemporality of a 'great time of culture', it does seem to me that Levi deliberately dwells on and reinforces a blunt double perspective. This undoubtedly functions to the detriment of the more subtly intertwined similarities linking writing about science and literature revealed by his work. The persistent dichotomous thematic, I would argue, contributed heavily to the way in which he was received critically, as writer and

⁵⁶ See: 'Io sono un centauro', by Marco Belpoliti; 'Primo Levi si sente scrittore "dimezzato"', interview with Edoardo Fadini; 'Credo che il mio destino profondo sia la spaccatura', interview with Giovanni Tesio, *Nuovasocietà*, 16 January 1981; repr. in *Conversazioni*, pp.vii-xx, 106-109, 185-187 respectively.

⁵⁷ Cavaglion, 'Primo Levi era un centauro?', in Mattioda (ed.), pp.23-32 (p25). 'Quaestio de Centauris' features among the *Storie naturali* (*I*, pp.505-17).

individual, almost licensing the refusal of some critics to engage with him as a writer and scientist together.⁵⁸ Yet his work is both informed and enhanced by a series of delicately interwoven interdisciplinary voices, a plural microdialogue within his work that mirrors the drawing together of perspectives in the anthology for its scope and variety.

As for his own voice, Levi's desire for acceptance by the literary academy arguably led him to indulge in some self-canonization by including one of his texts in the anthology: an extract from his short story 'Nel parco', set in a park where literary authors and characters reside until they fade from cultural memory.⁵⁹ Levi's story, a homage to literature as its own special, separate, eternal realm, features a variety of literary and historical personalities, including the eponymous hero of Carlo Porta's poem 'Olter desgrazzi de Giovannin Bongee'.⁶⁰ By citing his own work in *La ricerca* alongside that of Porta, Levi highlights the intertextual dialogue, and is able to reflect on the traditional literary canon through its dramatization. Amongst the residents of the park, Levi subtly inserts Mordo Nahum, the Greek who features in *La tregua*, thus proclaiming himself an author who has penned a character worthy of canonization. However, he also comments that whilst the eulogized canon is overflowing with romantic heroes or objects of desire (explorers, poets, prostitutes: see *I*, p.676), it lacks

⁵⁸ Angier, one of Levi's biographers, expressed similar convictions in conversation with me (8th May, 2001).

⁵⁹ From *Vizio di forma*, in *I*, pp.671-80. The setting may well have been inspired by the virtuous pagans in limbo on the edge of Dante's *Inferno* (Canto IV).

⁶⁰ The section Levi cites appears in Carlo Porta, *Le poesie* (Milan: Feltrinelli, 1964), pp.146-54 (v. 129-264).

facilitators for everyday life (plumbers, electricians, chemists).⁶¹

Having used 'Nel parco' as a vehicle through which to make this observation, Levi then seeks to rectify this imbalance in his own writing, by opening up literary space to dialogue with those characters ignored by the classic authors—for example, the focus on the rigger Faussonne in *La chiave a stella*, a text intended specifically to break down disciplinary barriers.⁶² 'Nel parco' is thus a pivotal intersection between the literary canon and a literature-science approach reminiscent of the 'scrittore-operaio' movement discussed in Chapter 1. However, as Borri points out, Faussonne is a man who commands himself, and owes more to the 'grandi artigiani e [...] tecnocrati rinascimentali, provenienti dei grandi fiumi di pensiero individuale', than to the characters represented by the 'Letteratura d'industria' (*Le divine impurità*, p.42).

Remaining in the literary 'parco', Levi's narrative microdialogue also focuses on a fantastic strand of scientific thought. The fading away of the forgotten characters in 'Nel parco' is similar to the atomistic fragmentation of bodily matter in 'Il passa-muri', a story in which literary-scientific interpenetration abounds.⁶³ The protagonist Memnone, an alchemist, is imprisoned for his atomist beliefs. However, by filtering his food, with the passing of time he becomes able to penetrate the walls of his prison and escape. Thus he proves that 'la materia, anche la sua, [è] penetrabile, dunque discreta, dunque fatta

⁶¹ Levi also used interviews to express a desire to write about his own profession, which he deemed to be significantly underrepresented in literature. See Adolfo Chiesa, 'È tatuato sul braccio con un numero di cinque cifre', *Paese sera*, 12 July 1963 and Ernesto Ferrero, 'L'Odissea di Primo Levi', *L'Unione sarda*, 15 September 1963, cited in *I*, p.1445.

⁶² Levi describes this text and *Il sistema periodico* (1975) as 'tentativi di abbassare e sopprimere' the 'barricata tra cultura umanistica e cultura scientifico-tecnica'; see Antonio Debenedetti, 'Vincitore il romanzo', *Corriere della Sera*, 4 July 1979.

⁶³ *II*, pp.898-901. This 1986 story may have been inspired by Calvino's 'Il conte di Montecristo' written in 1967, published in the collection *Ti con zero* (Turin: Einaudi, 1967); in *Romanzi e racconti (RR)*, ed. by Claudio Milanini, Mario Barenghi and Bruno Falchetto, 3 vols (Milan: Mondadori, 1992) II, pp.344-56 (see also the note on p.1358).

d'atomi' (II, p.900). This deduction reads as an inverse version of the conclusions reached by Lucretius himself in the passage from *De Rerum Natura* which Levi quotes in *La ricerca*: light and liquids are made of atoms, therefore diamond and stone too are made of atoms, only less easily separated (II, pp.1465-67). Although 'Nel parco' does not overtly acknowledge any debt, its narrative is underpinned by a Lucretian conception of material. Yet this underpinning theory, although valorized as 'contemporary' in *La ricerca*, is here treated as alchemical fantasy. Levi is revelling in the pleasurable, amusing aspects of combined literature-science writing, enjoying the task of narrativizing scientific thought.

From this account of Levi's dialogic activity, it emerges that Levi uses scientific writing and progress as inspiration for two kinds of writing: fantastic literature—based on less recent epistemologies—and narrative reflecting 'real' technological progress—based on the present time but infused with sometimes outmoded ideals regarding the individual. This reinforces the conclusion that the relationship between science and literature is not the straightforward single bridge or 'bilancio' Levi suggests, but rather the triangular *ménage-à-trois* of science, literature and 'la tecnica' which Porro identifies.⁶⁴ As has been illustrated by Italian authors such as Antonio Tabucchi, literature is not the unanchored balloon of fantasy, but must be located in a certain temporal and cultural space.⁶⁵ For Levi, this seems to mean acknowledgement of industrial and technical progress, yet without an end to romanticized characters.

⁶⁴ Porro refers to Levi's suggestion of a 'bilancio' but subsequently discusses Levi's *ménage-à-trois* (pp.434, 436-37).

⁶⁵ *Sostiene Pereira* (Milan: Feltrinelli, 1994) is a strong argument against the separation of literature from its historical and political context.

A solution to the riddle of his dualistic self-identification is suggested by Levi himself when in the preface to *La ricerca* he invites the reader to consider the ‘ecosistema’ of texts that resides in his bowels. His remarks imply fertile—if saprophytic—symbiosis, rather than division. Critics have identified not only connections and echoes between Levi’s works but uniting characteristics: Massimo Rizzante writes of the ‘Unicum’ of the ‘Lager-laboratorio’, and when Philip Roth suggested to Levi that ‘lo scienziato e il superstite sono una sola persona’, Levi responds with positive glee: ‘Benissimo! Hai colpito nel segno’.⁶⁶ This response certainly suggests a desire to overcome perceived or experienced existential rifts. In *La ricerca* Levi commends writers who enjoy strong connections with the world in which they live, which he implies is unusual: Mario Rigoni Stern provides an example of the rare ‘aderenza fra l’uomo che vive e l’uomo che scrive’ (*II*, p.1515); Ludwig Gattermann, author of a Chemistry textbook, is revered as one of the few who command ‘l’autorità di chi insegna le cose perché le sa, e le sa per averle vissute’ (*II*, p.1423). Like these figures, Levi sought a balance between experience and writing, through activity that informed his manner of combining his cultural ‘input ibridi’. Appropriately then, the texts which influenced his intellectual development reflect both professional and personal interests, works by friends and by distant Jewish ancestors, textbooks and a text he read whilst awaiting what he thought was certain death (*II*, p.1364).

Although Levi was part of no literary or scientific movements, from the way in which he interweaves messages in *La ricerca* it is plain that he enjoyed and flourished

⁶⁶ Massimo Rizzante, ‘Dell’ibrido: osservazioni su Primo Levi, in *Primo Levi: il mestiere di raccontare, il dovere di ricordare*, ed. by Ada Negri (Fossombrone: Metauro Edizioni, 1998), pp.45-52; Philip Roth, ‘L’uomo salvato dal suo mestiere’, *Conversazioni*, p.86.

through dialogical support of his views by others. To this end, and to appease epistemological isolation whilst avoiding the herd instinct that leads to conformation, he used diachronic dialogue to construct a community in his own great time of culture, drawing together similarities across several types of boundary. The voices who helped him with the difficulty of saying 'io' allowed him to use canons and traditions to constructive advantage while seeking to validate a literature-science perspective by forming a discursive community of collaborating colleagues spread throughout history.

One surprising absence in *La ricerca* is Aldous Huxley, an author whom Levi acknowledges elsewhere as having inspired his work. In a 1985 interview he discussed how Huxley's eclectic, sceptical writing style, influenced the writing of *Se questo*.⁶⁷ In particular, he mentions Huxley's 'studio degli esseri umani quasi zoologico', his way of describing humans 'come se fossero animali' that resonated with his experiences as a chemist and pleased him a great deal. Levi remarks in this interview how Huxley's books were hard to obtain and read in the early 1940s, but he managed to obtain them somehow, showing his interest in unusual perspectives and voice from other cultures—which he himself points out as lacking from *La ricerca* (Appendix, pp.321-22). Huxley may be seen as providing a model of a novelist who adopted an intriguing 'scientific' perspective on his characters, combining perspectives drawn from both cultural canons and methodologies.

As regards this type of cross-fertilization, Levi argues that the interweaving of

⁶⁷ Germaine Greer, 'Colloquio con Primo Levi', 1985, in *Conversazioni*, pp.65-76 (p.67). The translation and publication of this interview are discussed in detail in the Appendix, below. Unless specified otherwise, citations from this interview are taken from my transcript of the original recording, excerpts of which appear in the Appendix. The literariness of *Se questo*, and many other points arising from this interview are discussed in Chapter 4.

scientific and fantastic texts enriches both. Fadini had explored this point in an earlier article which seems curiously resonant here: in 1966 he wrote, with regard to *Storie naturali*, that:

la fantasia dell'uomo si rivela, anche in mezzo ai sinistri presagi in mezzo ai quali viviamo di nuovo, quel grande serbatoio di soluzioni dell'esistenza che è sempre stato. È, insomma, esattamente il contrario della fuga. È andare in fondo al corridoio, in fondo alla galleria, in fondo al pozzo. ('Primo Levi si sente scrittore "dimezzato"', pp.108-09)

If we consider the 'buchi neri' of Levi's 'map' to *La ricerca* as representing 'il fondo del pozzo', they no longer appear, as they may initially, as menacing voids. Instead, they become the profound elaboration of our attempts to resolve the riddles and problems of existence. Following the dark, parallel corridors of different existential modalities (salvation through laughter; unjust human suffering; salvation through understanding and an appreciation of the measure of a human being), we see how the historical and contemporary texts that Levi drew together are inextricably anchored to his struggles to understand his specific experiences. Furthermore, we appreciate how, in probing these near and distant voices, he never lost sight of his own cultural location but drew together interchronotopic backgrounds against which to establish words and deeds of hope, enlightenment and inspiration.

Chapter 3: Interactive Dialogues: Levi and Calvino

Each dialogue takes place against the background of the responsive understanding of an invisibly present third party who stands above all the participants in the dialogue.¹

Having established a broad picture of Levi's dialogues with other writers and thinkers, I now examine one specific, longstanding and particularly relevant dialogue that Levi continued over several decades: that with his colleague and friend Italo Calvino, a literary author with a family background in science who shared Levi's interest in breaking down the rift between the two cultures.

In his homage piece to Italo Calvino 'Con la chiave della scienza', published in *La Stampa* on 20 September 1985,² Levi speaks of Calvino as one of his 'compagni di itinerario' and recalls how their literary careers were launched in parallel. Levi relates how he and Calvino, 'quasi coetanei', both participated in the struggles of the Resistance and were 'promossi scrittori insieme' in Arrigo Cajumi's review of their contemporaneous first publications *Se questo* and *Il sentiero dei nidi del ragno*.³ Although he acknowledges that they never spoke a great deal, Levi's charged phrases convey the wordless closeness and understanding shared by the two authors with relation to their various 'lavori in corso' as well as to their epistemological outlook on the world.

¹ Bakhtin, *Speech Genres*, p.126; see also Morson and Emerson, p.135.

² Repr. in *II*, pp.1274-75.

³ *Il sentiero dei nidi del ragno* (Turin: Einaudi, 1947). See 'Immagini indimenticabili', *La Stampa*, 26 November 1947; repr. in *Antologia*, pp.303-05. It is surprising that Levi emphasizes his activities as part of the Resistance over his imprisonment in Auschwitz, implying a stronger parallel between his and Calvino's wartime experiences than might have been expected. See Angier, pp.230-61 for a discussion of Levi's brief, difficult stint as a partisan.

In this article Levi alludes to the sense of indebtedness he feels towards Calvino, who assumed the role of 'fratello maggiore' when working as an editor at Einaudi (1947-84),⁴ providing swift yet considered advice. He further elaborates on the intellectual connections between them, explaining that Calvino was one of the few Italian writers who shared Levi's 'fame di scienza', seeing it as one with nature: for Calvino science acts as 'lente', chiave' and 'codice', facilitating our comprehension of the natural world. This homage piece confirms the subtle profundity of the relationship between Levi and Calvino, and vitally for a discussion of both writers' engagement with the literature-science debate, reveals an abstract but compelling collaborative plan to scale the gulf between the disciplines. Levi explains:

Avevamo discusso e condividevamo, programmi vaghi e grandiosi, di una letteratura mediatrice, rivelatrice, a cavallo fra le 'due culture', partecipe di entrambe. A questo traguardo si è avvicinato meglio lui di me, armato com'era di una cultura vasta e varia, e di una frequentazione con molti fra i massimi intellettuali del nostro tempo. (*II*, pp.1274-75)

As this statement makes clear, the project was less than precise. This is itself worth further consideration, begging questions as to how seriously each writer engaged with the task they seemed to have set themselves. Was their intention practically to establish a new kind of literature (and the choice of the word 'letteratura' rather than 'scrittura' may be significant here), or rather to encourage more open considerations of the relations between the disciplines? Was the project ever firmly delineated or embarked upon, or did it remain an abstract, idealistic fantasy?

Levi claims that Calvino had come closer to achieving their objective, due partly to his position as an established member of the literary academy. His unsurprising

⁴ See Angier (p.639) for an account of Einaudi's financial difficulties at the time when Calvino, and others, left.

implications are that it is easier to effect changes in a literary paradigm from the 'inside', with the support of the 'intellectual' elite. With this in mind, Calvino's editorial comments on Levi's literary style take on a new significance, as does the hierarchy in their brotherly relationship as defined by Levi. For Levi, Calvino had the vital literary advantage of being 'del mestiere'. In comparison, the picture from Calvino's perspective reveals a similar envy of the other's formative expertise and acknowledges a close personal relationship, but maintains it is of *equal* standing: in a 1984 conversation with Ian Thomson, Calvino professed admiration for Levi's scientific training, and called Levi his 'twin brother and soulmate' (Thomson, *Primo Levi*, p.295).

Through an examination of both direct correspondence (letters and joint projects), and indirect communications (literary allusions and suggestions of reciprocal influence), this chapter explores Levi and Calvino's common desire to forge a new type of writing. I first outline and briefly analyse a chronology of contact between the two men, which is followed by a broader discussion of their individual engagements with and portrayals of the relationship between literature and science. These individual projects will then be considered as constitutive elements of a collaborative project.

I argue that when not in direct dialogue with one another, each writer became for the other a 'superaddressee'. Bakhtin's notion of the supreme listener, above and beyond an immediate listener, and whose 'absolute just responsive understanding is presumed' can be productively applied to the relationship between Levi and Calvino. The relevance of this concept becomes especially clear when we consider that Bakhtin also posited a series of personified, ideological superaddressees, such as 'absolute truth, the court of dispassionate human conscience [...], science' (*Speech Genres*, p.126). Scholars of Bakhtin's work urge against confusing the superaddressee's flexible function as

‘metalinguistic fact constitutive of all utterance’ with determined ideological positions (Morson and Emerson, p.136). However, with regard to the specific dialogue between Levi and Calvino, as well as that between each author and their various addressees, a series of ideological superaddressees are evoked—such as scientific or literary authority—either in a broad sense or embodied in the expertise of the other. These presupposed listeners grant authority through their presumed sympathy, whether automatically or through negotiation, and therefore merit attention as essential motivations underpinning Calvino and Levi’s dialogic relationships.

With regard to the use to which these evoked authorities are put, I then explore the extent to which the superaddressees of science and literature are themselves challenged, or used to shore up a particular perspective. The blanket evocation of an undefined but presumed authoritative ‘science’ functions less than clearly when a chemist and a writer discuss biological developments, for example.

1. Critical Attention to the Relationship

The relationship between Levi and Calvino remains under-explored by literary critics. Indeed, the only sustained piece of comparative writing is the chapter ‘Italo Calvino e Primo Levi’, in Giorgio Bertone’s 1994 study of Calvino, *Il castello della scrittura*.⁵ Although examining several instances of correspondence which point strongly towards

⁵ See pp.177-212; also in Ioli (ed.), as ‘Primo Levi e Italo Calvino’, pp.236-60 (the text is identical with the exception of the title wording). There is a further relevant chapter in *Il castello*, ‘Calvino, Levi e la tradizione del Novecento’, pp.265-72, which functions as a review of Mengaldo’s *La tradizione del Novecento* (Turin: Einaudi, 1991), giving a brief account of and comment on Mengaldo’s portrayals of the authors in context.

attempts to reconcile literary and scientific writing, Bertone surprisingly does not mention the literary project to which Levi alludes in the citation above.

As for further sources of critical attention, this occurs either in the fragmentary, marginal and tentative form of footnotes, or as a passing comparative remark that seems to assume an acknowledged relationship. Many moments of contact between the men are well known, yet the implications of these remain as yet undeveloped, especially with regard to the literature-science debate. To give some characteristic examples of this further critical attention I cite a series of references in chronological order of publication: there is an unexplored footnote by Pier Vincenzo Mengaldo in his Introduction to the earlier edition of Levi's *Opere* which suggests that a link might be drawn between their work;⁶ Cesare Cases suggests that 'il parallelo con Italo Calvino è possibile, non per nulla entrambi avevano avuto a che fare con la scienza', but leaves his explorations of the subject there;⁷ equally tantalizingly, Stefano Bartezzaghi's 'Cosmichimiche'⁸ obviously takes its title from Calvino's *Cosmicomiche*,⁹ but the significance of this is not articulated, and there are only two passing references to Calvino—in relation to the experimental collective Oulipo, of which Calvino was a member (p.282) and as a critic of Levi's 'etiologia della lingua' (p.308).¹⁰ Porro's

⁶ Footnote 1, in Pier Vincenzo Mengaldo, 'Lingua e scrittura in Levi', in *Opere*, 3 vols (Turin: Einaudi 1990), III, pp.vii-lxxxiii (p.vii-viii); repr. in *Antologia*, pp.169-242 (p.169).

⁷ 'Sodio e potassio: scienza e visione', in *Primo Levi as Witness*, ed. by Pietro Frassica (Fiesole: Casalini libri, 1990), pp.21-30 (p.23).

⁸ Belpoliti (ed.), *Riga*, 267-314.

⁹ Milan: Garzanti, 1965, in *RR*, II, pp.79-221.

¹⁰ See Calvino's 'Poesie e invenzioni Oulipiennes' in *RR*, III, pp.313-43, and the notes on pp.1239-45. For an account of Calvino's activities with Oulipo, see Marcel Benabou, 'Si par une nuit d'hiver un oulipien' and Mario Fusco, 'Entre Queneau et l'Oulipo', in *Magazine littéraire*, 274 (Feb. 1990), pp.41-44 and 44-47 respectively; Jonathan Usher, 'Calvino and the Computer as Writer/reader' in *Modern Language Review*, vol. 90 (1995), 41-54. For a general discussion of the Oulipo group in context see Peter Consenstein, *Literary Memory, Consciousness and the Group Oulipo* (Amsterdam and New York: Rodopi, 2002).

'Scienza' (Belpoliti (ed.), *Riga*, 434-75), has the most to say on the literature-science connection between Levi and Calvino, yet even so only briefly discusses the writers' shared interest in reconciling the two cultures, moving instead towards an analysis of their contrasting engagements with 'naturalismo'; in *L-atopia letteraria*, Moliterni comments on Levi and Calvino as situated 'tra scienza e fantasia', and discusses their use of language, contrasting their styles in terms of 'materia' and 'forma' respectively.¹¹

The lack of *comparative* literature about these authors is surprising given the interdisciplinary interest that forms such a strong link between them. Of course the list above is not exhaustive, but it is representative. The truncated nature of these investigations seems staggering, especially given that many critics (Marco Belpoliti and Giovanni Tesio for example¹²) have worked significantly on each author. Perhaps some of this reticence to make comparative comment can be explained by the unavailability of material: for example, Calvino's *Lettere 1945-1980* were finally published in 2000, and Levi's correspondence remains in the keeping of his family.¹³ Another factor may be the existence of material documenting and analysing their respective individual interests in science and its relation to literature.¹⁴ The present discussion attempts to open a more

¹¹ Fabio Moliterno, 'Primo Levi: dell'atopia letteraria', in Moliterni and others (eds), pp.3-61 (pp.29-38).

¹² Tesio edited the collection of Calvino's letters written in his position as editor at Einaudi (*I libri degli altri: lettere, 1947-1981* (Turin: Einaudi, 1991)), but also worked on Primo Levi, especially his poetry (see 'Premesse su Primo Levi poeta', in *Studi Piemontesi*, xiv/1 (March 1985), 12-23; 'Nego di essere gran lettore di classici e di romanzi'; 'Credo che il mio destino profondo sia la spaccatura', among other essays). As well as the volume of interviews with Levi, Belpoliti edited the 1997 Einaudi edition of Levi's *Opere*, and has also authored several works on Calvino, such as *L'occhio di Calvino* (Turin: Einaudi, 1996).

¹³ *Lettere 1940-1985*, ed. by Luca Baranelli (Milan: Mondadori, 2000).

¹⁴ On Calvino, see for example Andrea Battistini, 'Ménage à trois: scienza, arte combinatoria e mosaico della scrittura,' *Nuova civiltà delle macchine* 17.1 (1987), 11-24; Mimma Bresciani Califano, *Uno spazio senza miti: scienza e letteratura* (Florence: Le Lettere, 1993); Pierpaolo Antonello, 'Literature and Science: Epistemological and Rhetorical Perspectives in Calvino's *Le cosmicomiche*. Imagination at Work', *Romance Languages Annual*, 7 (1995), 190-98; Kerstin Pilz, 'Literature and Science in the Works of Italo Calvino' (unpublished doctoral thesis, University of Melbourne, 1999).

sustained debate, assessing the relationship between these authors, as self-fashioned examples of a prototype: the twentieth-century syncretic intellectual.

2. Personal and Professional Dialogues

The first tangible connection between the two men came in 1947, when their debut novels were reviewed by Cajumi. Levi, 'nostro chimico', is praised for his concise writing 'senz'ombra di retorica'. Cajumi compares Levi and Calvino to desolate night and faint dawn light respectively: 'tanto il primo è misurato ed austero, quanto l'altro giovanilmente sboccato ed estroso'. Whether intentional or not, a staged contest of staid scientific logic versus weightless artistic creativity can be detected in this description. This constitutes a significant comment on perceptions of the two writing styles in view of each author's previous education and experience while attention drawn to the disciplinary dialectic confirms the pervasive force of Croce's legacy even after the war.

Calvino, at this time a new arrival at Einaudi, also penned a review of Levi's novel: 'Un libro sui campi della morte. *Se questo è un uomo*'.¹⁵ The tortured history of the publication of *Se questo* and the tardiness of institutional recognition of its merits are well known.¹⁶ Calvino's early, boldly positive review stands in contrast to other less enthusiastic reactions; 'il discorso fu rapidamente concluso, senza che si andasse al nocciolo della questione'.¹⁷ In his view the novel is not only 'una testimonianza

¹⁵ *L'Unità*, 6 May 1948.

¹⁶ Originally rejected by Natalia Ginzburg, Cesare Pavese and others, *Se questo* was republished by Einaudi in 1958. Its original publication by Francesco De Silva was largely unsuccessful; it received little attention and many copies remained unsold. For a fuller account see *I*, pp.1377-91.

¹⁷ Ferrero, 'La fortuna critica', in *Antologia*, pp.303-84 (p.303). Ferrero refers to Cavaglion's discussion of the text's reception in *Primo Levi e 'Se questo è un uomo'* (Turin: Loescher, 1993), p.57.

efficacissima, ma ha delle pagine di *autentica potenza narrativa*, che rimarranno nella nostra memoria tra le piú belle della *letteratura* sulla guerra mondiale' (emphasis added). Thus he profiles the literary, creative power of Levi's work without even mentioning his qualifications as a chemist. Calvino was conscious of the need to broaden the narrow definition of Italian literature, as argued by those involved in the 'scrittori e industria' debate. With regard to Resistance Literature too, there were reconsiderations to be made, as he expresses in his 1949 piece 'La letteratura italiana sulla resistenza'.¹⁸ He posits works by established writers, giving their 'posizione d'intellettuali singoli' on events, against the more documentary texts, mostly by partisans. The latter may be better located among necessarily diaristic historical and political accounts than in a literary tradition but they are able to blend the experiences of the individual with the collective. This vitally allows 'il realizzarsi, per la prima volta dopo molto tempo, d'un denominatore comune tra lo scrittore e la sua società', and creates an opening for a new 'letteratura nazionale' (*Saggi*, I, pp.1492-93). *Se questo* is one of the many texts mentioned in this article. Calvino states:

Una trattazione a parte meritano i diari dei *lager* tedeschi, innumerevoli [...] Mi limiterò a citare quello che, e credo di non sbagliare, è il piú bello di tutti: *Se questo è un uomo* di Primo Levi: un libro che per sobrietà di linguaggio, potenza d'immagini e acutezza psicologica è davvero insuperabile. (*Saggi*, I, p.1499)

As described below, there are several instances in which Calvino singles out Levi's work for particular mention, performing an act of publicity. In the light of Levi's meagre literary standing in 1948, this instance seems the more notable, especially for its insistence on the justness of superlative acclaim. Calvino had as yet little influence at Einaudi, but his positive views must have been instrumental in plucking *Se questo* from obscurity for its republication by Einaudi in 1958: indeed, the (unattributed) description

¹⁸ In *Il movimento di liberazione in Italia*, I (July 1949), pp.40-46; repr. in *Saggi*, I, pp.1492-1500.

on the back cover is an edited version of the review Calvino wrote in 1948, a decade earlier (*I*, pp.1388-89).¹⁹

Subsequent professional contact between the two men came largely under the aegis of Einaudi. In his capacity as editor, Calvino wrote two letters to Levi. The first is dated 22 November 1961, and discusses the preliminary manuscripts for the *Storie naturali* (*Lettere*, pp.695-96). Calvino recognizes and applauds Levi's ability to move successfully from 'un dato di partenza scientifico-genetico' towards a literature full of 'suggerione intellettuale e anche poetica'. Levi is further praised for his wit that prevents his work from falling into various traps: that of 'sottoletteratura'—often the fate of intellectual experiments—and that of cartoon-like pastiche. The tone of this letter, which reveals evidence of telephone conversations, is friendly but professionally distanced as Calvino attempts to categorize and manipulate Levi's 'personalità stilistica'. This should be coherent, to allow for a continuous dialogue with readers. However, despite urging Levi to establish an easily recognizable style, Calvino is simultaneously impressed by Levi's unconventional authorial trajectory: he characterizes it as an 'intelligente divagazione ai margini d'un panorama culturale-etico-scientifico', that allowed for a more variegated audience than that assumed by much Italian literature of the time. As regards stylistic coherence, it is opportune to recall here that Calvino contravened his own advice, priding himself on the fact that his own signature authorial voice was paradoxically recognizable by its propensity to change.²⁰ Thus both authors

¹⁹ Calvino must have worked on the republication, as witnessed by his letter to Giacomo Debenedetti (1 August 1958, *Lettere*, pp.554-55) in which he mentions the corrected manuscript of *Se questo*. Thomson records that the only internal opposition to republication of *Se questo* in 1952 came from Giulio Einaudi himself (*Primo Levi*, p.295).

²⁰ Speaking of himself in the first chapter of *Se una notte d'inverno un viaggiatore* (Turin: Einaudi, 1979) Calvino remarks: 'si sa che è un autore che cambia molto da libro a libro. E proprio in questi cambiamenti si riconosce che è lui' (*RR*, II, p.619).

share a desire to eschew homogenization: of their perceived public persona and of their readership.

With regard to readership, Calvino saw liberating connections between the necessary, simultaneous broadening of literature and of material consumed by the reading public, stating:

una situazione letteraria comincia a essere interessante quando si scrivono romanzi per persone che non sono solo lettori di romanzi, quando si scrive letteratura pensando a uno scaffale di libri non solo di letteratura. (*Saggi I*, p.200)

Levi would have agreed with the idea of a broadened selection of genres sharing the same bookshelf (one only has to think of the range of works from which he draws in *La ricerca*, which he claims nestled on the same shelf, irrespective of their theme; *II*, p.1365). However, when speaking of *Il sistema periodico* he observed that most people to whom he had shown his manuscript had found it boring, whilst scientists had enjoyed it, 'che è già un cattivo segno'.²¹ This comment was undoubtedly intended in a light-hearted manner, but indicates that despite his desire to broaden the range of subjects deemed 'worthy' of literary narrative by including themes such as the activities of a chemist, Levi desired his writing to be appreciated by a literary minded audience.²²

The second letter from Calvino to Levi, dated 12 October 1974, discusses *Il sistema periodico* (*Lettere*, p.1256). Levi (now addressed as 'Primo') had submitted a revised and enlarged manuscript that was ready for publication. As before, this letter shows Calvino in his role as editor, suggesting improvements and according judgement on work presented to him. Levi, the silent correspondent, is implicitly seeking approval

²¹ Interview with Levi's Croatian translator Mladen Machiedo, October 1968, published as 'Riječ će preživjeti. Razgovor s Primom Levijem', *Republika*, Zagabria, 1 (Jan. 1969), cited in *I*, p.1446.

²² By the time of writing *La chiave a stella*, his view was somewhat broader; see Chapter 4 below.

and permission to push on with projects, but the balance of the relationship is not as clear cut as it may appear: for example, Calvino's advice to move the chapter 'Argon' from the beginning to the middle of the volume is ignored by Levi.²³ Indeed, during the years that elapsed between these two editorial letters there is evidence of both writerly communication and intertextuality: Levi's short story 'Il fabbro di se stesso' in the collection *Vizio di forma* is dedicated to Calvino.²⁴ This story, written between 1968-70 seems to derive straightforwardly from Calvino's *Cosmicomiche*, but the process of inspiration was more reciprocal as Levi explains:

Calvino ha preso spunto per scrivere *Le Cosmicomiche* da un mio racconto, 'Il sesto giorno', pubblicato in una rivista prima che nelle *Storie naturali*, perciò mi ha regalato il suo libro con una dedica molto cordiale. Adesso, invece, vorrei chiedere io il permesso a lui di prestarmi il suo Qfwfq su cui ho già un racconto in mente.²⁵

Levi's borrowing of Qfwfq and Calvino's inspiration by 'Il sesto giorno' are explored in more detail below. I continue here with an account of other examples of intertextual inspiration, since as hinted by the tentative critical hypotheses cited earlier, this was not the only instance: for example Mengaldo suggests that Calvino's meditation on the 'reality' of the external reality outside the hospice-turned-polling station of Cottolengo in *La giornata di uno scrutatore* may have been inspired by the ending of *La tregua*, in which Levi articulates his fears that the Lager is the only reality, and his warm home is no more than a dream.²⁶ Mengaldo posits that although the books were both

²³ See *Lettere*, p.1256; See also Giulio Einaudi, 'Primo Levi e la Casa editrice Einaudi', in *Antologia*, pp.393-99 (p.397). Calvino adds, 'ma se i capitoli seguono un ordinamento anche per peso atomico (con eccezioni mi pare) non parlo più'. Pierantoni remarks that 'Il peso atomico dai primi [capitoli] sale verso quelli centrali, oscilla violentamente poi plana e discende verso il fatale Carbonio' ('Il sistema Aperiodico', p.168). Levi seems not to have commented on this aspect of the book's structure, so it is hard to evaluate the relevance of these observations.

²⁴ Turin: Einaudi, 1971, in *I*, pp.571-737 ('Il fabbro di se stesso', pp.702-09).

²⁵ Interview with Machiedo, cited in *I*, p.1444.

²⁶ *La giornata di uno scrutatore* (Turin: Einaudi, 1963).

published in the same year, Calvino could easily have had access to Levi's manuscript.²⁷ Mengaldo then summarily dismisses his suggestions as 'generiche ipotesi', which seems premature. I would argue that *La giornata* was influenced not only by *La tregua* but also by *Se questo*. This seems irrefutable when we consider Calvino's review of the latter in 1948, which begins with what must have been the most striking image for him: the prisoners' recurring dream of being disbelieved when they returned to their families.

One major difference between these two accounts of an externally imposed control that curbs individual freedom is that Calvino's version typically toys with possibility, while Levi's account is part of his own reality. Calvino's hypothesizing about the potential development of the world 'se l'evoluzione della specie umana avesse reagito diversamente a qualche cataclisma preistorico' (*RR*, II, p.26) is characteristic and might be compared to his more abstract meditations in *Le città invisibili*, upon, for example, the unrealized glass spheres of potential development in display in *Fedora*.²⁸ (*RR*, II, p.382). Calvino and his protagonist Amerigo Ormea are intrigued by plurality and possibility, while Levi himself is caught in a personal psychological trap of doubt and fear. This point is worth making because it reflects a crucial distinction that may be drawn between the two author's approaches to science and its links with society. For Calvino, scientific investigation functions as a productive facilitator, 'una chiave' to unlock more knowledge, while for Levi science also represents pressing danger and the truncation of our rights.

With the recent biographies of Levi, earlier instances of informal contact have

²⁷ This point is also made by Bertone, 'Italo Calvino e Primo Levi', pp.199-200. For all Mengaldo's comments see 'Lingua e scrittura', note 1, *Antologia*, p.169.

²⁸ *Le città invisibili* (Turin: Einaudi, 1972), in *RR*, II, pp.357-498 (p.382).

also been revealed. Thomson writes that Levi's reading of *Il visconte dimezzato* coincided with Einaudi's second rejection of *Se questo* and inspired him to shake off his depression and begin writing science fiction.²⁹ Cases sees a link between the second book in Calvino's trilogy, *Il barone rampante* and the ending of 'Carbonio' in *Il sistema periodico*.³⁰ There was also social interaction, as in the latter part of this decade, around 1957, Levi and Calvino were fairly regular visitors to Ada Gobetti's house in the hills above Turin.³¹ These were gatherings of 'old friends from the Resistance and their children'; reunions to which Levi would take his daughter Lisa, and at which Calvino often read from his *Fiabe italiane*.³² The positive nostalgia of these weekend get-togethers was entirely in keeping with Calvino's belief that 'la letteratura della Resistenza non deve aver fine, come non deve aver fine lo spirito della Resistenza' (*Saggi*, I, p.1500). This resonates with an earlier view of the authors: just as Calvino had described *Il sentiero dei nidi di ragno* and *Se questo* as respectively hopeful and bleak, so Calvino's attitude to the Resistance compares with Levi's more despondent view of the endlessness of struggle, 'guerra è sempre', sadly witnessed by the biographical accounts of his tortured periods of depression and his sadness at events in Israel in the early 1980s.³³ Again, these opposed positions reflect the tendency towards positive and critical engagement with scientific developments, as argued in the second part of this chapter.

²⁹ Thomson, *Primo Levi*, p.265; *Il visconte dimezzato* (Turin: Einaudi, 1952).

³⁰ *Il barone rampante* (Turin: Einaudi, 1957). See 'Introduzione' in the Einaudi 1987 edition of Levi's *Opere*, I, p.xvii; this point is also mentioned in Bertone, *Il castello*, p.200.

³¹ She was the widow of the anti-fascist Piero Gobetti, and an old friend of Levi's (Thomson, *Primo Levi*, p.279).

³² Turin: Einaudi, 1956.

³³ See Angier, on Levi's depressions, pp.577-78, 615-16, 631-33, 653-55, 660-61, 672-728; on his response to strife in Israel, pp.627-30.

In the late 1970s and 1980s, contact between the two authors became more frequent, culminating in a collaborative project and several reciprocal reviews. Besides this, in his capacity as editor, Calvino often made positive mention of Levi's work, perhaps in a conscious effort to accord Levi his deserved status in the literary academy, perhaps simply because he believed in the value of Levi's work. For example, in his 1977 'Ricordo di Franco Antonicelli', he praises Antonicelli through association with Levi: 'Basta ricordare che è stato Antonicelli nelle edizioni De Silva a pubblicare per primo *Se questo è un uomo* di Primo Levi. Antonicelli di cose ne ha fatte'.³⁴ In 1983, he mentions Levi's translation of Kafka's *Il processo*, the inaugural volume in the Einaudi series 'Scrittori tradotti da scrittori'.³⁵ In another review of a collection of fantastic stories entitled *Notturmo italiano*, Calvino discusses how the

evocazione moderna dei miti classici, tra ironica e affascinata—difficile operazione che molti scrittori europei hanno tentato facendo leva sulla distanza tra l'immaginario nordico e quello greco latino—è affrontata dagli scrittori italiani con la familiarità e l'agio di chi si trova a casa sua [...] su questa linea si trova perfettamente il bellissimo racconto sui centauri che chiude *Notturmo italiano*, di Primo Levi.³⁶

Within a cultural context unwilling to relinquish the labels of 'testimone' or 'chimico', Calvino's insistence on categorizing Levi as a 'scrittore' and declaring him decidedly at ease with a testing literary exercise went against the grain, much as his prescient review of *Se questo* anticipated serious interest in the novel by ten years.

A more sustained eulogy comes again in the form of a review: Calvino's 1981 article 'Le quattro strade di Primo Levi', discussing *La ricerca*.³⁷ The proximity of

³⁴ *Saggi*, II, pp.2818-2822 (p.2821).

³⁵ 'Tra Jekyll e Hyde è meglio Utterson', *La Repubblica*, 18 June 1983; repr. in *Saggi*, I, pp. 981-88. Levi's translation was published as *Il processo* (Turin: Einaudi, 1983). For details of Levi's involvement in this series see *II*, pp.1586-87, and his meditative piece 'Tradurre Kafka', *II*, 939-41.

³⁶ *Notturmo italiano: racconti fantastici del Novecento*, ed. by Enrico Ghidetti and Leonardo Lattarulo (Rome: Riuniti, 1984). See Calvino, 'Benvenuti fantasmi' in *La Repubblica*, 30-31 December 1984; repr. in *Saggi*, II, as 'Un'antologia di racconti "neri"', pp.1689-95 (p.1695).

³⁷ *La Repubblica*, 11 June 1981; repr. in *Saggi*, I, pp.1133-37.

shared interest in this publication stems from the fact that, as noted in the previous chapter, Levi's anthology grew out of Giulio Bollati's proposal—also made to Calvino among other writers—to compile a selection of texts which had influenced their work. Calvino never completed his anthology, writing instead this review which is appended in the paperback edition of Levi's text (*La ricerca*, pp.237-41). Returning to his earlier admiration for Levi's proficiency in navigating intelligently around epistemological areas without becoming enmeshed, Calvino here singles out Levi's ability to 'stabilire relazioni tra i testi più eterogenei' (*La ricerca*, p.239), and in the late twentieth-century climate of post-encyclopaedic sureties, he praises Levi's skill in holding together 'in un equilibrio continuamente messo in forse, le acquisizioni eterogenee e centrifughe che costituiscono il tesoro della nostra dubitosa sapienza' (*La ricerca*, p.241). In a similar vein, Calvino's approbation for *Il sistema periodico*—the book which Levi had hoped would lower the barrier between humanist culture and scientific and technical culture that he felt as a persistent blockage in European thought³⁸—was printed on the back cover of the American translation: 'A new bridge between the two cultures'.³⁹ This direct acknowledgement of Levi's success in their jointly desired goal was no doubt pleasing to Levi.

The remainder of the correspondence between the authors centres around activities in 1985, and follows the aforementioned pattern of reciprocal praise for the abilities of the other, tinged with admiring envy. Calvino's review of *L'altrui mestiere*⁴⁰ singles out the pieces that are 'degne di un'antologia ideale', echoing Levi's earlier

³⁸ Antonio Debenedetti, 'Vincitore il romanzo'.

³⁹ *The Periodic Table* (New York: Schocken Books, 1984).

⁴⁰ 'L'altrui mestiere di Primo Levi', 6 March 1985, *La Repubblica*; repr. in *Saggi*, I, pp.1138-41.

statement when asked which contemporary Italian authors he would preserve in a hypothetical universal library: 'Salverei Calvino, senza dubbio' (Andreoli, p.124). For Calvino, Levi's encyclopaedic curiosity and elegance of observation render him both worthy of canonical status and a one-man avant-garde movement: Levi's work is 'degnà della tradizione italiana' but simultaneously constitutes 'un tipo di racconto solo suo'. In addition to this review, Calvino also draws specifically on Levi's chapter 'Perché si scrive?' in an article entitled 'Perché scrivete?': an overt allusion to Levi's text.⁴¹ In this article, Levi's status as Calvino's superaddressee comes to the fore. Calvino notes the nine reasons given in Levi's text, as well as remarking on the impersonal and the direct formulations of the titular questions posed. Calvino then enters into a dialogue with his readers (both French and Italian), and his superaddressee Levi. He distinguishes his own practice from that of Levi insofar as he does not enjoy himself when he is writing (although hopes he creates enjoyment for his readers), but agrees with Levi's mistrust of those who write 'per migliorare il mondo'. He then gives three reasons why he writes, of which the second is the most important for the present discussion:

Perché leggendo X [...] mi viene da pensare: 'Ah, come mi piacerebbe scrivere come X! Peccato che ciò sia completamente al di là delle mie possibilità!' Allora cerco d'immaginarci questa impresa impossibile, penso al libro che non scriverò mai ma che mi piacerebbe poter leggere, poter affiancare ad altri libri amati in uno scaffale ideale. Ed ecco che già qualche parola, qualche frase si presentano alla mia mente. (*Saggi I*, p.1863)

I cite this in full because of its resonances with Levi's indirect communication to his superaddressee Calvino in the piece 'La *Cosmogonia* di Queneau' in *L'altrui mestiere* (II, pp.766-9). Fittingly for a chapter in a collection that sets out to perform a series of deliberate 'invasioni di campo' (II, p.631), this piece reflects on writing practices that

⁴¹ Calvino's article was published in a special edition of *Libération*, 'Pourquoi écrivez-vous? 400 écrivains répondent', 22 March 1985, p.83; repr. in an amended version in *La Repubblica*, as 'Io ho detto che...', 31 March-1 April 1985, and in *Saggi*, II, pp.1861-64.

differ from those of Levi himself, of which he has traditionally shown mistrust (for example writing without clarity as a primary objective), but which he now wishes he might be able to replicate:

Ho sempre pensato che si deve scrivere con ordine e chiarezza [...] Dopo aver letto la *Piccola Cosmogonia portatile* di Raymond Queneau [...] mi vedo costretto a rivedere questi principî: penso che continuerò a scrivere come mi sono prescritto, ma penso anche che Queneau abbia fatto benissimo a scrivere nel suo modo, e che mi piacerebbe scrivere come lui se ne fossi capace. (II, p.766)⁴²

As evidenced by the similarities between these observations, both writers recognize the value of writing styles that are clearly distinct from their own. The difference in their respective responses is determined by Levi's recognition of and self-imposed prescription to remain within his own 'limitations', as compared to Calvino's almost instantaneous desire to performatively embody the writing style of the other. In Levi's piece on Queneau, Calvino is the superaddressee: initially slightly hidden, but later directly evoked and commended for his efforts to consult specialists across disciplinary divides—'naturalisti e chimici'—on the particulars of Queneau's text. Levi's remarks regarding Queneau's style are arguably indirectly addressed to Calvino, who takes them up and articulates his own desire to perform stylistic 'invasioni di campo', as seen above. The fact that he does this in response to Levi's text 'Perché si scrive?', which appears in the same collection as 'La *Cosmogonia* di Queneau', arguably constitutes intertextual debate around the notion of writerly identity and the possibility of assuming an identity outside the boundaries of oneself, or of one's disciplinary formation.

The final, and most sustained interchange between Levi and Calvino that I examine, is that surrounding the translations of Queneau's *Petite Cosmogonie portative*,

⁴² Queneau's *Petite Cosmogonie portative* (Paris: Gallimard, 1950) is translated by Sergio Solmi as *La piccola cosmogonia portativa* (Turin: Einaudi, 1982).

and 'Le Chant du styrène' on which the two authors collaborated.⁴³ These poems held a profound fascination for Calvino. It is worth expanding on his longstanding involvement in Italian translations of Queneau's works since the character of his investment becomes significant when considered in the light of his collaboration with Levi. Calvino worked closely with Queneau on a variety of Oulipo projects, translated *Les Fleurs bleues*,⁴⁴ oversaw translations of *Les Oeuvres complètes de Sally Mara*, *Loin de reuil*, *Bâtons, chiffres et lettres* and more importantly Sergio Solmi's efforts with *La Petite Cosmogonie portative*, to which he wrote a *Piccola guida*.⁴⁵

Calvino collaborated extensively on Solmi's translation of the *Cosmogonia*. When Solmi took on the project, Calvino sent him painstakingly detailed letters answering queries relating to vocabulary (for example *Lettere* pp.1347, 1353-55, 1413-15). However, even this degree of input did not satisfy him, due to the high esteem in which he held Queneau,⁴⁶ and his lack of confidence in Solmi's approach. He wrote to Guido Neri in 1980:

Sto faticosamente rivedendo la traduzione dell'ottantenne Sergio Solmi [...] bella come versificazione ma con tutte o quasi le crittografie scientifiche da risolvere [...] Ma si tratta di difficoltà elementari mentre le difficoltà che mi pongo io né [il traduttore tedesco] né Solmi se le sono poste. (*Lettere*, p.1434)

⁴³ 'Le Chant du styrène' (1969), in Queneau, *Oeuvres complètes* (Paris: Gallimard, 1989), pp.241-43.

⁴⁴ *Les Fleurs bleues* (Paris: Gallimard, 1965) is translated as *I fiori blu* (Turin: Einaudi, 1967).

⁴⁵ The Italian translation of *Les Oeuvres complètes de Sally Mara* (Paris: Gallimard, 1962) was originally offered to Franco Quadri but was only published in 1991 as *Il diario intimo di Sally Mara* (Milan: Feltrinelli), trans. by Leonella Prato Caruso (see Calvino's letters to Quadri in *Lettere*, pp.858-59, 863-67). *Loin de reuil* (Paris: Gallimard, 1944), trans. by Clara Lusignoli as *Suburbio e fuga* (Turin: Einaudi, 1970), a title suggested by Calvino who was unhappy with the translation; see *Lettere*, pp.1073-74. *Bâtons, chiffres et lettres* (Paris: Gallimard, 1950), trans. by Giovanni Bogliolo as *Segni, cifre e lettere* (Turin: Einaudi, 1981), with an introduction by Calvino; see *Lettere* pp.1396-98. Sergio Solmi's translation of the *Petite Cosmogonie portative* included Calvino's *Piccola guida alla Piccola cosmogonia* (pp.145-83).

⁴⁶ He deemed him worthy of the Nobel Prize for Literature; see Calvino's letter to Pirkko-Liisa Ståhl, 14 September, 1977, *Lettere*, pp.1338-40.

This outpouring demonstrates Calvino's evident frustration that a project which had held his attention for over twenty years was being inadequately brought to its conclusion.⁴⁷ On one level, these letters show that Levi was more than justified in commending Calvino's efforts to consult appropriate experts to clarify difficult terminology. Queneau himself had drawn on biological and zoological tracts, about which Calvino may well have spoken to him during their friendship; however when working on the *Piccola guida* after the death of Queneau (1977), his meticulousness was foiled:

Vorrei capire assolutamente tutto, il che richiederebbe di rintracciare i libri scientifici che Q. aveva sottomano quando scriveva, cosa in cui nessuno mi può aiutare. (*Lettere*, p.1434)

Calvino also wrote to Solmi about his search for Queneau's missing list of works consulted, anxiously stating 'ho paura che nessuno sia in grado di ricostituire la rete delle allusioni' or of finding the 'chiave' to solve the text (*Lettere*, p.1371). From the remaining letters between Calvino and Levi, it is clear that Calvino turned to Levi for help with this project. Levi wrote to Calvino on 6 April 1985, thanking him for his generous review of *L'altrui mestiere* and suggesting an answer to a riddle that had dogged Calvino since 1978, which he and Solmi puzzled over at length.⁴⁸ The riddle regards a reference to Morse code that evoked the practices of Johann Mendel. Thus, this unresolved allusion had been discussed and had also caught the fancy of Levi, sufficiently for him to propose a potential title for a reconstructed version of Queneau's missing list.⁴⁹

⁴⁷ Through Einaudi he had originally offered this text, 'uno dei più straordinari exploits della poesia del nostro secolo', to Franco Quadri in 1965. He emphasized its representative quality as a 'libro queneauiano' that was more easily translatable than some others (*Lettere*, p.859), but Quadri refused.

⁴⁸ See notes in *Lettere*, pp.1534-35, for Levi's letter to Calvino.

⁴⁹ See *Lettere*, p.1371, for earlier discussions of this issue in Calvino's correspondence with Solmi in 1978. The reference in question appears in the second 'chant' of the *Cosmogonie*, lines 108 onwards, in Queneau, *Oeuvres complètes*, p.208.

From Calvino's reply, dated 30 April 1985 (*Lettere*, p.1533-34), we can deduce either that the riddle and Queneau's text were discussed in rather general terms, or that Calvino was more informed about the strict chronology of scientific developments and publication than Levi: Calvino specifies that the *Cosmogonie* dates from 1950, while the theories of DNA and of François Jacob suggested by Levi derive from a later date.⁵⁰ More concretely, in 'Calvino, Queneau e le scienze' (*II*, pp.1344-46), an address which Levi read at the presentation of 'La canzone di polistirene' in January 1986, Levi describes how he and Calvino worked on the final touches to Solmi's manuscript, 'in montagna, a Rhêmes Notre Dame', accompanied by a cat. Thus one of the 'chimici' consulted for specialist advice, to whom Levi referred in 'La *Cosmogonia* di Queneau', was himself.

Also in the letter of 30 April, and in the same meticulous vein, Calvino dissects an expression explored by Levi in *L'altrui mestiere* which he had already questioned in his earlier review: 'leggere la vita'. Levi had defined this as a phrase used exclusively by women, meaning to speak ill of someone. He then provides a carefully documented account of his research into the etymology of the term, concluding that it derives from traditional monastic practices whereby at Matins, after singing the psalms, hymns and reading from the Scriptures, especially from Leviticus, the prior would speak to individual monks about their absences or neglected duties: thus reading Leviticus became synonymous with being criticized (*II*, pp.682-84). Calvino disagrees with Levi's conclusions, affirming that in Liguria many men use the expression 'leggere la vita'.⁵¹

⁵⁰ The Jacob text is *Evoluzione e bricolage* (Turin: Einaudi, 1978). The structure of DNA was elucidated by J.D. Watson and F.H.C. Crick in 1953; see Olby and others (ed.), p.503.

⁵¹ He uses it himself in a letter to Silvio Michele, dated 8 November 1946 (*Lettere*, p.167).

Secondly, Calvino reveals he has undertaken his own research regarding the monastic use of the phrase, as he was unsatisfied with the hypothesis that monks would include passages as 'tecnico' as those in Leviticus as a teaching text. After due consideration of a verse from Dante's *Commedia* that had come to mind, he concludes that the monks would have read passages about the Levites, rather than verses from Leviticus.

The level of precision in this research, and reluctance to accept data at face value confirms Calvino's insatiable desire to 'capire [...] tutto' that characterized his valiant efforts to translate Queneau's verses. After seeking Levi's help with the *Cosmogonia*, Calvino wrote to him again on 8 August 1985 for advice on terms used in 'Le chant du styrène' (*Lettere*, pp.1539-41). Levi immediately telephoned Calvino who is reported as having been 'molto divertito' by the project's 'ludico-serio' nature, as well as by a translation process which foregrounded the metrical, scientific and linguistic elements of the original. This collaboration is a useful example of the seriousness with which Calvino considered accuracy in translation. Far from falling into the category of literary thinkers recently accused by Sokal and Bricmont of freely misappropriating technical vocabulary out of context (*Intellectual Impostures*). Calvino approaches scientific terminology with respect and rectitude. Levi, on the other hand, is amused and intrigued by the image of the chemist as 'mago-celeste'.⁵² This example illustrates clearly the impossibility of pigeonholing either of the authors within a Crocean fixed sense of what their discipline might entail, since the chemist and literary intellectual each demonstrate

⁵² See Bertone, *Il castello*, pp.178-9. The idea of science and myth is explored in Giorgio di Santillana's work *Hamlet's Mill: An Essay on Myth and the Frame of Time*, 2nd edn (London: Macmillan, 1970). Calvino knew this work well: he met di Santillana in Boston in 1960, where he heard and was impressed by several papers destined to become *Hamlet's Mill*, and which inspired the *Cosmicomiche* (RR, II, p.1320).

what might be seen as stereotypical characteristics of their 'opposite' discipline.

A month later, Levi was working on the manuscript when Calvino died; thus it fell to Levi to complete the task and present the publication, at the request of Pasquale Alferj, head of the Progetto Culturale di Montedison. In this presentation, Levi declares that although he had not completed a scientific degree, Calvino 'era di fatto uno scienziato' (Poli and Calcagno (eds), p.329).⁵³ Elsewhere he stated that Calvino was 'the only Italian writer to have bridged the gap between our earth-bound language and a science fiction language adequate to describe the stars'.⁵⁴ The use of language will be discussed in Chapter 4, but here I am interested in the definitions bestowed by each on the other. In 1985 Calvino summed Levi up as embodying a combination of virtues that spread over the so-called disciplinary gulf to which they objected: 'l'abito mentale scientifico, la misura dello scrittore e del moralista' (*Saggi*, I, pp.1141). Intriguingly, alongside these eulogies to the other's expertise, individually they opted for a more modest view of themselves: Calvino saw himself as a 'profano che legge libri scientifici' (*RR*, II, p.1300); Levi too considered his status of be that of a 'profano', but the potentially flawless symmetry in these self-positionings is twisted by his admission of inexperience not in the face of the *literary* canon but before the expanding mass of *science* (*La ricerca*, p.229); a position shared by all of us.

These observations are witness to a long and involved reciprocally supportive relationship that arguably developed and drew strength from these authors' shared

⁵³ Calvino's widow Esther urged against overemphasizing Calvino's interest in and understanding of science: 'Si è parlato molto dei suoi interessi per la scienza. Ma non bisogna equivocare, non era scienziato [...] quello che lo interessava era il mistero dell'universo, non la scienza in quanto tale'; Enrico Filippini, 'Calvino mio marito: intervista con la moglie Chichita mentre esce, postumo, *Sotto il sole giaguaro*', *La Repubblica*, 14 June 1986.

⁵⁴ 'Primo Levi in Conversation with Ian Thomson', *Poetry Nation Review*, 14/2 (1987), 15-19 (p.18).

appreciation for an interdisciplinary approach to literary production. Their common desire to forge a new type of literature rested upon a much larger objective than the delimited production of a single work that exhibited characteristics of both disciplines. Instead, it pointed to a new way of writing and thinking in the world that would necessarily impact on the communities of literary and scientific thinkers and affect the epistemic balance in cultural production and thence in cultural consciousness. In the second part of this chapter I move to a broader examination of the ways in which each author conceptualizes and portrays the literature-science relationship in their written work, outlining the major similarities and differences between their views and motivations.

3. Literature-Science Narratives

If Bakhtin defines the superaddressee as ‘a constitutive aspect of the whole utterance, who, under deeper analysis, can be revealed in it’ (*Speech Genres*, pp.126-27), this notion is clearly relevant for the relationship between Levi and Calvino, and their understanding of interconnected intellectual issues. As regards the ideological superaddressee, taken in this context to be the establishment of ‘literature’ or ‘science’, Levi provides his own account of how this evocation operates with him, or rather *within* him. Exploiting his dual identity as a trained chemist and practising writer, he describes how he amused himself by alternating his methodological approach and viewpoint: ‘a visitare le cose della tecnica con l’occhio del letterato, e le lettere con l’occhio del tecnico’ (*II*, p.631). The process of superimposing an alternative discipline-specific set of criteria on the materials of a given subject area was made possible by Levi’s dual

expertise, and the fact that he seems to have internalized the authority and values of each discipline as distinct phenomena. Aside from revealing an unexpectedly dichotomous view of science and literature, this process shows Levi working overtly within the criteria of the 'other' discipline while covertly addressing himself to the disciplinary field of the material considered.

This might be compared to Calvino's oblique approach to describing and representing the world; in the *Lezioni americane* he recalls how in the early years of his career the myth of Perseus and Medusa inspired him to cultivate an indirect vision of events when the petrifying reality and inertia of the world weighed too heavily upon him.⁵⁵ Using this form of indirect engagement, Calvino composed the *Cosmicomiche*. Each of these stories is inspired by 'unâ frase letta in un libro scientifico' (RR, II, p.1302), but the voice of authoritative scientific knowledge is immediately superseded by that of the protagonist Qfwfq, a being in a constant state of transformation who gains his own authority from having directly observed the developments of the universe. The compelling tension in these stories stems from the intertwining of plausible scientific premises with their narrativization by an anthropomorphic consciousness that anticipates contemporary norms. Thus they both are and are not engagements with our 'realities', social, historical and epistemological.

Le narrazioni [...] non hanno un argomento 'storico', almeno nel senso in cui questa parola è usata abitualmente, e nemmeno si può dire che abbiano un'ambientazione 'contemporanea'. Ma sono, nello stesso tempo, quanto di più contemporaneo si può immaginare, e pure il risultato d'una prospettiva 'storica' portata alle ultime conseguenze.⁵⁶

Calvino's tactics prevent the superaddressees of science and literature from petrifying

⁵⁵ Milan: Garzanti, 1988; repr. in *Saggi*, I, pp.627-753 (pp.632-33).

⁵⁶ Cited from the unattributed 1975 'Postilla a *La memoria del mondo e altre storie cosmicomiche*' (RR, II, pp.1304-07; p.1304), which was probably written by Calvino.

into distinct sets of rules and regulations. Indeed, in several of his stories he offers clear criticism of the ways in which modern science seeks to dominate nature and control social development through its use and implementation of regulatory calculations and predictions. For example, in 'La luna come un fungo',⁵⁷ when the rest of the world is still reeling from the emergence of land formations from the waters, the opportunist Ispettore Oo grasps his opening to capitalize on the calculations he has made at the Observatory, drafting in the support of the ruthless pirate Bm Bn: 'Andiamo incontro a grandi cataclismi e i miei studi e le mie previsioni ci metteranno in grado di padroneggiarli; anzi di volgerli a nostro vantaggio' (*RR*, II, pp.1188-89). He gleefully launches into a vision of the cities, mines, cranes, skyscrapers, neon signs and gala evenings that will result from his strategies of development on the untouched 'terre emerse', before the land has even stopped moving. To Qfwfq these images seem apocalyptic; to the contemporary reader, they are sadly reminiscent of modern urban excess and the tendency of modern science and technology to exert as much of its potential power over nature as possible.

In evoking a tension between Qfwfq's yearning for simplicity and the exploitative developments envisioned by greedy entrepreneurs ('Meglio la nostra povera vita acquatica di pescatori [...] che tanti splendori pagati con la soggezione a Bm Bn', p.1190), Calvino turns his story into a site of struggle; a struggle between different world views, approaches to knowledge, development and progress. When enumerating the qualities of literature that ensure its vitality, it is the embracing and exploration of

⁵⁷ First published in *Il Giorno*, 16 May 1965, and then in *La memoria del mondo e altre storie cosmomiche* (Milan: Club degli Editori, 1968); repr. in *RR*, II, pp.1183-1192.

such struggle that he privileges. He argues that writers should be aware of their cultural context and allow space within their works for constant changes in cultural paradigms:

lo scrittore [...] deve in primo luogo tener presente il contesto generale in cui l'opera si situa, deve essere consapevole che il fronte passa anche all'interno della sua opera, un fronte in continuo movimento, che sposta continuamente le bandiere che si credevano inalzate più definitivamente. Territori al sicuro non ne esistono; l'opera stessa è e deve essere terreno di lotta. (*Saggi*, I, p.204)

This image of moving boundaries echoes that evoked by Bakhtin, who favoured the fluidity of electric fields and elastic environments to the delimiting nature of boundaries. Calvino's comments on the passing of the 'fronte' through the heart of every cultural text is also deeply reminiscent of Bakhtin's notion of culture as a site of interaction without an 'internal territory', 'entirely perforated by boundaries that 'pass everywhere, through its every aspect...Every cultural act lives essentially on the boundaries.'⁵⁸ This contrasts with Levi's position that posits science and literature as separate entities that can, and should, be joined by bridging channels of communication and interaction. In the analysis that follows, I explore the extent to which both authors encourage or resist the types of elastic, interdisciplinary interaction described by Bakhtin, and assess their tendencies to favour more dichotomous conceptions of epistemological activity. Does their writing really offer itself as a 'terreno di lotta' and if so, with what implications?

To see more clearly where and how Calvino and Levi defined, located and engaged with the boundaries between science and literature in their work, I now turn to a closer examination of their writings, focusing on the specific and acknowledged intertextual dialogue between them inspired by Levi's short story 'Il sesto giorno'

⁵⁸ *Estetika*, p.281, cited in Holquist, *Dialogism*, p.14. Punctuation as in original.

(1957).⁵⁹ This is a short dramatization of the decision making process that should have led to the creation of a 'Uomo maschio' and an oxymoronic 'Uomo femmina' (*I*, p.545) undertaken by a panel of 'signori tecnici' including the 'Ministro delle Acque', a 'Consigliere psicologo' and an 'Economo'. The presiding committee of apparently non-human experts is composed of individuals whose behaviour constitutes an obvious parody of stereotypical human committee members. Largely characterized by human gestures, when described they take the form of anthropomorphized 'Martians' or Greek gods.

Their discussion of how a 'Uomo' might be formed leads them to consider issues of size, skeletal structure (internal or external), habitat (land, sea or air), how to craft the brain, reproduction and sexual difference.⁶⁰ Just when the committee has agreed that the 'Uomo' should be formed as a bird, a well-timed intervention by a messenger (again an allusion to the machinations of classical tragedy) reveals that an unnamed Heideggerian 'they' has already taken the decision out of the hands of the technicians. 'They' have created an upright man out of clay, and formed woman from his rib; thus Levi combines Biblical, classical and science fiction accounts of the creation with a satirical account of modern power relations in the boardroom. His 'technicians' are powerless against the desires of the—presumably religious—higher force, although Levi's sympathies with Darwin's theories of evolution testify to his ludic intentions here in a drama that challenges several 'certainties' about how or why we developed as we did.⁶⁰

⁵⁹ This is the date of the final draft. The notes in the 1997 Einaudi edition do not give the name of the magazine in which the story was first published (*I*, p.1438), but Calvino had certainly seen the manuscript by 1961, as witnessed by his letter of 22 November (see above). 'Il sesto giorno' was published in the collection *Storie naturali* (*I*, pp.529-47).

⁶⁰ See Levi's comment on Darwin in *La ricerca*, *II*, p.1383.

From this story, Calvino lifted the notion of endowing a pre-human being with a contemporary consciousness. This device, that characterizes the *Cosmicomiche*, allows the author to fold time and speak both from within and beyond modern life. As in Levi's story, he uses the *Cosmicomiche* as a space to explore potential deviations from the line of teleological evolution as we see it in hindsight, narrating different possible, textually coexistent trajectories for the relationship between the earth and the moon, for example.⁶¹ However, Calvino wished to avoid his works being classified as science-fiction, arguing that this tends to normalize an imagined situation in the far distant future, in order to render its complexities comprehensible to us. Conversely, his work tries to present an alternative 'mito delle origini' and to defamiliarize even the most quotidian of experiences by making 'real' scientific data into fantasy (*RR*, II, p.1300). As the intertextual dialogue between Levi and Calvino continues, the different subjective approach of each author becomes clearer. I now focus in more detail on Levi's 'borrowing' of Qfwfq for 'Il fabbro di se stesso' (1971), comparing it with Calvino's 'Lo zio acquatico' (1965), the chapter in the *Cosmicomiche* to which Levi seems to be replying.⁶²

In 'Lo zio acquatico', Qfwfq belongs to a family of vertebrates descended from fish that developed lungs and in the Carboniferous period left the waters to live on land, adapting their fins into limbs. His family is not the first to effect this change, and

⁶¹ For a series of different co-existing perspectives see, in the *Cosmicomiche*, 'La distanza della luna' (*RR*, II, pp.81-96) and 'La molle luna' (*RR*, II, pp.227-35); in the later collection *La memoria del mondo e altre storie cosmicomiche* (Turin: Einaudi, 1968), see 'La luna come un fungo' (*RR*, II, pp.1183-92) and 'Le figlie della luna' (*RR*, II, pp.1193-1205).

⁶² 'Lo zio acquatico' was written in 1964, first published in *Il Giorno*, 1 May 1965, and then in *Cosmicomiche*, now in *RR*, II, pp.142-53. 'Il fabbro di se stesso' was written between 1968-70 (Levi's comment regarding the 'borrowing' of Qfwfq was made in 1968), and published in *Vizio di forma* (I, pp.704-09).

therefore suffers from the social stigma of being 'behind' other families, such as that of his girlfriend Lll, who left the water earlier and now claim evolutionary superiority, laying their eggs in dry areas and pretending they never lived in the water. Qfwfq's family is prevented from aspiring to such conditions by his great uncle N'ba N'ga, a fish. The assumed superiority of a progression towards dwelling on land is challenged in the story when rather than ridiculing the backward manners of N'ba N'ga, Lll becomes fascinated with his ability to swim and breathe in the water. After N'ba N'ga teaches her how to do this herself, she finally fulfils her dream of returning to and populating the waters, and defies the impulse towards teleological evolution by marrying Qfwfq's uncle.

'Il fabbro di se stesso' is the diary of an individual who is now a man, but whose memory contains the recollections of all his ancestors, right back to 'il primo' (an obvious pun on Levi's first name). In this it might be seen as a fiction that echoes some of the material presented in Darwin's *The Descent of Man*.⁶³ Beginning here, at a time of -10⁹, Levi's protagonist recounts the diary entries detailing the changes effected by this first ancestor as he and his wife leave the water and forge a new body and way of life on land. In contrast to the amorous plot of Calvino's tale, Levi's 'fabbro' focuses on the biological alterations necessary to enable this great mutation: on the optimum dimension and number of his legs; the necessary consistency of his skin; how reproduction and gestation should take place; how to make a pair of eyes; which elements to use as materials (he develops a fondness for and reliance on carbon, hydrogen and oxygen).

⁶³ Charles Darwin, *The Descent of Man and Selection in Relation to Sex* (London: John Murray, Albemarle Street, 1888; 1st edn 1871). Darwin states: 'The sole object of this work is to consider, firstly, whether man, like every other species, is descended from some pre-existing form; secondly the manner of his development; and thirdly, the value of the differences between the so-called race of man', p.2.

The story ends in -10⁶, when the protagonist is walking, working with his hands to make implements and able to use them against his fellows.

Both stories assume an anachronistic traditional twentieth-century western view of social organization as the inevitable, natural outcome of evolution ('una prospettiva "storica" portata alle ultime conseguenze' (*RR*, II, p.1304)), in which individuals form male-female couples, raise children together and have some sort of extended family. In both tales, the female character is portrayed as having a dichotomously opposed nature to that of her male companion; Lll is 'irrational' in her choice to 'tornare indietro', and the unnamed wife in Levi's story is unable to reason in matters of reproduction: 'Si sa come sono le femmine: quando si tratta dei piccoli non intendono ragionare' (*I*, p.704). Qfwfq is the loser in the story, but the eventual winner; he may not have been 'uno che annunciava il futuro' at that moment, but through dramatic irony we see that his continual evolutionary transformations will take him beyond the stasis achieved by crocodiles or rhinoceroses (*RR*, II, p.153). Thus Lll is mistaken. In Levi's story however, there is no room for deviation, since every progression takes the protagonist one step further on an inevitable march towards attaining human form: a being that can invent the wheel, devise the alphabet, cut down trees, decorate him or herself, conceive of religion, hunt, defend his territory, kill others because they covet his wife, or for reasons of racial prejudice. This bleak picture seems to take us to a primitive—or all too familiar—version of human civilization as we know it, but Levi darkens even the prospects of this brute being, as his protagonist concludes that the diary may as well finish on this note since with these final transformations he is more or less complete: 'da allora, nulla di essenziale mi è piú successo, né penso mi debba piú succedere in avvenire' (*I*, p.709).

Human socio-cultural behaviours as typically performed in western contemporary culture are therefore naturalized, rendered inevitable, as if there were no other way to be despite the painful shortcomings of our existential state.

A major difference in each author's presentation and structuring of the theme comes down to Levi's superior level of expertise and experience in things scientific. Both 'Il sesto giorno' and 'Il fabbro di se stesso' show an easy familiarity with organic chemical compounds, but also a sustained interest in the physical, biological aspects of evolution. As a result, his protagonist focuses on his body, even confessing 'ho l'impressione di pensare piú con le mani che col cervello' (*I*, p.709). Although brief, Levi's story engages with the role enacted by Qfwfq as human memory in a more overt and direct manner than Calvino chooses to do in any of the *Cosmicomiche*. Levi's protagonist takes firm responsibility for his actions ('Io sono il fabbro di me stesso', *I*, p.703). Moreover, he displays a far superior awareness of and dexterity at manipulating the biological processes necessary for mutation to that shown by the passive, disembodied Qfwfq, to whom transformations simply happen. Indeed, Qfwfq cannot even be considered to be an individual being: 'non è nemmeno un personaggio [...] è una voce, un punto di vista, un occhio'.⁶⁴ However, Levi also draws attention to the limitations of an individual's knowledge as the 'fabbro' admits he has little faith in metals: 'Forse è perché non so tanto bene la chimica inorganica: mi trovo molto piú a mio agio col carbonio' (*I*, p.706). This last comment is clearly a pun on Levi's occupation as an organic chemist, but also betrays an anxiety about his forays into disciplines beyond the reach of his specialization.

⁶⁴ Back cover of the 1965 edition of the *Cosmicomiche*, probably written by Calvino; see *RR*, II, p.1318.

To this end, Levi made several intriguing comments regarding the collection *Storie naturali* as a whole, which also shed light on the premise behind *Vizio di forma*. A letter written by Levi appears on the back cover of the 1966 edition of *Storie naturali*, in which he discusses his:

percezione di una smagliatura nel mondo, di una falla piccola o grossa, di un 'vizio di forma' che vanifica uno od un altro aspetto della nostra civiltà o del nostro universo morale.

In writing, Levi admits feeling guilty, like someone who 'commette consapevolmente una piccola transgressione'. He then offers two possible explanations for this feeling: first, if one discovers a fault, one should act to rectify it, rather than simply writing about it to alleviate anxiety; second, he feels a little fraudulent asking a public who knows him for his accounts of the Lager to take seriously his lighter stories. Yet, in true 'primoleviano' fashion, he then detects a bridge between the testimonial works and these stories, since the Lager was the greatest 'vizio' of all. In addition to these two transgressions, I would argue for a third; from the world of a chemist into that of a fiction writer.

It was this leap that troubled not only Levi, but also the commercial director of Einaudi, Roberto Cerati, to the extent that he advised Levi to publish this text under a pseudonym fearing that these stories were not equal to the earlier testimonial works (*I*, p.1434-35). Yet as ever support came from Calvino, whose comments—also printed on the back cover of the book—confirm Levi's legitimacy as an author, and more importantly as a figurehead for the 'two cultures' model for literature:

L'autore è un chimico, e la sua professione traspare nell'interesse per come sono fatte le cose dentro, per come si riconoscono e si analizzano. Ma è un chimico che sa le passioni umane non meno di quanto sappia la legge dell'azione di massa, e smonta e rimonta i segreti meccanismi che governano le vanità umane. (*I*, p.1434)

Calvino's words are strongly reminiscent of Snow's exhortation to literary scholars to be aware of the Second Law of Thermodynamics, while emphasizing Levi's capacity to analyse in depth. They also evoke a mechanistic view of both scientific knowledge and human emotions, portraying both as comparable quantities that can be known, which conform to laws and may be built upon or taken apart like pieces of 'meccano'. Connections might be drawn between Calvino's remarks and Levi's 1985 story 'Meccano d'amore' (*II*, pp.882-85), which describes his failed attempts at the age of eleven to win the attentions of a certain Lidia by making her a clock out of meccano for her name-day celebrations. He reflects:

Nel ricordo di oggi non saprei come giustificare questa mia scelta: forse pensavo confusamente che un orologio batte come un cuore, o che è fedele e costante, o lo ricollegavo alla ricorrenza dell'onomastico. (*II*, p.884)

It is difficult to gauge what Levi hoped readers would glean from this story, but his construction, 'una dichiarazione in codice', was not sympathetically viewed or deciphered (p.883). Lidia's gaze ultimately fell most favourably on a gift of foreign stamps, perhaps implying that the imaginative draw of exotic locations usually commands more sway over our emotions than mechanisms. Certainly, Levi seems to be telling us that human emotions and the human form are constituted by far more than detachable parts.

As regards the separate components of writing, it was noted earlier that Calvino praised Levi for his proficiency in moving convincingly from 'un dato di partenza scientifico-genetico' towards a literature full of 'suggestione intellettuale e anche poetica' (*Lettere*, pp.695-96). This view assumes that a 'scientific' approach to writing constitutes the 'informative' part of the merger, whilst a poetic slant takes the scientific source beyond itself, even, as Calvino suggests, 'in una direzione completamente

autonoma' (*Saggi*, I, p.705). This is in keeping with Calvino's belief that literature is the supreme forum and vehicle for epistemological progress, as well as confirming his resistance to scientific writing taking on traditionally literary qualities.⁶⁵ Speaking of his inspiration for writing the *Cosmicomiche* he says:

La scienza contemporanea non ci dà più immagini da rappresentare; il mondo che ci apre è al di là di ogni possibile immagine. Eppure, al profano che legge libri scientifici [...] ogni tanto una frase risveglia un'immagine.⁶⁶

Thus Calvino drew on science as a grounding 'alimento' to ensure valid and varied substance for his cognitive wanderings and to prevent them from disintegrating into unfounded dreams (*Saggi*, I, pp.635-36). However, the potential to heal epistemological division remains a quality of literature:

Da quando la scienza diffida dalle spiegazioni generali e dalle soluzioni che non siano settoriali e specialistiche, la grande sfida per la letteratura è il saper tessere insieme i diversi saperi e i diversi codici in una visione plurima, sfaccettata del mondo. (*Saggi*, I, p.723)

In contrast to Levi's declared intention to bring down the barriers between science and literature with novels such as *La chiave a stella* and *Il sistema periodico* inspired by both literary and scientific or technical issues, it seems that Calvino did not intend the *Cosmicomiche* to function in this way. It is indicative of this position that he describes a 'cosmogonia' as a 'genere letterario prima che speculazione scientifica' (*Saggi*, I, p.685, emphasis added). Indeed, the citation above states that it is literature that needs to reforge links between fragmented areas of knowledge.

⁶⁵ He remarks that although pleased to discover 'una suggestione poetica' in scientific writing, this must not be proclaimed overtly: 'devo essere io a scoprirla; se è la scienza stessa a dirmi: "hai visto come sono poetica!" io non ci sto, anzi ho una reazione di rifiuto' (*Saggi*, II, p.2040). This is a clear example of the different standards he employs in his engagement with the relationship between science and literature, as his *Cosmicomiche* are subtly infused with similar declaration that might be paraphrased as 'Hai visto come sono scientifico!'

⁶⁶ See notes to the *Cosmicomiche* (*RR*, II, p.1321). Calvino's remarks were printed in *Caffè*, in which the first four stories were published in 1963.

Calvino argues for literature that challenges received wisdoms, but simultaneously states the object of literature as being to reconstitute—without necessarily reconfiguring—discrete parcels of different ‘saperi’. Levi is driven to write this type of story by his perception of a ‘vizio di forma’, not, as Calvino arguably is, by a desire to open wide the latent imaginative potential hidden within a chance scientific phrase (see *RR*, II, pp.1300-03). However, while feeling strong sympathy for Levi’s desire to point out the flaws in our social organization, I also feel it is necessary to draw attention to the assumptions encoded within his own writing which he does not appear to perceive and with which both he and Calvino might be said to collude.

The astronomer Giannina Poletta said of Calvino:

L’astronomia di Calvino [può] inserirsi, in maniera originalissima, in quel filone che tende a portare fisica, matematica e astronomia nella vita di tutti i giorni, mostrando l’affinità di leggi fisiche con intuizioni umane.⁶⁷

While not wishing to deny the originality of Calvino’s work, I would argue that it is because of this process of normalizing science that several problematic characteristics of Calvino’s—and indeed Levi’s—work arise. Whatever these authors’ intentions in their engagement with the authority of science, scientific reference conveys just that to the reading public: authority. Thus Calvino may have aimed to defamiliarize scientific data by transforming it into fantasy narrative, but he chose to do it in such a way that he ultimately reinforced many stereotypical, normative western views of social organization and gender roles in particular. To illustrate how I understand this to operate in his work, and by association in Levi’s writing, I turn to Lynne Segal’s recent critical

⁶⁷ ‘L’astronomia di Calvino’, in *Italo Calvino: la letteratura, la scienza, la città. Atti del convegno nazionale di studi di Sanremo*, ed. by Giorgio Bertone (Genova: Marietti, 1988), pp.101-112 (p.111).

account of 'the latest "science" versus "humanities" wars', and draw also on theories of evolutionary biology.⁶⁸

Evolutionary biology is the conviction that the purpose of human life is to survive and mate, as opposed to Segal's view that our *raison d'être* is actually 'collective co-operation in the shaping of history' (p.80). She chronicles how 'belief in universal truths (now derided as "grand narratives")' which dominated science in the 1950s was eroded by theorists such as Roland Barthes, whose work (especially *Mythologies*⁶⁹) challenged the continual converting of 'history' into 'myths of "nature"' (Segal, p.78). Although initially influential, Barthes' efforts to discredit the unfounded reduction of human interaction to biological imperatives were repudiated in the 1970s by theories proposed by authors such as E. O. Wilson and Richard Dawkins.⁷⁰ As Segal points out, their insistence on the 'natural', dichotomously opposed roles of men and women ('aggressive' as opposed to 'coy' for example) avail themselves of all the authority endowed by scientific rhetoric, without a shred of 'scientific' proof (Segal, pp.84-85). What these theories do rely on, Segal argues, is an appropriation of Darwinian thinking.⁷¹ Contrary to the propositions of Wilson, Darwin's original theories pertained to a theory of 'descent', not of 'evolution', therefore not of a progressive series of developments that explained (and determined) future social behaviour.⁷²

⁶⁸ *Why Feminism? Gender, Psychology, Politics* (New York: Columbia University Press, 1999), p.80.

⁶⁹ *Mythologies*, trans. by Annette Lavers (London: Jonathan Cape, 1972; 1st edn 1957).

⁷⁰ See in particular Wilson's *Sociobiology* (1975) and Dawkins' *The Selfish Gene* (Oxford: Oxford University Press, 1976).

⁷¹ Segal compares the use made of Darwin's theories by evolutionary biologists to the ways in which they are manipulated by eugenicists.

⁷² Segal discusses how Darwin originally referred to his central idea as a 'theory of descent with modification', rather than as a "theory of evolution" (implying a notion of "progress") but the speedy advocacy of his ideas by Victorian scientists and eugenic enthusiasts encouraged him to speak of "evolution" in his next book *The Descent of Man* (p.81).

Lamenting the frustration of seeing Barthes' progressive theories palimpsestically erased by what have been derided as 'intellectually shaky and [...] right-wing treatise[s] disguised as science',⁷³ Segal observes that the media has sided with the successors of C. P. Snow; the supporters of universal grand narratives. As witnessed by the analysis of their two stories above, Calvino and Levi's work can, on some counts, be subsumed into this category. Their evolutionary accounts assume a Darwinian progression through mutation, but in their narrations they contravene Darwin's belief that we descend ultimately from inanimate material, endowing their diachronically present protagonists with a contemporary (white, western, middle-class, male) consciousness. The inevitable result is that their work aligns itself with an evolutionary biological perspective. Calvino's ability to show the affinity between the laws of physics and human emotions also functions as a normative process that lends a specific, context dependent perspective the authority of a universal law. Likewise Levi asserts that humankind has progressed as much as it ever will, and effectively sets our social, existential identities in stone.

Clearly this is not the only characteristic of their writing, and here I have focused on a strictly limited number of texts. However these texts do constitute a vital document for the literary dialogue between Levi and Calvino touching on the science-literature connection and, especially in the case of Calvino, have come to symbolize his rendering of the new type of integrated 'letteratura' as outlined in Levi's description of their shared project.

⁷³ Wilson in conversation with Terence Monmaney, a medical writer, 'Divisive Ideas on "Unification"', *Los Angeles Times*, Thursday, July 9 1998. Retrieved from <<http://www.2think.org/hii/wilson.shtml>> on 27/02/04.

One final distinction between Levi and Calvino's approach to the use of scientific material as an inspiration for fiction relates to anthropomorphism. On this issue Calvino states:

Una precisazione sull'antropomorfismo nelle *Cosmicomiche*: la scienza m'interessa proprio nel mio sforzo per uscire da una conoscenza antropomorfa; ma nello stesso tempo sono convinto che la nostra immaginazione non può essere che antropomorfa; da ciò la mia scommessa di rappresentare antropomorficamente un universo in cui l'uomo non è mai esistito, anzi dove sembra estremamente improbabile che l'uomo possa mai esistere (*Saggi*, I, p.706)⁷⁴

Although Calvino's aim may have been to represent a universe without human beings, his stories overflow with distinctive human characteristics; for example in 'Tutto in un punto' (*RR*, II, pp.118-23) we encounter topics such as the family and the 'mentalità' of its various members, immigration, gossip and La Signora Ph(i)Nk° who creates a 'big bang' phenomenon by simply expressing the desire to make tagliatelle for everyone (*RR*, II, p.122). Thus despite the unfamiliar—or indiscernible—forms of Calvino's characters, his tales unquestionably present a defamiliarized dramatization of contemporary Italian family life. In contrast, Levi does not try to defy the suggestion that chemical elements have anthropomorphic qualities. He refers to 'la materia' as 'madre', and states:

Altri elementi (per esempio il ferro, l'oro, lo zolfo), cioè tutti quelli che hanno una lunga storia, hanno indubbiamente una fisionomia umana, un carattere antropomorfo. (Poli and Calcagno (eds), p.58)

Levi does caution against exaggerating the anthropomorphic potentialities of the elements, but he nevertheless confirms that this aspect of their discursive construction lends itself easily to fictionalization, for chemists and non-specialists alike.

As regards the imposition or projection of human qualities onto pre-human entities, this might be seen as a loose appropriation of Darwinian logic, since rather than seeing

⁷⁴ I would question this last sentence strongly, since, as argued previously, the anthropomorphization of 'characters' in the tales implies an inevitable evolutionary 'descent' to our current incarnations.

the past as a key to the present and future, Darwin argued that ‘the present is the key to the past (just as Marx had earlier remarked that “human anatomy is a key to the anatomy of the ape”)⁷⁵. Anthropomorphization is arguably ‘anti-scientific’, in that it endows specific quantities with a vastly unpredictable and unwieldy range of human qualities. However, it certainly allows kinship bonds and connections to be forged between human beings in their current incarnations and ‘some pre-existing form’ (Darwin, *Descent of Man*, p.2). Moreover, as explored in later chapters, bonds with anthropomorphized objects can prove vital to galvanizing our embattled sense of self in a technologized world of alienated subjectivities.

Although the effect of anthropomorphization in Calvino and Levi’s short stories explored here is to normalize a particular perspective and way of living, insinuating that this is in fact the only logical outcome of evolution, elsewhere in their work it functions in different ways. In Calvino’s *Lezioni americane*, he expresses a desire to ‘far parlare ciò che non ha parola, l’uccello che si posa sulla grondaia, l’albero in primavera e l’albero in autunno, la pietra, il cemento, la plastica’. However, for Calvino this would be achieved through ‘un’opera concepita al di fuori del *self*, un’opera che ci permettesse d’uscire dalla prospettiva d’un io individuale’ (*Saggi I*, p.779). As with his desire to create in the *Cosmicomiche* a universe in which human life seemed impossible, but which was paradoxically anthropomorphized, this statement seems to support the dissolution of the material body, of the individual, deliberately evoking a process of continual Ovidian metamorphosis. Calvino’s discomfort with the physicality of the body is particularly evident in *Se una notte d’inverno un viaggiatore*, as, reflecting on the

⁷⁵ Segal, p.81. She cites from Marx’s Introduction to *Grundrisse*, trans. by Martin Nicolous (Harmondsworth: Penguin, 1973; 1st edn 1857), p.105.

activity of writing he exclaims vehemently:

Come scriverei bene se non ci fossi! Se tra il foglio bianco e il ribollire delle parole [...] non si mettesse in mezzo quello scomodo diaframma che è la mia persona! [...] Se fossi solo una mano, una mano mozza che impugna una penna e scrive....[...] per trasmettere lo scrivibile che attende d'essere scritto, il narrabile che nessuno racconta. (*RR*, II, p.779)

Calvino wishes to approach the freedom of not being, or of being at one with his surroundings. He strives to enter a state of transcendence and to be able to write without the 'constraints' of personality, experience, body, consciousness. His wishes still require that a part of him—his hand—will distinguish itself from the external world, but his vision of human 'presence' does not demand or even appear to value materiality. The voice that Calvino wishes to unleash seems not to be of human provenance. Conversely, as explored below, for Levi the anthropomorphization of objects serves to reinforce and validate our embodied selves, as a holistic union of psyche and soma. The voices he amplifies are decidedly human, and inextricably bound to their physical presences in the world; indeed, problems for Levi arise when this link is challenged by alienation, for example.

The issues raised in this and the previous two chapters are further probed and explored in the second part of the thesis, which considers Levi's treatment of the often-fraught relationships between science and society, and human and machines—relationships in which the human subject and human body are deeply implicated.

Part II: Science and Society, Humans and Machines

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Chapter 4: Communication, Knowledge and the Public Intellectual

The unconscious is always the negative side of science—that which resists it, deflects it or disturbs it. What I would like to do [] is to reveal a *positive unconscious* of knowledge: a level that eludes the consciousness of the scientist and yet is part of scientific discourse, instead of disputing its validity and seeking to diminish its scientific nature.¹

Aside from striving polemically either to reinforce or deconstruct understandings of scientific and literary language as radically dichotomous in nature, much recent scholarly work has problematized the apparent neutrality and transparency of scientific discourse. Critics of its traditionally asserted univocality identify ‘dead metaphors’ normalized through frequent usage, and unmask language as a ‘repository of ideological values’.² These critics argue that language is ‘historically and culturally determined; it is never neutral; and it is multivocal. It potentiates diversity of meaning’.³ In the broader context, this position mirrors developments in post-structuralist thought that seek to reveal ‘an essential endemic disorder in language and in the world’ which evades attempts at mastery through linguistic or other codes.⁴ An important part of the post-structuralist project is the challenge to historically sedimented notions of an objective ‘truth’ and reality unaffected

¹ Foucault, *The Order of Things*, p.xi. Emphasis in original.

² *Literature and Science: Theory and Practice*, ed. by Stuart Peterfreund (Boston: Northeastern University Press, 1990), p.6.

³ Beer, ‘Problems of Description in the Language of Discovery’, in Levine (ed.), pp.35-58 (p.41). See also, for example James J. Bono, ‘Science, Discourse and Literature: The Role/Rule of Metaphor in Science’, in Peterfreund (ed.), pp.59-89; Beer, *Open Fields, Darwin’s Plots*; Mary Hesse, *Revolutions and Reconstructions in the Philosophy of Science* (Brighton, The Harvester Press, 1980).

⁴ Julie Rivkin, and Michael Ryan ‘Introduction: “The Class of 1968: Post-Structuralism *par lui même*”’, in *Literary Theory: An Anthology*, ed. by Rivkin and Ryan, rev. edn (Oxford: Blackwells, 2000), pp.333-357 (p.334). Key texts include Foucault’s *The Order of Things*, Derrida’s *Of Grammatology*, trans. by Gayatri Spivak (London and Baltimore: Johns Hopkins University Press, 1976).

by human perspectives: part of the pervasive legacy of Cartesian dualism.⁵ Positions of this type that insist upon the possibility of objectivity—often referred to as metaphysical realism—have been refuted by cultural critics who unmask both the necessarily situated nature of the ‘knower’ and his or her inevitable investment in the object of knowledge.⁶

The implications of these revelations are multiple. Perhaps most importantly, once we have acknowledged the impossibility of understanding the world from ‘outside’, the only option open is to live in it ‘knowingly’ (Rivkin and Ryan, ‘Introduction’, p.355). This ‘knowing’ stance seeks to release Foucault’s ‘*positive unconscious* of knowledge’, or what philosopher of science Sandra Harding has called a ‘return of the repressed’—that is, of the subjective investments that condition any scientific endeavour.⁷ Similar observations are made by Calvino in his 1976 essay ‘Usi politici giusti e sbagliati della letteratura’ (*Saggi I*, pp.351-60). Calvino asserts that it has become impossible to conceive of ourselves and our practices as ‘innocente’, since whether we are dealing with political or linguistic issues, for example, we must remain alert to the constructed nature of such discourses, and sensitive to the hidden ‘*motivazione segreta, quella dell’uomo bianco, o del maschio, o del fruitore d’una certa rendita*’. To nurture such an awareness does not lead necessarily to a universal sense of blame, Calvino argues. Rather, it is a constructive element of his project to ‘*mettere in crisi*’, question and probe the nature of, and relations between, literature,

⁵ *Gender/Body/Knowledge: Feminist Reconstructions of Being and Knowing*, ed. by Alison M. Jaggar and Susan R. Bordo, rev. edn (New Brunswick, New Jersey: Rutgers University Press, 1992), p.3.

⁶ See Feyerabend, pp.221-22; Sandra Harding, *The Science Question in Feminism* (Ithaca and London: Cornell University Press, 1986), and ‘Rethinking Standpoint Epistemology: What is “Strong Objectivity”?’ in Keller and Longino (eds), pp.235-48; ‘Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective’, in Haraway, *Simians, Cyborgs and Women*, pp.183-202. These positions can be seen as developments of Heisenberg’s 1927 theory that demonstrates the impossibility of carrying out purely objective research.

⁷ In *The Science Question* (p.202), Harding cites Jane Flax’s work on this subject: ‘Political Philosophy and the Patriarchal Unconscious: A Psychoanalytic Perspective on Epistemology and Metaphysics’, in *Discovering Reality: Feminist Perspectives on Epistemology, Metaphysics, Methodology and Philosophy of Science*, ed. by Sandra Harding and Merrill Hintikka (Dordrecht: Reidel, 1983).

science and philosophy—but also to challenge the status of our very modes of expression (*Saggi*, I, p.360).

In previous chapters I located Levi within a postwar context alive with debates regarding integrated culture, and explored his relationships with other thinkers whose work interrogates the ‘two cultures’ divide. In addition, I examined the connections between scientific and literary inquiry and production, and foregrounded some of the links between science and social life as conceptualized by Levi and his contemporaries. I now focus on the ways in which language functions within these areas of debate as a vehicle for communication and ultimately knowledge. Levi attributes much importance to issues of communicability and the effective dissemination of messages to a broad and variegated public, but is also sensitive—albeit somewhat unwillingly—to the ‘inconscio’ of language, over which we have little control, and which may speak out in compelling ways. The links between language and knowledge are made explicit by Foucault’s statement that:

Knowledge [...] consist[s] in relating one form of language to another form of language; in restoring the great, unbroken plain of words and things; in making everything speak. That is, in bringing into being, at a level above that of all marks, the secondary discourse of commentary. The function proper to knowledge is not seeing or demonstrating; it is interpreting. (*The Order of Things*, p.40)

This chapter examines Levi’s attempts to bring together forms of language, and his attitude to critical commentary and interpretation. In this, as in so many other aspects of his work and thought, he is torn by his signature ‘spaccatura paranoica’, displaying both a fascination with and resistance to the ‘inconscio’ of discourse and knowledge. I begin with a discussion of his linguistic style and reflections on language, which is then developed into a consideration of his understanding of ‘knowledge’ and the ways in which this knowledge is, might be or should be communicated. Taking this line of inquiry further, the final section of the chapter explores Levi’s role as a public intellectual. More specifically,

it reflects upon the ways in which he endeavoured to disseminate the knowledge and epistemological concerns he developed in his first two careers—those of chemist and writer—through the activities of what has come to be viewed as his third profession. Belpoliti comments that despite being reserved, Levi conducted so many interviews that ‘cominciò a considerare questa attività di parlatore e di testimone un terzo mestiere, da affiancare a quelli piú ufficiali [...] di chimico e di scrittore’ (*‘Io sono un centauro’*, p.vii).

1. Language and Communicability

Levi’s status as a respected witness—of not only the holocaust but of the twentieth century in general—put him in a position of social responsibility but also endowed his words with a solemn authority. Levi was certainly aware of his status, and of the related potential power to influence and change cultural consciousness, rising to the challenge through a carefully studied linguistic style:

ho assunto deliberatamente il linguaggio pacato e sobrio del testimone, non quello lamentevole della vittima né quello irato del vendicatore: pensavo che la mia parola sarebbe stata tanto piú credibile ed utile quanto piú apparisse obiettiva e quanto meno suonasse appassionata. (*I*, p.175)

Many critics have observed that Levi’s language ‘tende alla precisione’ as his ‘lingua classica’ strives towards clarity (Porro, p.473). This view finds ample confirmation in Levi’s own reflections on his writing style, as he asserts ‘ho sempre pensato che si deve scrivere con ordine e chiarezza’, since ‘uno scrittore beneducato’ must assume personal responsibility for the accessibility of his or her messages (*II*, p.766). However, in the essay ‘Dello scrivere oscuro’ (*II*, p.676-81), he also acknowledges the difficulty of achieving this ideal, transparently clear mode of expression, since ‘una scrittura perfettamente lucida presuppone uno scrivente totalmente consapevole, il che non corrisponde alla realtà’: a

reality, he expands, constituted by the tangle of ego and id, flesh and spirit (*II*, p.677).

Hence Levi's self-styled 'linguaggio pacato' may not be as functionally neutral and uncoloured by emotion, or the unconscious, as he claims. Indeed, in 1980 he admitted:

lo scrivere non è un mestiere razionale, o non tutto. Cioè, quando uno scrive, c'è anche l'inquilino del piano di sotto che collabora...e se ne accorge più il lettore di chi scrive. E questo è, come dire, è un...colpo all'ambizione e alla superbia di chi pretende di scrivere tutto dalla cintola in su.⁸

For Mengaldo, Levi's work is characteristically marked by precisely this combination of clarity and confusion; he comments on both Levi's classical 'italiano marmoreo' and the recurrent trope of extracting order from chaos that is arguably a key driving force behind his work ('Lingua e scrittura', p.232). Mengaldo concludes that 'la scrittura, col privilegio del suo essere intrisa insieme di conscio e inconscio, e di varii livelli di coscienza' has become charged with the myriad levels of subjective 'sdoppiamento' to which Levi often draws attention. Thanks to this richness of latent signification and plurivocality, Mengaldo suggests, language may function to reveal an image of Levi even more ambiguous than that presented by the writer himself ('Lingua e scrittura', p.242).

In this section I consider issues related to the 'inconscio' of language, as present in Levi's work, discussing communicability, the compatibility of different languages, the anthropomorphic dimension of linguistic expression and the impact of technology on language use. Beginning with communicability, Levi openly criticized texts that 'suonano al limite dell'ineffabile', luxuriating in their own deliberate obscurity (*II*, p.679). Indeed, in *I sommersi e i salvati* he launches a direct attack on 'incomunicabilità': the 'mostro

⁸ 'Primo Levi: conversazione con Daniela Amsallem', 15 July 1980, Belpoliti (ed.), *Riga*, 54-73 (p.61). The splitting of the individual at the 'cintola' resonates with Levi's self-characterisation as a centaur.

linguistico' that became a feted 'ingrediente immancabile' in the 1970s and proudly descrying all discourse as 'fittizio, puro rumore' (II, p.1059). Communication, Levi argues, is a need and a duty which is always possible even despite linguistic barriers. To remain silent is also a form of communication, but is dangerously ambiguous, generating 'inquietudine e sospetto'. Hence it follows that 'rifiutare di comunicare è colpa' (II, pp.1059-60). The section of *I sommersi e i salvati* from which these citations are taken reflects chillingly on the inhuman nature of communication within the Lager. The Nazis had been instructed that German culture was the only culture, and consequently whoever could not speak German was considered 'barbaro'; 'non era un *Mensch*, un essere umano' (II, p.1062). This link between humanity and language is made several times: 'Tutte le razze umane parlano; nessuna specie non umana sa parlare' (II, p.1060). In addition, those in a condition of 'non essere parlati a' suffered devastating consequences: if you could find someone with whom to converse in whatever fashion, you might hold together; if not, 'la lingua ti si secca in pochi giorni, e con la lingua il pensiero' (II, p.1062). By the same token, an absence of linguistic competence was fatal to the degree that Levi exchanged precious rations of bread for German lessons, having grasped that without them he risked death through misunderstanding orders.⁹

Levi's reflections here evoke many lines of questioning which will be revisited later in this chapter; for example the responsibility of the witness or of any human being to communicate, which led to Levi's activities as a public intellectual figure. Furthermore, the wordplay on 'lingua'—meaning both 'tongue' and 'language'—in the citation above, emphasizes the extent to which, despite its arbitrary and abstract nature, language emanates

⁹ Greer, 'Colloquio con Primo Levi', *Conversazioni*, p.67.

from the body. Levi frequently underlines the importance of embodied physicality to communication, learning and thought itself. First, however, I examine the ways in which Levi's work reflects his exhortations for a language that is cleansed of superfluity and ambiguity as though decanted through a 'pompa-filtro', emerging almost 'sterile' (*II*, p.939).

Describing his writing style, Levi characterizes his 'modello letterario' as that of the 'rapportino di fine settimana, quello che si fa in fabbrica o in laboratorio, e che deve essere chiaro e conciso, e concedere poco a quello che si chiama il "bello scrivere"'. He declares that his work constitutes not a 'messaggio' since that carries too many pedagogical connotations, but a 'comunicazione' (Luce, p.40). Beyond the acknowledged influence of his work as a chemist as a key inspiration for this approach to communication, it is clear that anyone who had been forced to decipher the 'indecifrabile' machinations of the Lager (*II*, p.1018) would manifest resistance to a linguistic style that trumpeted obscurity. 'Scrivere è un modo per mettere ordine', he declares.¹⁰ Clarity and order do indeed prove compelling when contrasted with the dangerously persuasive oratory techniques of Mussolini and Hitler. Their 'recitazione ispirata' and 'pseudocolloquio con la folla' secured '[la] creazione del consenso attraverso il plagio e il plauso' (*II*, p.1039), even though their speeches seem utterly 'incomprensibili' to us today.¹¹ Yet elsewhere Levi is keen to encourage precisely the opposite of such clarity.

In 'Dello scrivere oscuro', criticizing unclear modes of expression, Levi states definitively that 'l'effabile è preferibile all'ineffabile, la parola umana al mugolio animale'

¹⁰ Roberto di Caro, 'Il necessario e il superfluo', *Piemonte Vivo*, 1 (1987); repr. in *Conversazioni*, pp.195-205 (p.203).

¹¹ Milvia Spadi, 'Capire e far capire', radio interview for 'Westdeutscher Rundfunk', September 1986, published in *La Terra vista dalla Luna*, 1, 1, (1996); repr. in *Conversazioni*, pp.242-59 (p.242).

(II, p.679). However, in his later interview with di Caro he posits quite a different view. Discussing the insufficiencies of language, he muses: 'Ineffabilità, si chiama, ed è una bellissima parola' (p.202).¹² He subsequently tells another interviewer that 'un libro che abbia solo un aspetto, che si possa leggere in un solo modo, secondo me, è un libro povero' (De Rienzo and Gagliano, p.115). In a similar vein, his approach to writing based on the weekly scientific report is revealed to be an aspiration rather than an accurate reflection on his work as he admitted to Greer in 1985:

ho costruito io stesso una specie di leggenda intorno a [*Se questo*], cioè che veramente io l'abbia scritto senza piano, che io l'abbia scritto d'impulso, che io l'abbia scritto senza pensarci sopra. È la prima volta che mi trovo messo alle corde perché le altre persone con cui ho parlato hanno accettato questa leggenda.¹³

Aside from the influence of classic Italian texts that served as 'pietra di paragone' to his writing style, he also acknowledges the influence of Aldous Huxley's 'zoological' study of human beings—an approach that might be seen as mediating between the biological observation of a 'rapportino' and a more traditional literary approach. As regards the agenda of a particular writer, Levi differentiates between various types:

scrittori che [reinventano la realtà] deliberatamente; scrittori che lo fanno consapevolmente non deliberatamente; e scrittori ingenui che deformano la realtà perché è una necessità di chiunque scriva, senza rendersene conto, senza volerlo'. (Appendix, p.324)

In relation to *Se questo*, he situates himself in the last category. However, despite his growing awareness that all writing is a distortion, he deliberately perpetrated the image of a clear and distinct, scientifically inspired, unedited prose—a statement thrown into

¹² Comparisons might be drawn here with the work and thought of Eugenio Montale whose poetry engages with the 'limits of expression, and [...] acknowledges the weakness or "balbo parlare" [...] of language'. Yet despite acknowledgements that much experience cannot be conveyed through language, Montale nevertheless employs language 'in an attempt to express the inexpressible'. Clodagh Brook, 'The Montalian Object and Inexpressibility', in *Montale: Words in Time*, ed. by George Talbot and Doug Thompson (Market Harborough: Troubador, 1998), pp.83-98 (p.83).

¹³ This is cited from my transcript of the interview, not included in the Appendix. For the published version of this text, see *Conversazioni*, p.65.

question by Tesio's research which points out the extent to which Levi reworked all his manuscripts.¹⁴ Here it seems relevant to recall some of Huxley's own comments on the nature of literary and scientific writing. Differentiating between a science that is value neutral and literature as value specific, Huxley maintained that the 'aim of the scientist is to say only one thing at a time'.¹⁵ Although obviously resonating with Levi's desire for clarity, univocality and accessibility, Huxley's view does not accord with Levi's paradoxically coexistent view of words as saturated with accumulated meanings. This is especially true for words gleaned from his experience as a chemist, which are endowed with a wide 'gamma di significati' (*Dialogo*, p.59). In a more general sense, Levi's view of sedimented meanings is profoundly etymological, as he recalls in an interview:

A undici anni ho mosso mari e monti per avere un dizionario etimologico. L'ho ottenuto, è stato il mio *livre de chevet* per molti anni e lo è ancora adesso. Già allora mi interessava capire il perché delle parole. Poi ho razionalizzato questo interesse, sapere quel che c'è di storicamente addensato dietro una parola mi sembra importante.¹⁶

The progression from curiosity in the 'perché' of words to an awareness of their arbitrary and historically embedded nature, echoes his avowed interest in 'il perché delle cose' (*Dialogo*, p.13) which led him to study and practice chemistry. Just as his rather positivist, youthful desire to discover 'il perché delle parole' was replaced by an interest in semantic sedimentation, so his drive to unlock the explanatory 'perché delle cose' was supplanted by the poignant, yet productive realization, that 'non c'è, il perché delle cose'; there simply are no certain answers (*Dialogo*, p.13).

Such realizations led to reflections on scientific language as seen in the two essays on 'La lingua dei chimici' (*II*, pp.741-50). The first of these begins by noting that chemists

¹⁴ 'Su alcune aggiunte e varianti di *Se questo è un uomo*', *Studi Piemontesi*, vi/2 (Nov. 1977), 270-78.

¹⁵ Aldous Huxley, *Literature and Science* (London: Chatto and Windus, 1963), pp.9-14.

¹⁶ Ferrero, 'Se lo scrittore sapesse che la scienza è anche fantasia', *Tutto libri*, 21 January 1984, p.1.

must be able to indicate with precision millions of distinct chemical compounds, but immediately moves on to a discussion of how chemistry—and its various languages—did not come into being as complete phenomena, but evolved over a period of time: ‘la chimica del secolo scorso si è andata consolidando attraverso una terribile confusione di linguaggi, i cui resti persistono nella chimica di oggi’ (*II*, p.741). The tangle of meanings ‘storicamente addensato’ within twentieth-century chemical terminology held a deep fascination for Levi, and allowed him to perform interdisciplinary analyses on how certain terms or languages had come into general usage.

Levi describes and identifies the three main languages of chemistry: first, the ‘nome di fantasia’ given to newly discovered compounds, derived etymologically from the natural product from which it is created and which thus gives no information about the properties or character of the new compound (*II*, p.741); second, the less fantastic but more expressive numerical formulas which reveal nothing about the provenance or use of the substance, but provide an ‘inventario’, although not of *how* atoms are linked together; finally there is the pictographic illustration of chemical structures—less symbolic than most languages but one which therefore also tends towards the utterly impractical and impracticable system of exact correspondence of referent to sign. Levi illustrates this difficulty with reference to the method proposed by an eccentric academic whom Gulliver encounters in Swift’s land of Balnibarbi (*II*, p.744).¹⁷ Levi’s awareness of the shortcomings of these languages when taken separately, and the infinitely fuller dimensions when read as complementary, can be linked to his desire to see and come to understand the world in its fragmented polysemous sprawl without being blinkered or

¹⁷ Jonathan Swift, *Gulliver’s Travels* (Oxford: Oxford University Press, 1971, 1st edn 1726).

constrained by any one delimited methodology; an echo of his desire to remain uncircumscribed, on the margins of groups or disciplines, 'per vedere meglio il paesaggio' (II, p.631).

In these two essays, the radically interdisciplinary nature of Levi's analysis is enabled by his awareness and gleeful appreciation of the cultural, literary, subjective and often entirely arbitrary nature of many of the words employed within chemical terminology. His etymological excavations, coupled with a deep sense of praxis drawn from professional experience, emphasize his commitment to a socially-embedded analysis of language; an analysis that looks far beyond the immediate application of terminology, and which tends 'a non lasciarsi ingannare facilmente dalle apparenze' (*Dialogo*, p.59). Just as releasing Foucault's '*positive unconscious*' of knowledge does not threaten to compromise the validity of discourse but rather enhances its content, Levi's unveilings of imprecision within chemical languages serve only to improve precision. The more 'knowing' circumspection employed when approaching the inevitably flawed instruments of expression we develop, the more discerning our engagements with the knowledge communicated therein.

Here it is worth pausing to consider the allusions to psychoanalysis that can be identified in Levi's works. As explored in the next chapter, Levi had a rather ambivalent relationship to psychoanalysis, yet the processes involved in psychoanalytic evaluation have a particular resonance with his work and thought. He portrays organic chemistry as involving investigation, identification, classification, through experiments that separate and combine, leading to an improved understanding of the elements contained within a given substance and their individual character or potential. As such, it can be directly compared

to the discipline of psychoanalysis. This analogy was in fact drawn by Sigmund Freud himself; in a discussion of his choice of the term 'analysis', Freud poses and answers a vital question:

Why 'analysis'—which means breaking up or separating out, and suggests an analogy with the work carried out by chemists on substances which they find in nature and bring into their laboratories? Because in an important respect there really is an analogy between the two.¹⁸

He goes on to explain that the patient in psychoanalysis shows composite symptoms, but is unaware of the 'elementary motives' that provoke these symptoms. The work of psychoanalysis is thus to 'trace the symptoms back to the instinctual impulses which motivate them [...] and of which he [sic] has hitherto been unaware'. Similarly, 'a chemist isolates the fundamental substance, the chemical "element", out of the salt in which it had been combined with other elements and in which it was unrecognizable' ('Lines of Advance', p.160). Arguably, Levi performs an analogous process with words, tracing them back etymologically to their origins, removing them from the 'salt' of everyday hubbub to reveal their intrinsic properties, and render them fully visible.

Although on the one hand much troubled by the 'puro rumore' of ineffable 1970s discourse, on the other Levi espouses a position similar to William Paulson who argues that 'noise' is a vital element within cultural texts.¹⁹ As a contrast to Cartesian desires for clear and distinct ideas, Paulson posits texts whose 'noisy' ambiguity—often acquired during the communication of information—forces an acceptance of the rhetorical dimension of language, and inspires a conscious effort to achieve the comprehensible

¹⁸ 'Lines of Advance in Psycho-analytic Therapy', *The Standard Edition of the Complete Psychological Works of Sigmund Freud*, 24 vols, XVII, *An Infantile Neurosis and Other Works (1917-1919)*, rev. edn (London: The Hogarth Press 1975), pp.159-68 (p.159).

¹⁹ William Paulson, 'Literature, Complexity, Interdisciplinarity' in N. Katharine Hayles (ed.), *Chaos and Order: Complex Dynamics in Literature and Science* (Chicago: University of Chicago Press, 1991), pp.37-53.

organization of information. According to Paulson's argument, if we acknowledge the presence of noise, we will extract a more meaningful quantity and quality of information from any communication and therefore perform a more complex and rewarding form of reading.²⁰ Even scientific writing—or perhaps as has been argued by much recent scholarship, *especially* scientific writing—should nurture a healthy mistrust of its own constructedness and avoid figuring itself as 'precise', 'transparent' or 'unrhetorical'.²¹ Levi light-heartedly evokes such issues when discussing the recourse to Greek terms when naming a newly articulated scientific concept or phenomenon. Joking about the misleading authority of Greek derived words he states 'Com'è facile dare nomi greci alle cose che non si capiscono! Dopo, sembra di capirle meglio' (*II*, p.1236).

Returning to Huxley, it is worth contrasting his appreciation of scientific writing as univocal with his view of the literary artist who aims 'to speak about the ineffable' (*Literature and Science*, p.12). In light of Levi's contradictory denigration of and delight in the ineffable, Huxley's phrase takes on especial significance. Levi confronted the inadequacies of language on several levels as he struggled to stretch words to convey ideas or experiences that transcended 'normal' life. With regard to the Lager, he points out in *Se questo* that words such as 'fame', 'stanchezza', 'dolore' are 'parole libere, create e usate da uomini liberi'. In order to convey more accurately the reality of internment, a new language would have had to develop (*I*, p.119).

²⁰ This might be compared to Eco's notion of second level reading theorized in *Sei passeggiate nei boschi narrative* (Milan: Bompiani, 1994).

²¹ See for example Carol Cohn's discussion of 'the language of nuclear war' used by professors at the University of Washington defence centre. She argues that far from being 'transparent' and 'objective', the language employed constitutes a specialist jargon that encourages sexual investment in the act of bombing and the bombs themselves, and discourages the voicing of concerns; 'Nuclear Language and How We Learned to Pat the Bomb', in Keller and Longino (eds), pp.173-84.

On a more positive note, with regard to scientific discovery, language also disintegrates when asked to recount what takes place in a supernova, for example, as Levi shows in his story 'Una stella tranquilla' (*II*, pp.77-81). Just as words cannot express the extremity of pain and hunger within the lager, so they fall short of conveying the immensity of scale in space. Here Levi takes a Saussurean view of language as an arbitrary code that exists only 'by virtue of a sort of contract signed by the members of a community'.²² New meanings can always be developed, but only through a general consensus of a particular constituency. As seen in his essays on the languages used by chemists, it is perfectly possible for different, discrete languages to coexist, and to function as a 'noisy' form of supplemented communication. However, although acknowledging the benefits of such linguistic plurivocality in some situations, Levi is resistant to any language that is not shared with others: for example he lambastes philosophers for their propensity to invent highly exclusive, individual languages 'che bisogna sforzarsi di penetrare prima di capire cosa vuol dire' (di Caro, p.204).

As advocated by Foucault, Levi's interests lie in weaving together 'forms of language': in his *Conversazione* with Camon he recounts his early interests in chemistry as stemming from the symmetries he perceived between written language and the physical processes of experiment: 'Io ho scelto di interessarmi di chimica che ero un bambino, avevo 14/15 anni; perché mi appassionava il parallelismo tra la formula scritta sulla carta e quello che avviene nella provetta' (p.70). Similarly, he identifies parallels between the activities of the writer and the chemist: both transform a 'materia prima' into a form

²² Ferdinand de Saussure, *Course in General Linguistics*, ed. by Charles Bally and Albert Sechehaye in collaboration with Albert Riedlinger; trans. intro. and notes by Wade Baske (New York, Toronto and London: McGraw-Hill Book Company, 1966; 1st edn 1915), p.14.

accessible by the 'cliente'; both work through the illuminating and vitally formative cycle of positing, testing and potentially falsifying hypotheses; both seek insights into the composition and structure of a phenomenon. In addition, chemistry provides a vastly augmented vocabulary, 'un patrimonio immenso di metafore', the 'ombra simbolica' of which is unknown to those who have not practised in a laboratory, and whose understanding is thus virtual: 'di seconda mano' (*II*, pp.641-42).

For Levi, *first hand* contact with matter or situations is essential, and the importance of the hand and touch is constantly revisited in his work. Just as in the Lager one needed to actually articulate words with the tongue in order to continue thinking, so one must continue to touch and handle objects, and engage directly with the world in order to come to any degree of understanding. Levi comments: 'Il mio pregio sta nell'attenermi alla realtà: un debito che il Primo Levi scrittore ha verso il Primo Levi chimico' (Boeri, p.23). Far from living in a realm of literary or linguistic ineffability—he accuses many of dwelling intellectually in the 'cecità volontaria' of a closed 'condotta, in una tubazione che parte da Dante e arriva all'infinito' (Grassano, 'Conversazione', pp.173-74)—Levi is deeply embedded in his reality, in physical contact with the 'texts' he reads. He talks of the literature 'assorbita per via cutanea' which influences his writing style (Appendix, p.321); he casts a tactile eye over the worn and grooved stones, the 'lastroni incisi' of his city that record the comings and goings of past communities (*II*, p.687); he dignifies the 'vecchio corpo' that endures through time, entwining the threads of diverse subjectivities to emerge 'inciso di strani segni' (*II*, p.558); he strives to unlock the 'segreti del sangue e del seme' (*II*, p.613), playfully revealing them as the cryptic verses written into the histological

mosaic of a tapeworm, to be deciphered by the ‘hypocrite lecteur’, or human host. This particular tapeworm laments to its host:

Le nostre parole silenziose non trovano ascolto presso di voi, semidei superbi [...] Non chiedo che un dono: che questo mio messaggio ti raggiunga, e venga da te meditato e inteso. (*I*, p.459)

‘L’amico dell’uomo’ (*I*, pp.456-59), the piece from which this citation is taken, parodies scientific reports, claiming authority through a series of cited documents but simultaneously flaunting its obvious fictionality. In one sense, it might be seen as a deconstruction of ostensibly transparent, objective, scientific articles. On another level, it inverts Beer’s comment that ‘the implicit presence of the human body in writing and language has made it hard to expunge from the terminology of science’ (‘Science and Literature’, p.792). Instead, Levi’s text presents language as impossible to expunge from the inner depths of the human body, or from that of the parasites living within it. This tapeworm might also be compared to the ‘ecosistema’ of literary ‘saprofiti, uccelli diurni e notturni, rampicanti, farfalle, grilli e mufte’ that has seeped into his bowels, excavated and articulated in *La ricerca* (*II*, p.1363).

By living in our bodies and cities we mark them as type marks the page, yet although the ‘ineffable’ has to some extent been tamed by its location within socio-cultural ‘realtà’, our ability—and willingness—to read it clearly remains partial. Often the signs are there, but fall on deaf ears. At other times, even if we attempt an interpretation, we are not guaranteed even an approximate answer. This is spelled out most clearly in the short piece ‘Decodificazione’ (*II*, pp.185-91), discussing the futility of graffiti as a means of expression. Levi reflects:

Pensavo [...] alla essenziale ambiguità dei messaggi che ognuno di noi si lascia dietro, dalla nascita alla morte, ed alla nostra incapacità profonda di ricostruire una persona attraverso di essi, l’uomo che vive a partire dall’uomo che scrive: chiunque scriva [...] scrive in un codice che è solo suo, e che gli altri non conoscono. (*II*, pp.190-91)

Language as a system of signs may be written on the body or on our environment, but the core of our subjectivity remains idiosyncratically impenetrable, beyond the shared linguistic realm. Hence some philosophical discourse may be criticized for its conscious self-styled obscurity, but this is ultimately only a more acute instance of the slippery and elusive nature of our various linguistic codes.

As regards the inability of language to fully convey the self, it is while discussing his aim in 'Una stella tranquilla' to demonstrate the shortcomings of our words that Levi comments on the beauty of ineffability. He subsequently remarks that the inadequacies of our language stem from the fact that 'il nostro linguaggio è umano, è nato per descrivere cose a dimensioni umane' (di Caro, p.202). Thus when asked to reflect the dimensions of the superhuman (space), or the dehumanized (prisoners in the Lager), language struggles for a recognizable point of reference.²³ However, as implied by the citation from 'Decodificazione' above, the relation of individual human to language is far from an easy equivalence. On this issue Beer argues that 'language is anthropocentric, persistently drawing the human back to the centre of meaning. It thus both exaggerates the power of the human and blurs the limits of our perception of what lies beyond' (*Open Fields*, pp.154-55). In other words, the 'myth' of human centrality to the universe is reflected in our linguistic filtering of ideas through the human body and human subjectivity; a process that superimposes human experience as the 'measure' by which we should interpret and judge the world.

In her study on the 'Mano/cervello' relationship in Levi's work, Valabrega discusses measurement by exploring the cognitive function of manual activity and the

²³ This resonates with Calvino's comments on the *Cosmicomiche* as inspired by the challenge of escaping an anthropomorphic engagement with the world and language; see Chapter 3, above.

Conradian notion of 'il misurarsi con la materia' (*II*, p.641) which recurs frequently in Levi's writing.²⁴ In Gordon's view, the challenge of self-measurement 'becomes a crucial route to self-knowledge through testing and stretching one's limits' (*Ordinary Virtues*, p.129). In order to grasp the ineffable and express it through language, we must simultaneously scale up the notion of the 'human' and scale down all that hovers outside our immediate sphere, creating the impression that we can perceive phenomena which lie beyond language and perception. As Beer sees it, 'language is therefore both a limiting condition and a liberating discipline which makes possible the formulation of knowledge' (*Open Fields*, p.155).

Language, then, may be anthropocentric, but it vitally extends and enlarges human capabilities, hence its description by Rosi Braidotti as 'the ultimate prosthesis'.²⁵ Given its nature as a fundamental, enabling, organic extension of self, we must ensure that the human elements of language are not lost as technology rapidly surpasses bodily capabilities—a development which is then reflected in language. This possibility worried Calvino, who warned in 1976:

Ciò che si chiede allo scrittore è di garantire la sopravvivenza di quel che si chiama *umano* in un mondo dove tutto si presenta inumano: garantire la sopravvivenza di un discorso *umano* per consolarci della perdita d'umanità d'ogni altro discorso e rapporto. (*Saggi*, I, p.356)

Calvino posits our received perception of the 'human' as 'umorale, emozionale, ingenuo, non rigoroso', in opposition to the 'falso rigore dei linguaggi che oggi guidano il mondo' (*Saggi*, I, p.355). Of further relevance here is his sustained critique of 'l'antilingua', a

²⁴ See in particular 'Un'occasione di provarsi', the excerpt from Conrad's *Youth* (London: Dent, 1974; 1st edn 1898) included in *La ricerca* (*II*, pp.1414-22); see also Gordon, *Ordinary Virtues*, Chapter 5, 'Measure, or a Sense of Limit' (pp.113-132). Levi also reveals that he acquired a sense of 'misura' from the work of Huxley (Appendix, pp.321-22).

²⁵ Rosi Braidotti, *Nomadic Subjects: Embodiment and Sexual Difference in Contemporary Feminist Theory* (New York: Columbia University Press, 1994), p.43.

bureaucratic jargon provoked by 'la mancanza di un vero rapporto con la vita', and an apparent fear of words that have a recognizable meaning (*Saggi*, I, p.155). Clearly comparable to Levi's intolerance of obscure prose, Calvino's position also constitutes a critique of language that bypasses the human; an intolerance of language that is not anchored to its worldly referent.

The potential loss of the human quality of language—which, like the 'incoscio' of language, constitutes an often ignored but fundamental element of communication—leads to questions of technologically mediated writing. Calvino viewed this as the fruit of an automated 'macchina letteraria' that substitutes human powers of creation (*Saggi*, I, p.221). Levi explored similar concerns about writers being replaced by machines in the short play 'Il Versificatore' (*I*, pp.412-33; see further discussion in Chapter 6), in which a robot eases the burden on a young writer's shoulders by taking on his commissions. In a final twist, we are told that the play we have read (or watched: a television adaptation was screened on Rete Due in 1978²⁶), is the work of the robot. The prose emitted by the Versificatore, programmed to execute a certain number of verses, in a certain style, on a given theme, closely resembles Calvino's notion of literature as a 'processo combinatorio' (*Saggi*, I, p.205). Levi expresses comparable views, describing the literary influences of his schooling as having sedimented into a guiding 'programma software' that helped to structure *Se questo* (Appendix, p.321). For both Calvino and Levi, however, these views do not necessarily conceptualize the relationship of signifier to signified language in a reductive manner. For Calvino, the real imaginative act is not that of the writer but that of

²⁶ Directed by Massimo Scaglione, and aired on 27 January 1978, the programme also included adaptations of 'La bella addormentata nel frigo' and 'Procacciatori d'affari'. See *I*, p.1438. In *Dialogo*, (p.6), Levi describes how the Rai made a recording of his play spoken by a type of synthesizer.

the reader, as the work 'continuerà a nascere, a essere giudicata, a essere distrutta o continuamente rinnovata al contatto dell'occhio che legge' (*Saggi*, I, pp.215-16). For Levi too, the business of judging his prose is turned over to the reader: he responds to a frequent question as to whether he has pardoned his Nazi oppressors by remarking that the task of the witness in writing is 'quello di preparare il terreno al giudice. I giudici siete voi' (*I*, p.175). It is the reader who must decide on the import of his words.

As regards the 'processo combinatorio' of constructing phrases, Calvino's involvement in the Parisian Oulipo group in the 1960s (the *Ouvroir de littérature potentielle*) has already been mentioned. The group consisted of intellectuals who experimented with word games and linguistic constrictions which paradoxically enabled a supreme form of creativity. Levi never became integrated into such groups, remaining distant to the extent that he was described as never having even heard of the neo-avant-garde movements (Todisco). Nevertheless, he harboured similar linguistic predilections to those indulged by the Oulipiens, displaying a fascination for palindromes, and portmanteau words that 'si aprono in due metà simmetriche' (*II*, p.663).²⁷ Indeed, his work has been identified as displaying similar features to that of Perec, in particular.²⁸

Just as the 'programma *software*' that structured *Se questo* led not to a formulaic work but to a book that was 'pieno di letteratura' (Appendix, p.321), so the rules determining the construction of palindromes and portmanteau words produce elusive phrases and stimulating fusions. For Levi, language is fundamentally an organic phenomenon that must be allowed to grow and develop in order to adequately reflect and

²⁷ To read Levi on palindromes see 'Calore vorticoso' (*II*, pp.100-03); for a discussion of portmanteau words see 'L'aria congestionata' (*II*, pp.663-68).

²⁸ Suzanne Kiernan, 'Reflections on the Lipogram', *The Journal of the Sydney Society of Literature and Aesthetics*, 7 (1997), 43-53.

represent the ever-changing world. He critiques and ridicules rigidly prescribed significations in 'Le nostre belle specificazione' (*I*, pp.661-70), in which a pedantic, literally-minded bureaucrat strives to achieve absolute, inflexible semiosis, resulting finally in his perceived failure to qualify as a human being due to his inconsistencies with the received definition. Language is much more than a code of strict equivalences. This is why poets have nothing to fear from computerized writing apparatuses since a machine may be able to compose 'endecasillabi correttamente accentati e non privi di senso', but is unlikely to ever produce the 'associazioni profonde o sottili [...], richiami ad archetipi', and other features of poetry that render it 'maggiore della logica e del caso'.²⁹

Levi's understanding of language as radically constructed and mediated leads him not to shun technology, but to embrace it as enhancing our capabilities. Fearing a luddite streak in his own nature ('Poesia e computer', p.64), and initially doubtful of his word processor, he consciously strives to see the benefits provided by computers: they encourage easy and seamless editing and a lightness of composition that stand at the opposite end of the spectrum to the hammered incisions of words on tablets—a 'stile "lapidario"' he would rather avoid (*Dialogo*, pp.64-65).³⁰ He asserts that 'è folle oggi negare che anche la tecnica sia una forma di cultura', to the extent that both the works of Boccaccio and the transistor radio constitute equally valid objects of study.³¹ Accordingly, technologically inspired neologisms—usually anglicisms—are perfectly acceptable, but he does posit certain conditions which echo his views expressed elsewhere: use of the word

²⁹ 'Poesia e computer', anonymous interview with Levi, first published as 'Una domanda a Primo Levi', *Genius*, 4 (Jan. 1985); repr. in *Conversazioni*, pp.61-64 (p.63).

³⁰ See also di Caro (pp.196-97), where Levi discusses the difference between writing on a computer and on a typewriter.

³¹ Marco Vallora, 'Boccaccio e transistor per me pari sono', *Panorama*, 23 November 1981, p.175.

'kit' instead of 'scatola di montaggio' constitutes linguistic economy, and its efficiency is to be commended; however, importing a 'termine esotico' in order to elicit praise or to obscure meaning is 'da deplorarsi' (*I*, p.1223).

These comments are made in Levi's review of Vacca's *Parliamo itagliano*. Like Vacca, Levi is not a linguistic purist, and therefore has no strong opposition to adopting the 'itagliano' jargon, if it remains efficient. However, the surge of imported anglicisms must also be recognized as 'sintomo di un male grave':

la tecnologia di oggi nasce e cresce altrove, la scarsa creatività del nostro linguaggio segnala il basso livello creativo della nostra tecnologia. Segnala che, in questo campo, l'Italia viene 'acculturata' e non solo linguisticamente. (*I*, p.1224)

Here, Levi's underlying point is that Italy should not simply rely on importing technological developments from abroad, but needs to offer its own contribution in order to retain its international standing. Similarly, discussing the importance of keeping up with new technology, Levi demonstrates a vivid interest in computers.³² Not only is he researching the word processor through his reading,³³ but this has led him to the conclusion that 'oggi [1984] si può vivere senza computer, ma si vive ai margini, e si è destinati ad un distacco sempre maggiore dalla società attiva'. Lack of familiarity with the apparatuses employed by the rest of a particular society or cultural group renders one 'una persona incolta' (*Dialogo*, p.63). Although defining himself as a rather apprehensive 'neofita', Levi is happy to absorb the computer into his daily life, and to write on a screen rather than a piece of paper. Indeed, he immediately applies the same logic to computer technology as to

³² For a fuller discussion of Levi's approach to and relationship with his computer see Usher, 'The Author and the "Scribe"'. This article also contains an analysis of two stories in *Storie naturali*, 'Censura in Bitinia' and 'Il Versificatore' (*I*, pp.409-12, 413-33), which deal with 'the functions of computers as substitutes first for readers then for writers' (p.241).

³³ He cites Claudio Pozzoli's *Scrivere con il computer* (Milan: Bompiani, 1986), which, for him, 'ha fatto l'effetto della tromba che dà la sveglia in caserma' (*Dialogo*, p.63).

the teaching of chemistry, and life in general; he discards the indecipherable prose of the manual and learns through practice:

imparare a usare l'aggeggio studiando i manuali [...] sarebbe come imparare a nuotare leggendo un manuale, senza entrare in acqua [...] Bisogna imparare sul campo, sbagliando e correggendosi. (*Dialogo*, p.64)

In the next section I consider further the implicit presence of the body in this learning exercise.

2. Knowledge of Knowledge: 'Conoscere'

Despite his insistence on the 'dangers' of obscure modalities of expression, in which meaning is not immediately apparent to the reader, Levi undoubtedly nurtured great sympathy and sensitivity for the implied but unstated 'inconscio' of words and language, as well as for the often unacknowledged physical dimensions of communication. His is therefore a contradictory position that both warns against and embraces 'ineffabilità'—the unspoken 'ombra simbolica' of language. In this section I consider his attitude towards knowledge, which, I argue, is marked by a comparable contradiction. Despite his awareness of the relative character of knowledge as a slippery quantity that eschews all attempts at circumscription, and of the multitudinous possible interpretations of any text, at times he nevertheless argues for certain delimited 'truths' that can be ascertained through a particular experiment. Furthermore, despite speaking against reductive, often polarizing simplification, he returns insistently to the importance of extracting an ordered knowledge and understanding out of the chaos of life.

A key feature of Levi's epistemological approach is his desire to think and act 'knowingly'. Greer comments that Levi's writing displays a 'sensibilità raffinata, *disabused*, cioè non ingannata e non ingannabile'. She sees his approach as 'quasi scientifico' in that his concern is 'di non dare fiducia a niente'. Levi agrees, replying that his status as a 'disabused' thinker stems from his experience in the laboratory, where 'guai se uno si lascia ingannare. È sempre bene cercare di andare oltre delle apparenze' (Appendix, p.323). Yet, although arguing that 'lo scienziato-falsario non esiste, e non può esistere, perché la frode non paga' (II, p.952), Levi also acknowledges that 'anche nella ricerca scientifica è facile incontrare chi scambia ciò che è con ciò che desidera sia' (II, p.1237). He is himself sufficiently self-aware to wish to avoid this trap, admitting his areas of inexperience, even inviting refutation of information about which he feels uncertain: 'se qualcuno sa qualcosa di più, sarò lieto di disdirmi' (II, p.1237). In his view, the discovery of error is fundamental both to scientific endeavour and to life in general, leading to positive growth and maturity:

Sbagliare non era più un infortunio vagamente comico, che ti guasta un esame o ti abbassa il voto: sbagliare era quando si va su roccia, un misurarsi, un accorgersi, uno scalino in su, che ti rende più valente e più adatto. (I, p.801)

The hints of evolutionary development implied by the word 'adatto' are taken further elsewhere, as Levi emphasizes the importance of reason to our development as humans: 'l'uomo è diventato uomo [...] esercitando la ragione' (De Rienzo and Gagliano, p.116). Error too is characterized as essential to our status as humans. Such is the importance of experiencing and learning through our mistakes, Levi asserts, that 'chi fa un lavoro in cui non si sbaglia mai è fuori della condizione umana' (Grassano, 'Conversazione', p.169). He argues that 'il rimanere sconfitti' is 'un'esperienza dolorosa ma salutare, senza la quale non si diventa adulti e responsabili' (II, p.642). We learn more

from our mistakes than from our successes, he observes, praising the Popperian cycle of ‘formulare un’ipotesi esplicativa, crederci, affezionarsi, controllarla (oh, la tentazione di falsare i dati, di dar loro un piccolo colpo di pollice!) ed infine trovarla errata’ (*II*, p.642). Resisting the temptation to falsify information is vital, since this forces us to confront the errors of our hypothesizing, thereby extending the depth and acuity of our self-awareness and the limitations of our knowledge.

Not only does this cycle form the basis of chemical experiment, but it can also be identified ‘in infiniti altrui itinerari umani’ (*II*, p.642). This practice of tying together apparently disparate activities by discovering similarities in methodological approach occurs frequently in Levi’s work. He declares that chemistry is ‘una versione piú strenua, del mestiere di vivere’ (Boeri, p.20), and also sees analogies between the unpredictability that characterizes the meetings of both chemical compounds and individual:

È già difficile per il chimico anteverne, all’infuori dell’esperienza, l’interazione fra due molecole moderatamente semplici; del tutto impossibile predire cosa avverrà all’incontro di due molecole moderatamente complesse. Che predire sull’incontro di due esseri umani? O delle reazioni di un individuo davanti a una situazione nuova? Nulla: nulla di sicuro, nulla di probabile, nulla di onesto. (*I*, p.1093)

The marked sense of the unknown affects both laboratory experiments and human interaction. In order to know, understand or communicate to any degree, one must have direct experience which grants ‘l’autorità di chi insegna le cose perché le sa, e le sa per averle vissute’ (*II*, p.1423).

Levi’s broad interest in the multitudinous vicissitudes of human experience can be traced back to his experiences in the Lager. Speaking of his adjustment to conditions in the first few days he realizes that his interests are not only chemical but sociological: ‘ero uno scienziato, ero senza saperlo un sociologo. Non sapevo niente di sociologia, però m’interessava violentemente, proprio con violenza, capire il mondo intorno a me’

(Appendix, p.323). The weaving together of these forms of knowledge allows scientific approaches to epistemology to serve as a model for thought and writing, but also ultimately channels all knowledge, like language, back to the body.

Perhaps the clearest expression of the relationship between physical experience and knowledge occurs in *Il sistema periodico*. Describing himself as ‘sazio di libri’, Levi and his friend Enrico attempt to instruct ‘la parte meno educata dei nostri corpo’: their inexperienced hands (*I*, pp.758-59). In the same vein, when asked by Greer what he understands by the word ‘conoscere’, Levi concurs with a definition of himself as a ‘realista *naif*’, stating: ‘conosco con le mani, e col naso. Credo ai miei sensi’ (Appendix, p.327). Interestingly, however, in this interview he shies away from a broad view of knowledge with the disclaimer that ‘esiste la filosofia della scienza che lavora intorno a che cosa viene inteso per “conoscere”’. He subsequently insists that the acquisition of knowledge for him is not a case of reaching ‘le profonde radici del conoscere, ma solo di scendere da un livello a un altro, di capire qualcosa di più’. Levi continues:

Quando ho capito che cosa succede dentro una storta sono più contento. Ho conosciuto una cosa in più. Non ho conosciuto la realtà, la verità; ho solo ricostruito un piccolo segmento del mondo. E questo è già una grande vittoria dentro un laboratorio di una fabbrica. Fare in modo...riuscire a prevedere, ecco...per me chimico, ‘conoscere’ vuol dire prevedere una piccola area di avvenire. Se io so cosa capiterà fra un’ora dentro il recipiente di reazione, conosco. La mia conoscenza è questa, molto modesta. Non pretendo di conoscere l’universo. Mi piacerebbe ma non posso.³⁴

This position echoes that outlined by Regge in his *Dialogo* with Levi; if Gödel argues that any logical system is radically incomplete, then we can never push the boundaries of our knowledge sufficiently far to achieve a ‘teoria unificata finale’ (*Dialogo*, p.47). Aside from notions of knowledge as inevitably partial, however, here Levi scales down epistemology to empiricism, depicting knowledge as the ability to correctly predict a

³⁴ See Appendix (pp.327-29) for an account of the discrepancies between the various versions of this remark in recorded and published form.

determined action involving determined elements within a determined space. Moreover, rather than expressing an awareness of the limited, artificial nature of such knowledge, Levi declares that ‘fare per trent’anni il chimico insegna ad essere *naif*, di non porsi troppi problemi’ (Appendix, p.327). Thus he implies an unwillingness to challenge or question existing methodologies, despite the fact that much of his writing about his experiences as a chemist profiles him doing precisely this.³⁵ Characteristically, the extremely laboratory focused, delimited understanding of knowledge he presents to Greer is elsewhere refuted; in *La chiave a stella*, the Levi-narrator states³⁶:

Si fa presto a dire che dalle stesse cause devono venir fuori gli stessi effetti: questa è un’invenzione di tutti quelli che le cose non le fanno ma le fanno fare. Provi un po’ a parlarne con un contadino, o con un maestro di scuola, o con un medico, o peggio di tutto con un politico: se sono onesti e intelligenti, si metteranno a ridere. (*I*, p.1096)

It is surprising that having unmasked the fundamental changeability of the cause-effect relationship, and having reflected upon the impossibility of prediction itself (*I*, p.1093, cited above), Levi should then insist that the acquisition of knowledge occurs in a hermetically sealed ‘condotta’—the scientific equivalent of an intellectually blinkered, socio-historically dislocated ‘torre d’avorio’ which he criticizes (Grassano, ‘Conversazione’, pp.173-74). Admittedly, in order to demonstrate a hypothesis, scientific experiments must replicate the same set of conditions every time it is tested. However, this is not possible in the chaos and unpredictability of life, which means that knowledge gleaned in this way may not serve in our day to day existence. Notably, when speaking to Greer, Levi specifies that his responses are valid ‘per me *chimico*’ (emphasis added), thus

³⁵ For just two of many examples, see the chapter ‘Acciughe I’, in *La chiave a stella* (*I*, pp.1076-86), and ‘Stabile/instabile’ in *L’altrui mestiere* (*II*, pp.778-81).

³⁶ In the Greer interview he acknowledges directly that this narrator is himself: ‘Ci sono due narratori in questo libro. Ci sono io e Faussonne’ (Appendix, p.326).

evading issues of what 'conoscere' means to him as a thinking person with a broader view, endowed with a wealth of experience. Similarly, when Greer asks what Levi understands by the word 'spirito', he retreats behind the safety of the chemist's persona and avoids defining the word in its broader sense:

GG: Lei cosa intende per spirito?

PL: Non lo so.

GG: Nel senso chimico.

PL: Nel senso chimico le so rispondere. È la parte più volatile appunto. Nel senso normale della parola non so, io non so cosa vuol dire 'l'anima'. (Appendix, p.330)

The '*positive unconscious*' of this particular word is not a subject upon which Levi choses to reflect—or certainly not aloud.

Levi's understanding of 'conoscere' can, however, be deduced by searching elsewhere, especially through a consideration of the genres into which his work might be categorized, or, more appropriately, the genres which his work bridges. If Levi's work does to some extent display characteristics of a scientific report through its minute, ostensibly objective observation—reflecting the influences of Huxley's 'zoological' literary eye, and Levi's own 'occhio [...] del paleontologo futuro'³⁷—it is also, by his own admission, 'pieno di letteratura'. Vitally, this is the literature absorbed 'per via cutanea', that supplements an individual's life experience. In a related vein Levi comments:

nessuno nasce con un decalogo in corpo, e ciascuno si costruisce invece il proprio per strada o a cose fatte, sulla scorta delle esperienze proprie, o altrui assimilabili alle proprie; per cui l'universo morale di ognuno [...] viene a indentificarsi con la somma delle sue esperienze precedenti, e rappresenta quindi una forma compendiarica della sua biografia. (I, p.242)

As a parallel to the historically accumulated meanings of words, individual subjects are also constituted by their accumulated experience, whether acquired through literature,

³⁷ Cited from Calvino's review of *L'altrui mestiere* (Saggi, I, pp.1138-41).

professional activities or, more enigmatically, 'da altrove': through their activities and sensations as embodied subjects (Andreoli, p.124).

Levi's choice to present the majority of his thoughts in autobiographical form might be seen as an attempt to chart this self-constructed 'decalogo'. Apparently searching for a way to voice his sense of self—his 'io'—he wrote prose accounts of his life such as *Il sistema periodico*, and then supplemented these with an anthology of key passages excavated from the saprophytic communities of texts residing within his body; *La ricerca*. In so doing, he sought knowledge of himself and of the world around him in ways which challenge any notion of 'given' relationship dynamics. As Elspeth Probyn states:

The use of the autobiographical can be made to question implicitly the relation of self to experience, researcher to researched, and the production of knowledge itself.³⁸

Whether consciously or not, and despite his resistance to psychoanalytic investigation, his work does indeed question the relationship between the events of his life and his self, between the object of inquiry and the observing scientist: in short, he questions the meaning of 'conoscere' as a life practice.

It is here that the 'inconscio' of language as presented, or nebulously present in Levi's work, can be mapped onto the 'inconscio' of history, life and scientific experiment itself. Harding writes:

The insights of Freud and Marx have taught us that the accuracy of our autobiographies is limited by what we have inadvertently forgotten, by what is too painful to recall, and by what we cannot know about the forces operating in our natural/social surroundings that shaped our early experiences. It is useful to regard the same as true for concepts and institutions such as those of modern science. Histories and sociologies that are to be critical biographies of a culture—not just self-congratulatory autobiographies—*should* be a 'return of the repressed' [...] they should reveal to us the ambivalences and gaps in our conscious cultural memories, and their origins in socially repressed histories. (*The Science Question*, pp.201-02)

³⁸ Elspeth Probyn, 'True Voices and Real People', in *Relocating Cultural Studies*, ed. by Valda Blundell, John Shepherd and Ian Taylor (London and New York: Routledge, 1993), p.105.

Levi was profoundly aware of the difficulty of reconstructing a representative image of himself at a distance of several decades,³⁹ and conscious also of the ways in which 'History' often omits vital pieces of its fabric, or becomes the victim of revisionism.⁴⁰ He also brought this scepticism to scientific practice because it is a part of culture, and therefore must be treated as a cultural artifact. Although driven to sift the good from the bad, 'noi' from 'loro', 'amico' from 'nemico', we must, Levi exerts, maintain an awareness that while 'questo *desiderio* di semplificazione è giustificato, la semplificazione non sempre lo è' (*II*, pp.1017-18, emphasis in original). Beyond these oppositions or clarifications lie the repressed subjective investments that condition our interpretations.

Having embraced the necessary plurivocality of literary texts ('Un libro valido è di necessità [...] polivalente', De Rienzo and Gagliano, p.115), Levi also champions the multiplicity of interpretations. Speaking of the Talmud he emphasizes the range and variety of ways in which it may be read:

nel Talmud c'è tutto e il contrario di tutto. Dipende dal filtro che impieghi. Ne puoi estrarre le sentenze femministe come quelle antifemministe, le lodi dello studio e l'abominio dello studio. (*Dialogo*, pp.4-5)

According to this logic—as argued by opponents of empiricism such as Kuhn and Feyerabend—all interpretations, like all observations, are theory laden.⁴¹ Furthermore, because necessarily expressed through language, interpretations of data raise issues of signification and potential meanings. Beer posits that:

³⁹ In *Il sistema periodico* he writes: 'A distanza di trent'anni, mi riesce difficile ricostruire quale sorta di esemplare umano corrispondesse, nel novembre 1944, al mio nome, o meglio al mio numero 174 517' (*I*, p.860).

⁴⁰ Unsurprisingly, Levi spoke out vehemently against the historical revisionism that has attempted to deny the Holocaust. See 'Ma noi c'eravamo' (*I*, pp.1251-52); 'Cercatori di menzogne per negare l'olocausto' (*I*, pp.1332-33).

⁴¹ See Longino, 'Subjects, Power and Knowledge: Description and Prescription in Feminist Philosophies of Science', in Keller and Longino (eds), pp.264-79 (esp. p.271).

The terms of agreement between writer and implied reader can for the time being select and exclude significations [...]. However [...] such an agreement is neither permanent nor inclusive: signification may be controlled and focused within a like-minded group [...] but the excluded or left-over meanings of words remain potential. (*Open Fields*, p.156)

As such, these 'extra' meanings can be identified by non-specialists, or individuals of a different time period who bring an alternative 'filtro' to their reading and produce a different interpretation.

In an attempt to make sense of Levi's contradictory position—advocating both empirical experiment and socio-cultural excavation, seeking clarity despite an awareness of how compromised this clarity inevitably is—I turn once more to Mendeleev's table of the elements. In a round table discussion of Levi's work, the chemist Jean-Marie Lehn (Nobel Prize, 1987) explains how the almost unthinkable properties of this system indicate that the entire universe is made up of these elements and that the table is complete: 'there are no other elements. All the boxes are full, there are no more gaps'.⁴² Levi too expresses his delight at the idea of having resolved the mystery of the universe, enthusing at:

la grande scoperta, quella che ti toglie il fiato; [l]'emozione (anche estetica, anche poetica) che Mendeleev deve aver provato quando intuì che ordinando gli elementi allora noti in quel certo modo, il caos dava luogo all'ordine, l'indistinto al comprensibile: diventava possibile (e Mendeleev lo fece) individuare caselle vuote che avrebbero dovute essere riempite, dato che 'tutto ciò che può esistere esiste'; cioè fare opera profetica, antivedere l'esistenza di elementi sconosciuti. (*Dialogo*, pp.9-10)

Although seeming to refute Gödel's incompleteness theorem in particular,⁴³ and developments in late twentieth-century thought in general, this vision of a comprehensive schema of the universe is itself subject to further growth, deconstructing positivist notions of a final, teleological goal.

⁴² Geerts and Samuel (eds), p.298; my translation.

⁴³ Gödel's incompleteness theorem posits that 'in any sufficiently powerful, logically consistent formulation of logic or mathematics there must be true formulas which are neither provable nor disprovable. The theorem entails the corollary that the consistency of a logical system cannot be proved with that system' (OED). For an extended discussion of the theorem see Douglas Hofstadter, *Gödel, Escher, Bach: An Eternal Golden Braid* (New York: Basic Books, 1979).

As Lehn reports (Geerts and Samuel (eds), pp.298-99), human activity has resulted in the creation of supplementary artificial elements—comparable to the prosthetic additions we make to our bodies (explored in Chapter 5). Furthermore, it is predicted that in future years we may reach a plane of stability beyond the Periodic Table as we know it, whereupon spaces for new ‘caselle’ to be filled might be revealed. The rules of chemistry, Lehn continues, encourage and enable the building of new molecules with known molecules: basic bricks that may be amassed into a new and unknown quantity that transcends that nature of its original materials. If we accept this position, knowledge too can be seen as filling out a provisionally complete table of ideas, whose ‘inconscio’ or as yet unexplored dimensions hover all around. When exposed to a new readership with new tools and diverse subjective configurations, data becomes altered and begins to proliferate additional meanings. Similarly, Levi’s desire to simplify where possible, to perceive and understand in depth a ‘piccolo segmento del mondo’ can be seen as an attempt to grasp the essence of these basic chemical bricks of which the entire world is formed, in order to progress beyond them slowly and ‘knowingly’.

In this way, the contradiction in Levi’s thought is diffused, and the multitudinous tangled skeins of thought, knowledge and language are woven together, allowing their combined ‘inconscio’ to resonate perceptibly. This intertwining of different aspects of human reflection and expression is echoed in turn by the unifying properties of embodied learning and experience, as the senses are made to function together with the intellect: ‘le nostre mani, i nostri occhi, il nostro naso’ are ‘educated’ to provide supplementary sources of knowledge, filling the gaps and making us whole: ‘In questo il mestiere di chimico ti

integra nella funzione di persona completa, che non trascura nessuna delle sue facoltà possibili' (*Dialogo*, p.62).

This sense of integrated knowledge, in its fullest materialist sense, is under threat in an age where our bodies are ever more extended by technological prostheses, and we ask few questions about internal mechanisms, whether of computerized accessories or the basic physical functions of our organs. Learning how to use his word processor Levi comments that the vital step is to simply ignore the unseen processes:

bisogna reprimere il desiderio umanistico di capire 'quello che c'è dentro': forse che non usiamo il telefono da quasi un secolo, e la Tv da 30 anni, senza sapere come funzionano? E sappiamo forse come funzionano i nostri reni e il nostro fegato, che usiamo da sempre? (*Dialogo*, p.64)

Although here the desire to ignore the basic functions of modern equipment seems liberatory, elsewhere Levi openly laments the social alienation and dualistic thinking that cordons off our own bodies as mysterious and faulty apparatuses, notably in the story 'Self Control' where a bus driver is more familiar with the components of the vehicle he drives than with his own body.⁴⁴

Levi also explores western humans' inability to cope without their myriad prosthetic devices, since the advent of technology means that our reliant hands and senses are largely untrained and useless if not augmented. In 'Gli stregoni' (*II*, pp.151-61), two western ethnographers stranded with the Siriono tribe in Eastern Bolivia, realize the potentially fatal limitation of their skills when stripped of their cameras and matches. Aware that their hands are uneducated and inept at constructing or devising even the simplest of instruments, they are also forced to admit that the Siriono have no need of a

⁴⁴ *II*, pp.109-113. This story is explored in more depth in Chapter 5.

compass, for example, since they navigate by the sun. Cornered by their inadequacy in the face of unmediated nature, one of the ethnographers admits their evident inability to ‘dimostrare, in concreto’ the widely proclaimed advantages of western civilization (*II*, p.157).

The importance of learning *skills* in addition to—or even in place of—*facts*, is of vital importance to Levi. In ‘Il segno del chimico’ (*II*, pp.810-14), he highlights a further value of a training in chemistry; it produces ‘la sensazione di “aver imparato a fare una cosa”’; il che, la vita lo insegna, è diverso dall’aver “imparato una cosa”’ (*II*, p.814). This distinction is also emphasized in relation to Levi’s experiences in the Lager. In *I sommersi e i salvati*, reflecting on the difficulties of being ‘L’intellettuale ad Auschwitz’ (*II*, pp.1091-1108), he describes the humiliation and loss of dignity suffered by ‘l’uomo colto’ who was unversed in the strength and skills required for manual labour (*II*, p.1095). Levi defines ‘la persona colta’ as someone with knowledge and competences that range beyond his or her everyday occupation; a person:

la cui cultura è viva, in quanto si sforza di rinnovarsi, accrescersi ed aggiornarsi; e che non prova indifferenza o fastidio davanti ad alcun ramo del sapere, anche se, evidentemente, non li può coltivare tutti. (*II*, p.1095)

These competences clearly include manual dexterity and a general sensitivity to the physical world—indeed, to our own physicality—in order that we might break down the dualisms of Cartesian thought and develop an integrated knowledge.

Although in the initial paragraph of *Se questo* Levi describes how, after four years of oppression under the racial laws (1938), his only desire was to live ‘in un mio mondo scarsamente reale, popolato da fantasmi cartesiani’ (*I*, p.7), this feeling undoubtedly developed into a profound need for fully embodied subjectivity. It may be true that as part of the Turinese intelligentsia Levi was ‘trained to determine his worth as a man by his

ability to think', but it becomes clear upon reading his work that 'the ability to think and talk is tied to the awareness of being, and of being human'.⁴⁵ Both his experiences in the Lager and his activities as a chemist encouraged him to develop the view that one determines one's worth by a measuring body alongside mind.

3. Levi as Public Intellectual

Building on the discussion so far, which has considered the efficacy of various languages as vehicles for communication, and the production and acquisition of knowledge, this final section examines the role of the public intellectual as disseminator of information, and spur to cultural consciousness. The public intellectual is often considered—in Edward Said's words—as 'someone who ought to be listened to as a guide to the confusing present, and also as a leader of a faction, tendency, or group vying for more power and influence'.⁴⁶ As Said acknowledges (p.20), the Gramscian roots of this position are clearly identifiable.⁴⁷ Elsewhere, the public intellectual is defined as a figure driven by a need to communicate information and opinion about contentious world issues in clear, accessible language; a figure who commandeers the mouthpiece of the media to express unconventional views and often dissent, vital for the health of cultural consciousness (Altman). The public intellectual may well be assumed to wield a certain authority but may also succeed in transcending the strict categories of his or her immediate field of activity or specialization.

⁴⁵ Valerio Ferme, 'Translating the Babel of Horror: Primo Levi's Catharsis through Language in the Holocaust Memoir *Se questo è un uomo*', *Italica* 78 (Spring 2001): 53-73 (p.54).

⁴⁶ Edward W. Said, 'The Public Role of Writers and Intellectuals', in Helen Small, (ed.), *The Public Intellectual* (Oxford: Blackwell, 2002), pp.19-39 (p.20).

⁴⁷ See *Gli intellettuali e l'organizzazione della cultura*.

Such qualifiers hold an obvious significance for Levi, whose drive to recount his experiential trajectory, love of clarity, desire to (re)unite fields of intellectual inquiry and authority as a witness led him to conduct a great many interviews. As a supplement to my explorations of Levi's views on the links between science and social life, and in light of his self-identification as a 'sociologo' (Appendix, p.323), I now draw upon notions of language, communication, epistemological and social responsibility discussed hitherto. My aim is to determine how Levi understood the role of the public intellectual—with regard to himself and to others—and the role of such a figure in interpreting contemporary culture.

Levi's ideal reader is described minutely:

Non è un dotto ma neppure uno sprovveduto; legge non per obbligo, né per passatempo né per fare bella figura in società, ma perché è curioso di molte cose, vuole scegliere fra esse, e non vuole delegare questa scelta a nessuno. (*II*, p.678)

If this reader is unable to understand Levi's carefully accessible prose, she or he is unfairly humiliated and Levi is in breach of authorial contract. As Levi explains, this is because he writes not for himself, nor for the critics, or other powerful figures, but precisely for this 'lettore "perfetto"'. Here he emphasizes a sense of writerly responsibility, and readerly intellectual curiosity, or social conscience, as the reader refuses to let his or her stimulation and education be determined by any other individual or body. In other writings, however, this idealized image is brought down to the level of an often disappointing reality: 'un libro si legge, può divertire o no, può istruire o no, può o no essere ricordato e riletto'. As Levi admits, the reader is free to make this choice, but declares, 'come scrittore della deportazione, questo a me non basta'. His mission is to reach out not only to those who are aware of terrible events such as the Holocaust, but to the individual who has no knowledge of them, 'affinché sappia "fin dove si può arrivare"' (*II*, p.1351).

To achieve his goal of pricking the cultural conscience in a substantial manner, Levi must achieve two main objectives: first to impress upon society at large a sense of citizenship and responsibility to others, since ‘ognuno di noi è [...] un testimone, che lo voglia o no’ (*II*, p.1351). This fundamentally democratic position enables him to sidestep many contentious issues of how one might obtain or be ascribed the authority or qualifications of a public intellectual.⁴⁸ Levi’s status as ‘testimone’ clearly grants his words a weight of experience, which then allows him to expand upon his views in other areas of concern and interest. However, he retains a sharp sense of the potential illegitimacy of these ‘invasioni di campo’, as I argue below.

In exhorting augmented social responsibility, his broad ranging comments are addressed primarily to ‘coloro che sono più vicini al potere: i politici, i militari, gli scienziati, i grandi tecnici’—those who have the ability to ‘[dare] il via all’apocalisse’. Here, Levi urges those who can to act ethically, since, while the threat of nuclear war and massive human injustice loom ominously, ‘progress’ and ‘history’ are not pre-ordained teleological maps, but are phenomena open to change: ‘il fatto che il futuro è *anche* nelle nostre mani, è plastico e non rigido, non deve essere mai dimenticato’ (*II*, p.855; emphasis in original). His remarks echo the beliefs of Lewis Mumford, widely considered a public intellectual in the same vein as Levi. Mumford’s *Technics and Civilization*⁴⁹ concludes that ‘we must reject a passivity that allows technology to determine the course of history’, in an attempt to wrestle back power from its location in the faceless, unaccountable ‘megamachines’ of modern society.⁵⁰

⁴⁸ See Helen Small, ‘Introduction’, in Small (ed.), for a helpful account of some of these tensions (pp.1-18).

⁴⁹ Lewis Mumford, *Technics and Civilization* (New York and London: Harcourt Brace Jovanovich, 1963).

⁵⁰ *Lewis Mumford: Public Intellectual*, ed. by Thomas P. Hughes and Agatha C. Hughes (New York and Oxford: Oxford University Press, 1990), p.5.

Mumford was described as a 'technical intellectual', a person with a knowledge of technology complemented by great esteem for human experience. Just as Levi's experience of scientific activity and belief that salvation lies within technology, rather than in its total suppression, Mumford has been hailed as:

the rare intellectual who recognizes the destructive as well as constructive nature of technology and who tries to foster the spirit and the intellect, to cultivate community, and to nourish the personality. (Hughes and Hughes (eds), p.3)

This leads us to Levi's second objective as a consciousness raiser; to target individuals who do not usually read, or only read comics, and to 'riuscire a penetrare e a catturare, a conquistare anche questi lettori'. It is with this goal in mind that he wrote *La chiave a stella*—a project whose success is measured in one interview by his satisfaction at the fact that forty-six employees at a Turinese factory have passed the book around between them. He claims proudly, yet realistically, that he may not have saved souls but 'ho introdotto nel mondo del libro scritto gente che non c'era mai entrata' (Grassano, 'Conversazione', p.173).

In keeping with his views on the necessity for clarity in expression discussed above, Levi demands clarity and responsibility from all those who disseminate public messages; hence his criticisms of his Italian teacher who proclaimed '*pubblicamente* che le materie letterarie hanno valore formativo, e quelle scientifiche solo valore informativo' (*Dialogo*, p.14, emphasis added). Hence also his praise of Professor Ponzio, who taught him chemistry at university, who articulated 'notizie chiare, precise, controllabili, senza parole inutili' (*Dialogo*, p.19). Ever wary and mistrustful of the inevitable 'verità confezionata' (*II*, p.856), Levi criticizes journalists who sensationalize stories rather than clarifying for the public the real issues at stake: 'cronisti e giornalisti non dovrebbero né

minimizzare né terrificare'. This comment occurs in a column Levi published in *La Stampa* (5 April, 1986), motivated by a public scare regarding the presence of potentially lethal methanol in wine (*II*, pp.1294-96). It is a compelling piece for the different facets of Levi's public persona it brings together.

First, he draws on his experience as a survivor of Auschwitz, recounting how methanol was produced in the factory where he worked as a prisoner, and despite warnings was stolen and drunk by ill-fated Russians. He also obviously draws on his knowledge as a chemist to explain the properties of methanol and the difficulty of distinguishing it from ethanol. Thirdly, he writes in the hope of achieving social change. Arguing that in addition to expensive and cumbersome laboratory testing equipment there must be simple methods of detecting this dangerous relative of ethanol and protecting the wine we drink, he then suggests practical ways to perform this task. Why not invent some 'strumento analitico semplificato, tascabile' that could be used by teams of 'chimici a piedi scalzi'? Levi's hope here is that technology might be put to use in practical, economic and socially responsible ways. His implicit exhortation is that this technology be developed and that knowledge of it be made democratically available to the people.

There is a poignant, earnest quality to Levi's prose in this piece. Although the issue in hand is relatively minor and controlled, he nevertheless approaches it with the same principles as he brings to bear on larger threats, such as that of nuclear war. Just as some journalists reporting the methanol story added to rather than allaying public confusion, so many others disseminate confusion by pretending to have understood certain issues when they are not at all clear, or by simply placing inverted commas around terms whose meaning remains obscure (*II*, p.1250). Levi sets this journalistic attitude in its socio-

political context, reminding his readers of the fascist era when it was prohibited to report suicides, leaving reporters struggling with ludicrous and offensive tales of accidental deaths (*II*, p.1301). Now that journalistic freedoms are vastly improved, he hopes that the reporter 'non dimentichi mai il potere che ha nelle mani' (*II*, p.1250). Indeed, the power of the written word is so strong, he remarks, that, 'Avere la biro in mano, avere la macchina da scrivere in mano è come avere un mitra' (Appendix, p.325). Words can be used as 'weapons' to increase consciousness, rather than to maim.

Levi is critical both of censorship (Gorbachev's silencing of the 1986 Chernobyl disaster which led to widescale contamination), and of falsely induced complacency (many western papers implicitly claimed that 'disastri simili *da noi* non potessero succedere'; *II*, p.1302). His ideal is a transparent, self-aware circulation of information between governments, peoples, scientists and technicians. Every event is a potential learning experience, and information must be shared, as the impact of many scientific and technological practices may be extremely wide-ranging. As far as issues of his own journalistic and essay style are concerned, Levi may draw on his past experiences and scientific expertise that command authority, but he posits himself ostensibly as a modest observer. For example, he begins one piece on the threat of nuclear war thus:

È lecito ad un incompetente, inerme, ingenuo, ma non del tutto inesperto dei mali del mondo, dire qualche parola a titolo personale sulla questione dei questioni, quella della minaccia nucleare? (*II*, p.782)

Elsewhere he recognizes the difficulty of reporting news events in the current climate, and praises the 'cronista ignoto' whose indefatigable and often invisible labour has contributed substantially to improving public awareness of social issues. However, he also takes this opportunity to slip in some advice on the most responsible way to report news items:

‘Eppure, mi sia concesso fargli qui, a titolo personale, qualche raccomandazione [...]’ (II, pp.1249-50).

Whilst setting high standards for public education and information, Levi does not assume omnipotent wisdom on the issues discussed, depicting himself instead as one individual on the same side as his readers: with regard to the intricacies of technological advance, he speaks ‘da profano’, since ‘ora, profani siamo tutti’ (II, p.1302). However, he was regarded in quite a different light by the newspaper editors who published his work: Arrigo Levi, editor of *La Stampa* in the 1970s, published a large number of Levi’s pieces from 1975 on, a few of which were commissioned but the vast majority of which were submitted independently. All the pieces submitted were accepted, even poems, which the paper rarely publishes. As Lorenzo Mondo, a journalist at *La Stampa* and friend of Levi’s recalls, ‘we always took it. This was Primo Levi’. Several editors were also keen to commission articles on specific subjects but without much success; for example, Piero Bianucci, who worked at the *Tuttoscienze* section of *La Stampa*, often made requests for particular pieces which Levi refused to provide (Angier, p.595).

As a ‘parlatore e testimone’, Levi’s activities can be divided into two main strands: first, his attempts to convince people, especially school students, to *believe* in the history of the Holocaust;⁵¹ second, his efforts to convince and enable the general public to *disbelieve* in the ‘verità confezionata’ that results from hyperbolic idealization of certain influential figures whose word becomes law (II, p.856). Similarly, he himself assumed a dual position, warning that the ‘pochi non-profani sono parte in causa, e quindi non sempre

⁵¹ See the Appendix to *Se questo*, written in 1976 for the scholastic edition of the text (I, pp.171-201), in which Levi provides written answers to some of the questions most frequently posed by school pupils during his visits, and via letter.

immuni da partiti presi' (II, p.1302), but simultaneously mythicizing the unfathomable expertise of figures such as the revered, enigmatic astrophysicists to whom he refers (II, p.1524).

Here again we return to the contradictory nature of Levi's thought: we must both take the past seriously and probe it for hidden agendas; we must be wary of experts, but also admire them. Levi's thought is motivated by two halves: the 'metà razionale' and the 'irrazionale', driven by 'stimoli imprevedibili';⁵² the 'groviglio di dati positivi e negativi'.⁵³ On the one hand, Levi acclaims Mendeleev's discovery of the order pertaining to the periodic table as 'come quando si accende una lampada: prima era buio e poi luce' (Poli and Calcagno (eds), p.71). Although compelling, this view has already been widely proposed and deconstructed in relation to Newton and Leibnitz's discovery of infinitesimal calculus, satirized by Alexander Pope: 'Nature and Nature's Laws lay hid in Night; / God said, *Let Newton be!* and All was *Light*'.⁵⁴ On the other hand, Levi reminds us constantly that:

Il nostro futuro non è scritto, non è certo. Ci siamo svegliati da un lungo sonno, ed abbiamo visto che la condizione umana è incompatibile con la certezza. (II, p.856)

This chapter has argued that Levi's conceptions of language, knowledge, communication, the universe and the human condition itself are linked by a structural commonality—the presence of a central aporia or contradiction. He states definitively that 'dopo novant'anni di psicoanalisi, e di tentativi riusciti o falliti di travasare direttamente

⁵² Giulio Nascimbeni, 'Levi: l'ora incerta della poesia', *Corriere della sera*, 28 October 1984; repr. in *Conversazioni*, pp.136-41 (p.139).

⁵³ Virgilio Lo Presti, 'Tornare, mangiare, raccontare', *Lotta Continua*, 18 June 1979; repr. in *Conversazioni*, pp.48-57 (p.56).

⁵⁴ Pope's Epitaph 'Intended for Sir Isaac Newton in Westminster Abbey', in *The Penguin Book of English Verse* ed. John Hayward (Harmondsworth: Penguin, 1978), p.206. Rita Levi Montalcini cites the Italian translation of this couplet in a discussion of the Enlightenment and the Two Cultures (*Senz'olio*, p.130).

l'insconsio sulla pagina, io provo un bisogno acuto di chiarezza e razionalità' (*II*, p.847). However, he is nevertheless drawn to this 'inconscio', to the 'groviglio' that underlies or obfuscates any apparent answer, that impedes any attempt to determine the 'perché' of the world. If we are to live as responsible beings, we must employ constant vigilance in order to detect and diffuse potential threats: 'per la ragione non c'è congedo, non può andare in vacanza' (De Rienzo and Gagliano, p.116).

Even if we are to take his eulogistic view of the periodic table as a signifier of universal harmony, the threat of a 'ritorno alla barbarie' remains (Lo Presti, p.54). Therefore, despite his demands for clarity, insistence on universal order and impatience with scrambled messages, ultimately he admits—although rarely—that the clear and the chaotic must coexist. Asked his opinion on the 'sistema "umanità"', Levi first points out the dialectic of positive and negative features that abound therein, and then himself poses questions as to whether this 'system' should be judged on the extent of an individual's suffering, or his or her lived experience. His answer is that we should choose 'tutti e due' as indicative aspects of a human being (Lo Presti, p.56).

Fundamentally, then, he is asking us to live a 'knowing' life; to attempt to achieve clarity as far as possible, but to retain an awareness of the contradictions and obstacles of existence. There is no 'perché', there are no sure answers or prophets to lead us to certain glory. Instead:

Il domani dobbiamo costruircelo noi, alla cieca, a tentoni; costruirlo dalle radici, senza cedere alla tentazione di ricomporre i cocci degli idoli frantumati, e senza costruircene di nuovi (*II*, p.856)

Chapter 5: Machine Bodies, Hylozoism and Anthropomorphism

La macchina [...] ha dato anche la stura a tutto un frasario di tipo animistico; il quale vorrebbe ritenerla partecipe del nostro sentire e opinare e fare e discernere. L'operaio stesso parla talora della macchina come di una creatura pensante, la loda e la disprezza secondo il merito, la odia o la ama, come una bestia velenosa od utile. In realtà la macchina non è che l'attuazione di un nostro procedimento mentale, esteriorizzato ed automatizzato in una prassi.¹

Building on the discussion of technology, language and society in the previous chapter, both this chapter and the next explore in more detail Levi's presentation of the relationship between humans and technology, bodies and machines, in an attempt to shed more light on the dynamic he portrays. In the essay 'Una bottiglia di sole' (II, pp.959-61), Levi defines the human as a 'costruttore di recipienti', whose key characteristics are the capacity to think of the future and the ability to predict the behaviour of material placed inside the containers they construct. This chapter considers Levi's definition and portrayal of the human being—in this essay and elsewhere—as it resonates with his representations of machines.

Gadda's assertion (above) that we treat machines as though they were human when they are actually no more than artificial reifications of our thought processes, can be fruitfully compared to Levi's frequent anthropomorphization of 'materia', and the similarities he identifies between human and machinic bodies. According to Gadda's reasoning, detecting vitality in machines does not confirm some innate living quality in the device. Rather, it is symptomatic of animistic projection onto an apparatus modelled on our mental processes. Machines can be seen as a type of container invested with a

¹ 'L'uomo e la macchina', in Carlo Emilio Gadda, *Le meraviglie d'Italia* (Turin: Einaudi, 1964; 1st edn 1940), pp.167-68.

growing autonomy, created by human ‘costruttori’ working towards a brighter future. However, as much critical and fictional work on artificial intelligence has demonstrated, our ability to retain control over these mechanized containers is the subject of great anxiety.²

Levi often depicts the human body itself as a form of container; an understanding of delimited embodiment that resonates with earlier discussions of epistemological territories. Through these depictions, Levi opens up transversal links between the functions and ontology of our bodies and those of mechanical systems, including scientific apparatuses. Curiously, his work seems to acknowledge that similarities between humans and machines are limited to the presence of analogous features—as Gadda would have it—whilst simultaneously asserting the validity of an engagement informed by animism that endows the machine with autonomous vitality. Thus Levi’s engagement with machines functions on two levels: on the one hand he projects human behavioural patterns onto machines whilst on the other, he identifies profound similarities and kinships between human and mechanical entities. Levi uses fiction as a space in which to explore concerns about human domination by intelligent machines but also to assert the common characteristics of humans and other life forms. In so doing he raises questions of responsibility related to technological development; after all, if Gadda is right, then the technology we often fear is no more than a model of ourselves, and it is to ourselves we should look when attributing agency. Moreover, if technology is so closely modelled on the human form, it constitutes a narcissistic reification of human self-conception that

² Perhaps the best known science fiction dramatization of this concern is Stanley Kubrick’s *2001: A Space Odyssey* (1968), loosely based on Arthur C. Clarke’s ‘The Sentinel’, in *The Sentinel* (London: Harper Collins, 1991; 1st edn 1948.), pp.147-62.

reveals a great deal about experiences of embodiment, for example. As Bettina Knapp asserts, ‘because machines are the outgrowth of human imagination, inventiveness and skill, exploring the place of these automatic or semiautomatic entities in society is also to learn more about human nature’.³

To tackle these issues, I begin by discussing Levi’s view of the body as a container. This analysis is informed by and leads into a more sustained engagement with the relationship between human bodies and technological ‘prostheses’, and the projection/detection of anthropomorphic features onto/in machine technology. I provide a brief account of relevant theoretical approaches to embodiment and sentience, leading onto a text-based consideration of the ways in which hylozoism and anthropomorphism function in Levi’s writing. Throughout, the chapter seeks to discover the most fruitful analytic frameworks we might employ when interpreting the greater significance of this facet of Levi’s writing. Levi’s reading has been characterized (by himself as well as others) as ‘disorderly, episodic though extensive’, leading to a ‘cumulative’ understanding of different themes.⁴ It is with an awareness both of this mode of reading and of Levi’s desire that his works be seen to connect with and speak to one another, that I examine an array of his writings in this and the following chapter. Although my selection may at times appear arbitrary, I hope to show the establishment and cumulative development of certain themes through his writing career.

³ Bettina Knapp, *Machine, Metaphor, and the Writer: A Jungian View* (University Park: The Pennsylvania State University Press, 1989), p.2.

⁴ Usher, ‘Levi’s Science Fiction’, p.199. See Levi’s own description of his reading practices, *II*, p.1362.

1. Contained Bodies

Abito a casa mia come abito all'interno della mia pelle. (*II* p.636)⁵

The above statement occurs in 'La mia casa' (*II*, pp.633-36), Levi's account of his rather particular relationship to his home in Turin.⁶ This is a light-hearted discussion of how he has rather passively remained throughout his life within a fairly unremarkable apartment that he has made little attempt to personalize. Effectively, this account describes Levi's habituation to his surroundings, so that the thought of moving to even another area of Turin seems as 'innaturale' as exchanging his skin for that of another. Like a miniature ecosystem, this short piece contains the germs of the key themes considered in this chapter as they spread and mutate across Levi's work. First, Levi's sedentary relationship to his house is linked through metaphor to biological organisms—molluscs in their shells. The house then becomes a 'macchina per abitare', a functionally minimalist apparatus, pared down to the basic necessities for living. Next it is personified as an old friend. This is followed by an explanation of how our domestic spaces can function as mnemonic aids if we invest each corner with a different projected fact; however Levi's house is already deeply invested, a historical palimpsest in which he can still detect the ghostly traces of his

⁵ A comparable declaration is made by Elena in 'Protezione' (*I*, pp.573-77): speaking of how she feels inside the protective suit she is forced to wear against meteorite rain, she says 'ci sto proprio bene come si sta bene a casa' (p.576). See discussion in Chapter 6, below.

⁶ In "'How Much Home Does a Person Need?' Primo Levi and the Ethics of Home', Robert Gordon begins his account of Levi's unusually longstanding relationship with his family home in Corso Re Umberto by citing Philip Roth's observations on meeting Levi: 'he has lived in the same apartment all his life [...] I don't personally know of another contemporary writer who has voluntarily remained over so many decades, intimately entangled and in such direct, unbroken contact with his immediate family, his birthplace, his region, the world of his forbears, and, particularly, with his local working environment'; *Annali d'Italianistica*, 19 (2001), 215-33 (p.215). See also Roth, 'A Man Saved by his Skills', *The New York Times Book Review*, 12 October 1986.

past. Finally, the house becomes his own skin. In only a very few pages, a stone structure is presented as a biomorph and a machine; characterized as a friend and used as an external model for the structure of human memory; identified as the unflinching backdrop for a gamut of historical events (of which it bears the scars like a ‘veterano’) and fused with Levi himself. As a result, the house becomes animated by its perceived metamorphoses, and, like the machines Knapp describes above, reveals a great deal about human life because it is so saturated with human life.

With regard to Levi’s portrayal of the human body as a container, his statement cited above—‘*Abito a casa mia come abito all’interno della mia pelle*’—seems to claim that consciousness dwells inside the skin as the individual resides in a stone building: two comparable examples of containers and containment. This implies a correspondence between, on the one hand, the organizing structures that influence the relationship between the body and consciousness, and on the other, those underpinning contemporary western social and domestic arrangements; a linking of our internal bodily microcosm with the external socio-cultural macrocosm. I begin with some general remarks about how the image of the container has been linked to the human body, which then inform a discussion of Levi’s depictions of embodiment.

In her biography, Angier implies that Levi’s definition of humans as the makers of containers applies only to him.⁷ Although she is right to point out that the character of Levi’s particular sustained interest in containers is specific to him, the definition of the human being as a container has also been explored by several other writers and theorists.

⁷ ‘The question of containers defines not Man but this man: Primo Levi’, Angier, p.684.

For example, George Lakoff and Mark Johnson emphasize the wide variety of phenomena that we categorize according to a container model.⁸ They say: ‘even when there is no natural physical limit which could help to define a container, we impose limits, dividing a territory in such a way that it has an internal part and an external surface’ (p.29).

Ultimately, this desire can be traced back to our engagements with our bodies:

Each of us is a container with a surface which sets its limits in an inside-outside direction. We project our inside-outside direction on to all other physical objects which are bounded by surfaces, and we conceive them as containers with an inside and an outside. (Lakoff and Johnson, p.29)

This applies to houses, rooms, solid objects, fields of knowledge; the list is as potentially endless as the list of containers Levi cites in ‘Una bottiglia di sole’.⁹

By depicting his house as an external bodily shell, Levi makes connections between the way in which he conceives of his embodied experience and the physical architecture of his living environment: an approach that is entirely consistent with the patterns detected by Lakoff and Johnson. Elsewhere he talks about humans as “‘campioni”, esemplari in busta chiusa, da riconoscere, analizzare e pesare’ (II, p.1102).¹⁰ In so doing he forges links between the ‘materia’ he analyses and the people he encounters; an ontological bridge that is explored later on in this chapter. Levi even applies the concept of a person as a ‘busta chiusa’ to himself, when describing the process of compiling texts that had somehow shaped his thought for his personal anthology *La ricerca*. The texts he cites from seem to have been absorbed into his very bowels, and to release them Levi is forced to rend his container walls in a process that is both pleasurable and painful:

⁸ George Lakoff, and Mark Johnson, *Metaphors We Live By* (Chicago and London: University of Chicago Press, 1980).

⁹ See my discussion in the Introduction, above.

¹⁰ This phrase echoes his description of chemistry almost exactly: ‘La chimica è l’arte di separare, pesare e distinguere’ (II, p.642). See also Gordon, *Ordinary Virtues*, p.127, where Levi’s phrase is cited in the context of a discussion about ‘the measure of man’.

A metà cammino mi sono sentito nudo, e in possesso delle opposte impressioni dell'esibizionista, che nudo ci sta bene, e del paziente sul lettino in attesa che il chirurgo gli apra la pancia; anzi, in atto di aprirmela io stesso. (*II*, p.1362)

As regards other methods of 'opening up', Levi openly admitted his hostility to psychoanalysis as a methodology for understanding the self, but was not able to dismiss it altogether: he reluctantly concedes 'per quanto amo negarlo, uno straccio di *Es* ce l'ho anch'io' (*II*, p.1363).¹¹ On several occasions he even discusses the unconscious in the same architectural terms as he describes his relationship to his body, jokingly referring to it as 'l'inquilino del piano di sotto' that will make its presence felt whether specifically evoked or not (*II*, pp.847, 1305). Furthermore, in an interview about *La ricerca*, Levi states baldly 'Sono incapace di fare dell'analisi', but then divulges that his work is a nocturnal activity, 'spesso affidato all'inconscio'. His revelation that he wanted to call the anthology 'Un modo diverso di dire io', might even lead readers to view it as a literary realization of his ego.¹² Thus, despite ostensibly disavowing the validity of psychoanalysis as a heuristic tool for reading the self, on several occasions Levi specifically invites a psychoanalytic reading of his work. Accordingly, reference to relevant psychoanalytic theories will be made throughout the remainder of the chapter as evoked by Levi's own metaphorical expression of his experiences.

With the exception of the statement regarding his house, Levi's comments cited above relate to the ways in which containers can be—and need to be—opened up to reveal their contents. Angier implies that it was Levi's inability to 'open up' his emotions or his

¹¹ Levi criticized the use of psychoanalysis as a key to understanding the experience of Lager prisoners, finding these interpretations 'approssimative e semplificate, come di chi volesse applicare i teoremi della geometria piana alla risoluzione dei triangoli sferici' (*II*, p.1057). See Gordon, *Ordinary Virtues* (p.122), for a rare (but brief) critical engagement with this aspect of Levi's thinking. Levi's position here sheds some light on his view of applying the methodology of one area of disciplinary enquiry to the substance of another.

¹² This association relies in part on the multiple meanings of 'Io' in Italian: it is the first person pronoun, but is also used to refer to the self and to the ego (Andreoli, p.124).

home situation that led to, or at least compounded his last period of intense depression.¹³ Her citations (in translation) from the manuscript for Levi's last, unpublished work *Il doppio legame*, show how (for obvious autobiographical reasons) Levi deeply resented enforced enclosure: 'human beings are not made to be contained. That is why [...] prison is the worst and oldest punishment; and why mining is the worst work, where the first workers' revolutions began' (Angier, p.685). Thus Lakoff and Johnson's unproblematically posited assertions that we see our body as a three-dimensional container are ultimately too restricting for Levi and must be challenged.

Seeking to achieve precisely this objective, philosopher Christine Battersby posits that the body-as-container metaphor no longer holds because of our cultural and historical situation.¹⁴ Making reference to several theories or 'new topologies' developed in the twentieth century, such as chaos theory, Battersby introduces ideas of change within one system influencing patterns of behaviour in another. According to chaos theory, she writes, forms are not fixed but are 'temporary arrestations in continuous metastable flows, potentialities or evolutionary events'. Thus it follows that the body is not a 'three dimensional container', but can be conceptualized and experienced as 'an event horizon, in which one form (myself) meets its potentiality for transforming itself into another form or forms'. Battersby continues: 'Those who are aware of themselves as centred "inside" an insulated container [...] are captured by an illusion generated [...] by spatial models

¹³ During this period, Angier documents, Levi gave his last ever interview, to Roberto di Caro ('Il necessario e il superfluo') in which he began to reveal a range of insecurities and share new information with his readers. He also agreed to an 'authorized biography' compiled by Giovanni Tesio during a number of rather difficult sessions that Tesio described as a 'psychoanalytic operation' (Angier, p.706). The biography as such was never completed. During this period Levi also underwent several sessions of professional analysis. See Angier pp.672-727.

¹⁴ Christine Battersby, *The Phenomenal Woman: Feminist Metaphysics and Patterns of Identity* (Oxford: Polity Press, 1998).

inherited from a classical science which is no longer compelling' (p.52). In other words, our engagements with our bodies are now informed by a less schematic epistemological paradigm that celebrates fluidity.

In keeping with this progressive strand of epistemological development, Levi's sympathy with interdisciplinary cross-fertilization, coupled with extremely traumatic personal experience of containment, led him to resent rigidly delimited areas of whatever type. Yet his anxiety about 'opening' his mind and body while compiling his personal anthology demonstrates a deep-seated need for some degree of bodily security. Perhaps unsurprisingly, this complicated engagement with intellectual and somatic boundaries manifests itself through inconsistencies: for example, Levi's description of his body as a single apartment, as opposed to his portrayal of his mind as containing further residents within an internalized apartment block; or his desire for disciplinary freedom and epistemological cross-fertilization as compared to his self-identification as a centaur or hybrid, internally divided by a 'spaccatura paranoica' caused by his allegiance to and experience of two separate professions. The force with which he argues for the impossibility of reconciling these internal halves is surprising given the equally vehement views he expresses elsewhere regarding the need for and essential existence of bridging links between literature and science.

However, this internal division is not the only factor complicating the notion of the body as container, since Levi saw our bodies as composed of physical but also cultural elements, of ourselves but also of our own 'other':

Siamo fatti di Io e di Es, di spirito e di carne, ed inoltre di acidi nucleici, di tradizione, di ormoni, di esperienze e traumi remoti e prossimi; perciò siamo condannati a trascinarci dietro [...] un Doppelgänger, un fratello muto e senza volto, che pure è corresponsabile delle nostre azioni. (II, p.677)

This image endows us with an extra self, a self of experience and emotion to complement that of bodily materiality. The dichotomous rhetoric employed in this description is echoed in Levi's self-doubling; a reflection of the internal intellectual division Levi both enjoyed and suffered.

One interpretation of this internal division and doubled self is enabled by psychoanalyst Melanie Klein's theories of the paranoid-schizoid position and projective identification.¹⁵ In the paranoid-schizoid position—a 'position' that lasts throughout the individual's life as opposed to the chronological experiential 'stages' conceptualized by Freud—the individual creates a bi-polar world of 'good' and 'bad', splitting objects into two opposing halves and attempting to locate the 'good' within him or herself, while forcing the 'bad' part outside. This split necessarily results in a split in the ego, loosely comparable to Levi's internal 'spaccatura paranoica'. Projective identification involves the attribution to external objects of feelings or wishes that the individual wants to repudiate. As a psychic process it is akin to somatic processes of excretion or vomiting and often results in a fear of invasion or imprisonment (Bell, pp.133-35). Klein's theories resonate productively with Levi's discussions of the self in terms of psychic structural configuration (the split consciousness), but diverge from his position in terms of positive and negative investments (Levi tends not to see elements as polarized in these terms). Despite this apparent incompatibility however, Klein's theories will prove important in analysing Levi's thought and fiction in the remainder of this chapter.

¹⁵ See Melanie Klein, 'Notes on Some Schizoid Mechanisms', *International Journal of Psychoanalysis*, 27 (1946), 99-110; David Bell, 'Projective Identification', in *Kleinian Theory: A Contemporary Perspective*, ed. by Catalina Bronstein (London: Whurr Publishers, 2001), pp.125-47, Priscilla Roth, 'The Paranoid-Schizoid Position', in Bronstein (ed.), pp.32-46.

It is difficult to know how to approach Levi's complex accounts of embodied experience, which perhaps explains the relative scarcity of critical analysis of this aspect of his work. As an intriguing complement to his reflections on the inside of the bodily container, Levi also devotes attention to externalized elements of the self. Through melding intellectual with biological states, Levi gives the self a supplementary body that may be faceless and materially insubstantial, but functions as if it were actually present. By cross-identifying the intellectual with the somatic, and then dividing this internally as well as externally through processes of splitting and projection, Levi forges bridges that allow him to escape a series of containers, but without totally demolishing them. He splits not the good from the bad but the scientific from the literary; he projects beyond himself not experience or feelings he wishes to disavow but a Doppelgänger, that resembles nothing so much as a personified unconscious.

The doubled self mingles together our constitutive parts—spirit, flesh, hormones and experience. Importantly, this undermines the dualistic Cartesian logic of the body/mind separation that has exerted such an inescapable influence on western thought and theories of embodiment and subjectivity. Furthermore Levi does so without conceptualizing the body as an entity in permanent flux: even in stories such as 'Il passamuri' (*II*, pp.898-901), in which the protagonist Memnone thins his corporeal self to the extent that he can slip through the walls of his prison, his body does not totally dissolve, but finds an alternative container by merging with that of his wife through sexual union (*II*, p.901). Similarly in 'La grande mutazione', the protagonist Isabella may metamorphose by growing wings, but her body remains recognizably human and materially solid (*II*, pp.868-72).

Examining these stories, among other examples, Usher asserts that ‘Levi constantly looked for ways to be freed from the weight of the flesh’ (‘Levi’s Science Fiction’, p.206). I would agree that Levi certainly longs for ways to be free of the *weight* of our bodies, but not from the body itself. Indeed, in ‘L’uomo che vola’ (II, pp.974-77), which celebrates the weightlessness of the astronaut beyond the Earth’s gravitational field, Levi expresses a desire to experience this sensation, ‘di trovarmi, anche solo per qualche minuto, sciolto dal peso del mio corpo’ (II, p.974). Yet the essay concludes by asserting that ‘il nostro povero corpo, così indifeso davanti alle spade, ai fucili e ai virus, è a prova di spazio’ (II, p.977). The body is ‘space-proof’, and able to retain the coherence of its mass even without its weight. I read this essay as a fantasy about safety, about negotiating our way through a dream-like, protected environment in which we are liberated from the restricted movements of our earth-bound reality, and move ‘con la maestà silenziosa delle aquile e delle nuvole’ (II, p.975), yet without losing our familiar form.

Drawing together these observations, we see that on an epistemological level Levi’s attempts to escape from or elude the feeling of containment that permeated numerous facets of his intellectual and material life can be mapped onto his desire to replace an outdated, mechanistic, scientific paradigm with a more flexible understanding of knowledge production and identity. Yet, just as the fixed form of the scientific apparatus was shown in the previous chapter to retain a potentially unlimited capacity for knowledge production, via the range of reactions that can take place inside it, so the body is a transcended but present container. Levi’s fascination with the body was subdued by an innate sense of somatic reticence. This contradictory approach resonates again with his desire for knowledge as contrasted with his anxiety about knowing too much too soon,

especially in the case of ethically unchecked scientific and technical progress.¹⁶ Thence it follows that Levi used the image of the container as a limiting factor against which to posit that which transcends it.

Moving on from these considerations of the body as a type of container, the next section examines theoretical approaches to the relationship between bodies and external objects, drawing on notions of projection and introjection. Through a theoretical exegesis it becomes clear how the opened container functions in Levi's work as a bridge between machines and animals, as a stage within a continuous cycle of kinship. I argue that although based in fantasy, for Levi this cycle is 'real' and essential to our self-identification as human beings.

2. The Tool as Bodily Prosthesis

Communications sciences and biology are constructions of natural-technical objects of knowledge in which the distinction between machine and organism is thoroughly blurred; mind, body, and tool are on very intimate terms. (Haraway, 'Manifesto', p.165)

The relationship between the human body and the tools we use has been described in unmistakably symbiotic terms by a number of influential thinkers. For example, Paul Schilder asserts that our body image can absorb external objects into itself so that 'when we take a stick into our hands and touch an object with the end of it, we feel a sensation at the end of the stick. The stick has, in fact, become part of the body image'.¹⁷ Earlier

¹⁶ See 'Covare le cobra' (*II*, pp.990-96), for his views on corruption in science; see also 'Trenta ore sul Castoro sei' (*II*, pp.704-10), for a discussion of the importance of experience, and ways in which the sheer rapidity of modern scientific and technical progress prevents the acquisition of knowledge through trial and error.

¹⁷ Paul Schilder, *The Image and Appearance of the Human Body: Studies in the Constructive Energies of the Psyche* (New York: International Universities Press, 1978), p.202.

commentaries on this fusion include Martin Heidegger's argument that our relationship with things usually incorporates a theoretical veil separating us from the object, yet if we grasp hold of the "hammer-Thing" we will engage with it on a deeper, more primordial level.¹⁸ Within an Italian context, the futurist Arnaldo Ginna wrote of how 'la macchina è diventata il prolungamento evidentemente necessario dei nervi dell'operaio'.¹⁹ Earlier still, Friedrich Engels pointed out how use of the tool by our ancestors played a significant role in determining the way in which our bodies developed; he writes of the hand itself as an artefact, stating it is 'not only the organ of labour, *it is also the product of labour.*'²⁰

In her insightful study *The Body in Pain*,²¹ Elaine Scarry cites Engel's comments as part of a discussion about the way in which 'human beings unconsciously assumed responsibility for their own bodily evolution'.²² This line of reasoning is most often buried in our pre-memory, but deserves to resurface as a 'return of the repressed'—perhaps in the vein of Levi's account of a self-fabricating individual in 'Il fabbro di se stesso' (examined in Chapter 2, above), a story which is similarly preoccupied with the role of the hand in evolutionary development. In *The Body in Pain*, Scarry's discussion centres on Marx's two assumptions about the sentience of material objects: 1) the presence of the body in artefacts; 2) the making of the body into an artefact (Scarry, p.244). Her exploration of these assumptions holds great relevance for Levi's representations of the relationship

¹⁸ Heidegger, Martin, *Being and Time*, trans. by Joan Stambaugh (University of New York Press, 1964; 1st edn 1927), p.64.

¹⁹ Extract from *L'uomo futuro* (1933), cited in Mario Verdone, *Il movimento futurista* (Rome: Lucarini Editore, 1986), p.91.

²⁰ 'The Part Played by Labour in the Transition from Ape to Man', in Marx and Engels, *Selected Works* (New York: International Publishers, 1977), p.359.

²¹ Oxford: Oxford University Press, 1985.

²² Scarry, p.253. She also refers to Stephen Jay Gould's discussions of the importance of posture and hand held implements in creating human life as we know it today. See 'Posture Maketh the Man', in Gould, *Ever Since Darwin: Reflections in Natural History* (London: Penguin, 1980; 1st edn 1973), pp.207-13.

between bodies and objects that display similar characteristics. I will therefore briefly outline Scarry's presentation of Marx's views before proceeding in the following section to analyse Levi's writing in light of her conclusions.

The thrust of Scarry's discussion is that Marx seeks to retrace the lost stages in the construction of artefacts and cultural implements which testify to human agency in their creation. This can be considered as akin to the interest in recovering human input in evolutionary development expressed by Engels, but also present in the work of Levi and Calvino.²³ Marx's subject, Scarry asserts, is the loss of referentiality caused by the epistemological suppression which led to civilization being conceptualized as a free-standing, self-sustaining entity, rather than a process of reciprocal evolution between civilization and human action.²⁴ As a consequence, just as the labourer's work is lost in its economic translation into capital, so the artisan's contributions are erased in perceptions of made objects as inert phenomena. Alienated and disembodied, humans seek to effect a redemptive 'making sentient of the external world' (Scarry, p.281) through projecting their bodies onto made objects. Scarry outlines some key ways in which this projection occurs: parts of the body can inspire cultural artefacts—for example, the heart inspired the aqueduct (Gadda's view of machines falls into this category); alternatively, projection functions '*to deprive the external world of the privilege of being inanimate—of, in other words, its privilege of being irresponsible to its sentient inhabitants on the basis that it is itself nonsentient*' (Scarry, p.290). Although Scarry's use of the term 'projection' does resonate with Klein's theories, she makes no explicit reference to either Klein or

²³ See Levi, 'Il sesto giorno', 'Il fabbro di se stesso', and Calvino, *Cosmicomiche*, for example (see Chapter 3, above).

²⁴ Although Scarry does not refer to Jean Baudrillard's work on simulacra in *Symbolic Exchange and Death*, (London: Sage, 1993), her presentation of Marx's argument resonates clearly with his theories.

psychoanalysis in her discussion. However, pairing these interpretative frameworks enables a two-fold conceptualization of the process of projection, animated by intriguing points of overlap and divergence.

Vitaly for the present discussion, for Scarry projection works as part of a cycle in which:

human beings project their bodily powers and frailties into external objects [...] and these objects in turn become the object of perceptions that are taken back into the interior of human consciousness where they now reside as part of the mind or soul and this revised conception of oneself [...] is now actually 'felt' to be located inside the boundaries of one's own skin where one is in immediate contact with an elaborate constellation of interior cultural fragments that seem to have displaced the dense molecules of physical matter. Behind the surface of the face in the mirror is blood and bone and tissue but also friends, cities, grandmothers, novels, gods, numbers and jokes. (p.256)

In Kleinian analysis, this process of 'taking back in' would be deemed an 'introjection' or 'psychic swallowing' (Bell, p.133). Scarry concludes that the second group of elements residing under the skin—the 'socialization of sentience'—will be experienced more immediately by the individual than the former, more biological elements. Her observations chime significantly with Levi's description of his bodily and psychological make-up, for example with his account of the 'inquilino del piano di sotto' who inhabits the depths of his psyche. Similarly, he refers to the 'ecosistema' of novels that have been absorbed into his bowels, which reside there as 'saprofiti, uccelli diurni e notturni, rampicanti, farfalle, grilli e muffe' (*II*, p.1363), or the 'letteratura assorbita per via cutanea' which informs the composition of *Se questo* (Appendix, p.321). Furthermore, Levi's reflections on everyday instances of projective identification and introjection reveal the importance he ascribes to objects in the formation and reinforcement of our very identities. In *Se questo* he remarks:

quanto significato è racchiuso anche nelle più piccole nostre abitudini quotidiane, nei cento oggetti nostri che il più umile mendicante possiede: un fazzoletto, una vecchia lettera, la fotografia di una persona cara. Queste cose sono parte di noi, *quasi come membra del nostro corpo* [...] Si immagini

ora un uomo a cui, insieme con le persone amate, vengano tolti la sua casa, le sue abitudini, i suoi abiti, tutto infine, letteralmente tutto quanto possiede: sarà un uomo vuoto. (*I*, p.21, emphasis added)²⁵

Just as Levi identified a phantom doubled self constituted by a present but intangible materialization of personal experience, here he describes similarly configured phantom limbs constituted by a community of significant people and objects that have been introjected into the psyche over the course of a life; what Klein would call ‘internal objects’.²⁶ In the concluding lines to the paragraph cited above, Levi explains that the ‘Campo di annientamento’ functions as a death camp, but also as a place that strips the individual of his or her external and internal objects, leaving an empty shell. Thus he employs a container metaphor to describe the difference between full embodiment, in which the self is boosted by internal objects to the point that it spills out of the body via phantom limbs and a shadowy Doppelgänger, and the yawning emptiness of ‘chi ha perso tutto’, whose death sentence can be decreed lightly in the nightmare realm ungoverned by human affinities.

As argued in the previous section, the notion of being a self-contained entity was unacceptable to Levi. In the 1985 essay ‘Contro il dolore’ (*II*, p.673-75) he presents a violently anti-solipsistic argument, dismissing the possibility that our senses can fool us into believing in a false external reality. He declares unequivocally that ‘Il solipsismo è una fantasia puerile: gli “altri” esistono’. Our task is to work towards diminishing the polluting substance of pain that invades our lives and those of our ‘compagni di viaggio’,

²⁵ These observations are also cited in part in Gordon, *Ordinary Virtues*, p.207, as part of a discussion of the stripping away of humanity.

²⁶ Klein was the first psychoanalyst to flesh out theories of object relations. ‘Internal objects’ are usually people who have been symbolically introjected, like Scarry’s socialized sentience. See Bronstein, ‘What are Internal Objects?’, in Bronstein (ed.), pp.108-24.

including animals (*II*, p.635).²⁷ Besides the implications in this statement that living beings are not ‘contained’ within their separate species, but placed on a continuum (reminiscent of that evoked in ‘Una bottiglia di sole’), and that pain seems to be a tangible substance which enters the containers of our lives and bodies, this short piece is relevant within the context of the present discussion for its orientation of the individual towards others. Our duty as a human being is thus to engage with and help others, a duty which renders the possibility of hermetically sealed human containment unthinkable.

As opposed to psychoanalytic accounts of negatively motivated projective identification, the acts of projection outlined by Scarry function to enable identification of the sentience of other entities, and to responsabilize them—whether animate or object—for their actions. It is exactly this sense of responsibility towards others for which Levi is arguing in ‘Contro il dolore’, but also in *Se questo* since, as Scarry asserts, the act of hurting another being is enabled by an ‘inability to sense the sentience of other persons’ (p.294). As pointed out by A. La Torre, Levi’s experiences in Auschwitz included that of ‘cosificazione’, a term developed from Lukács’ concept of *reification*, or the reduction of the individual to the status of *res*—‘thing’—through the industrialization of labour practices that consumes individual identity.²⁸ Acts such as that of the kapo Alex, who unthinkingly wiped his dirty hand on Levi’s shoulder—an action for which Levi felt uncharacteristically moved to judge him—are motivated by the treatment of others as reified, non-sentient beings (*I*, pp.103-04). Speaking of *Se questo*, *La tregua* and *Storie*

²⁷ The process of alleviating pain is also a key theme in Scarry’s argument.

²⁸ A. La Torre, ‘La fantascienza “umana” di Primo Levi-Malabaila’, *L’Unità*, 19 October 1966. In her essay ‘Destituzione e ossessione biologica nell’immaginario di Primo Levi’ (*Letteratura italiana contemporanea* 32 (Jan-April 2001): 127-45), a piece that informs the next section of this chapter, Giuseppina Santagostino draws upon both this article and Lukács’s theories of reification (Georg Lukács, *History and Class Consciousness: Studies in Marxist Dialectics* (London: Merlin Press, 1971; 1st edn 1923).

naturali, La Torre continues, ‘in nome dell’umanesimo [Levi] si oppone alla cosificazione e distruzione dell’uomo, ieri perpetrate in termini mostruosi dal nazismo e dalla guerra, oggi in forme di “assurda” civiltà, dalla scienza e dalla tecnica’.

Thus in Levi’s work, the Nazi destruction of humanity and the alienation caused by modern industrial developments fall on a continuum. Not only does Levi consider it important for humans to resist and be protected from a reductive reification; our status *as* humans is actually to some extent reliant on our ability to internalize objects through introjection and project our identity onto external phenomena, since this provides a means to access and sympathize with sentience in other ‘beings’. I turn now to examine Levi’s relationship to sentient ‘materia’, and analyse several of his writings that privilege hylozoistic or anthropomorphic approaches to external objects. Among other questions his work leads us to ask whether, if technology is felt to be oppressive and reifying towards humans, recovering the human agency within it can help us to overcome this. On a more positive note, his writing also suggests the presence of empowering connections between humans and ‘non-sentient’ phenomena.

3. Hylozoism, Anthropomorphism and Projection

Writing of *Il sistema periodico*, Cesare Cases comments that a ‘traboccante ilozoismo è l’anima di questa singolarissima autobiografia’.²⁹ Hylozoism, deriving from the Greek *hyle* (wood or matter) and *zoe* (life) is the philosophical conception of nature as animate, living material. It originated with early Greek thinkers who perceived matter as ‘a living,

²⁹ ‘L’ordine delle cose e l’ordine della parole’, *L’indice dei libri del mese*, 10 (Nov. 1987), pp.25-31, repr. in *Antologia*, pp.5-33 (p.12).

spontaneously active entity that operated independently'.³⁰ As Cases rightly observes, *Il sistema periodico* is overflowing with descriptions of animate matter, perhaps most famously the single carbon molecule with which Levi ends his text, leaving its trace as 'questo punto: questo' (*I*, p.942).

'La materia', in this text, is characterized variously as the mysterious, metamorphosing Proteus (*I*, p.759); as a constant adversary, 'la grande antagonista dello spirito' (*I*, p.767); as 'la Materia-Mater [...] la madre nemica' (*I*, p.771); as 'il non-io, il Gran Curvo, la Hyle: la materia stupida, neghittosamente nemica come è nemica la stupidità umana' (*I*, p.873). Beyond the laboratory, however, Levi is shown how 'Materia' as 'maestra' is surpassed by 'l'autentica Urstoff' of the mountains around Turin (*I*, p.775). Small portions of such material may be brought into the laboratory for analysis but even this transplantation into relative domesticity does not temper the power that matter holds over humans: it is 'un giudice imparziale, impassibile ma durissimo: se sbagli ti punisce senza pietà' (*II*, pp.641-2). Protean indeed in the shape it assumes for its human investigators, 'la materia' is perceived in a variety of forms ranging from sparring partner to ignorant obstacle to omnipotent force, incorporating all the capacity, authority, stupidity and unwieldiness of human life.

Although unusual in his humanist-chemist's fascination with living 'materia', Levi was not alone among postwar Italian scientists in finding behavioural similarities between 'materia' and 'personaggio'. Levi's technique of linking individual characters with chemical elements in *Il sistema periodico* is echoed in narrative strategies employed by

³⁰ Attila Grandpierre, 'Methods and Systematic Reflections: The Fundamental Principles of Existence and the Origin of Physical Laws', *Ultimate Reality and Meaning*, 25/2 (2002), 127-47; retrieved from <www.zene.net/granpierre/200206/uram21.html> on 24/10/02.

Rita Levi Montalcini in her autobiographical account of her life and research, *Elogio dell'imperfezione*. An example of a clear 'primoleviano' correspondence between character and element is seen in Levi's heroic mountaineering friend Sandro Delmastro in the chapter 'Ferro' (*I*, pp.771-81). Sandro is described as made of iron, blending typical associations of iron with physical strength, with a family heritage hammered out in a traditional blacksmith's forge, and Levi's characterization of the element as easy and direct, incapable of concealment. Levi Montalcini similarly links microscopic phenomena to human characters: she sees crowds in New York as magnified particles moving in Brownian motion (*Elogio*, p.150), and constantly personifies the Nerve Growth Factor which she discovered, to the extent that she describes a fantasy encounter with the personification of this substance, identifying his sharp tuxedo among the applauding crowd when she accepted her Nobel Prize (*Elogio*, p.266).

Other literary authors were also working along similar lines, detecting animation in ostensibly inanimate matter. As Cases notes, in *Il barone rampante* Calvino uses a descriptive strategy comparable to Levi's tale of the carbon molecule.³¹ Furthermore, in the *Lezioni americane*, Calvino discusses the need for literature to 'far parlare ciò che non ha parola' (*Saggi*, I, p.733). These positions and objectives can be understood to function in two main ways: on the one hand, literature is depicted as a channel of communication that would ideally permit innate but inarticulable subjectivity to be expressed; on the other, we see the attribution of subjectivity to matter for narrative purposes, a form of (conscious) projective identification. Both processes can be identified as operating in Levi's work. His approach can be seen first as hylozoistic, relating to the detection of innate animation

³¹ See Cases, 'L'ordine delle cose', p.12. Calvino's novel ends thus: 'quel frastaglio di rame e foglie [...] era un ricamo fatto sul nulla che assomiglia a questo filo d'inchiostro'; *RR*, I, pp.776-77.

within matter, and second as attributing human characteristics to inanimate objects through anthropomorphism. Inspired by his comments cited above regarding internal and external objects, his split sense of self, the instances of projection identifiable in his fiction (examined below), and especially his probing of matter which resonates with Freud's analogy between chemistry and analysis, his work can be read as both inviting and performing psychoanalytic investigation.

Drawing on theoretical frameworks outlined above, this section examines a number of short stories and essays from the collections *Storie naturali*, *Vizio di forma* and *Lilìt*. Reference is also made to the novel *La chiave a stella*. Besides Cases' insightful but brief identification of 'ilozoismo', there is virtually no scholarship on Levi's work that considers the issues raised here, which in part motivated my decision to draw largely on Anglophone sources. However there are two rather lesser known essays on Levi that will inform this analysis closely: Giuseppina Santagostino's 'Destituzione e ossessione biologica nell'immaginario di Primo Levi' (1991) and Jonathan Usher's 'Levi's Science Fiction and the Humanoid' (1996).³² My concern in this analysis is to explore Levi's portrayal of the relationship between humans and machines, in an attempt to better understand the dynamic in his thought between conceptualizing the machine as a contoured canvas on which to project human attributes—commensurate with a discrete approach to different entities—and seeing all matter as falling on a continuum that links phenomena across a wide variety of categorical containers.

Santagostino's essay begins with some observations on the destitution or 'cosificazione' of prisoners in Nazi camps as mentioned above. Following Levi's lead in

³² One further source is Daniele Del Giudice's introduction to the 1997 edition of the *Opere*, in which he points out the meeting of 'animato e inanimato' through hybridization: *I*, pp.liv-lxi.

seeing his writings as connected, she then links the testimonial writings with his fictional work, in particular his science fiction stories, arguing that the process described in the former by which humans are degraded to the status of ‘non-uomini’ is mirrored by scenarios in the latter in which inanimate matter acquires vitality. Santagostino’s cyclical representation of this process developed from her discussion of a broad cross-section of Levi’s novels and short stories,³³ allows her to posit a convincing non-hierarchical continuum of spirit and matter. She illustrates this point through reference to Levi’s assertion that ‘la materia è materia, né nobile né vile, infinitamente trasformabile e non importa affatto quale sia la sua origine prossima’: an assertion that throws the positive or negative spin apparent in the perceptions of matter cited above firmly back onto the observer (*I*, p.895).

In conclusion, Santagostino suggests that Levi’s experience of imprisonment stimulated in him a desire to supplement or temper the destruction of the human spirit with a mythopoetic creativity akin to that of ancient writers who engaged with the cosmos as a totality of forces (e.g. Homer, Heraclitus). Citing examples drawn from a range of texts—from *Se questo* to stories in *Lilit*—she demonstrates how, in accordance with Levi’s belief in the necessary interfecundity between areas of intellectual or epistemological enquiry, a hylozoistic approach means that ‘esperienza storica ed esperienza biologica e somatica si integrano in un sincretismo fecondo’ (‘Destituzione’, p.129).

Usher’s article similarly deals with biogenetic transformations but also considers the relationship between the baser and more elevated parts of instinct. With reference to many of the same texts singled out by Santagostino (although he does not refer to her

³³ See Fig. 2, in Illustrations, p.333, below.

article), Usher discusses Levi's anthropomorphization of mechanical machinery depicted as straining to transcend its baser side, and Levi's 'fantabiological' experiments with the metamorphosis of humans into angelic, winged beings. Focusing in—as does Santagostino—on the connections between Levi's works, Usher concludes that the texts he considers can be seen as 'drafts of one never-realized book', a point he confirms by citing Levi's description of the texts residing within his bowels as a symbiotic 'ecosistema' ('Levi's Science Fiction', p.216; *II*, p.1363).

Santagostino refers to 'ilozoismo', and implies that in Levi's work, changes occur from within the entity in question. In contrast, Usher uses the terms 'anthropomorphism' and 'anthropomorphic', allowing his analysis to slip between the subtly different meanings of the words: 'anthropomorphism' is the attribution of human characters or behaviour to a god, animal or object'; 'anthropomorphic' can be used as a related adjective, or to mean 'having human characteristics'.³⁴ This distinction may seem trivial, but essentially relates to the difference between two modalities of conceptualizing sentience in non-humans: first, Gadda or Scarry's view that the human characteristics we see in machines are a projection of our inner concerns intended to humanize an alienating presence in postindustrial society; second, a classical view of the hylozoistic nature of all matter, as implied by Calvino's desire to enable non-human matter to speak its life. It seems to me that the reason neither of these essays engage with the respective implications of these positions is because neither makes reference to either the location of sentience or psychoanalytic theories of projective identification, and thus can only skirt around the issues raised by what Santagostino calls Levi's hylozoistic 'soluzione narrativa' ('Destituzione', p.129). In the

³⁴ As defined by the OED.

remainder of this chapter, I therefore re-read some of Levi's works referred to and analysed in these two essays with an awareness of the theoretical approaches delineated above not drawn on by either scholar.

Santagostino's analysis moves rapidly through a large number of Levi's short texts, and thus devotes limited attention to each. However, she does focus in a little more detail on the stories 'A fin di bene' (*I*, pp.636-46) and 'Ammutinamento' (*I*, p.718-24). These were both published in the 1971 collection *Vizio di forma*, concerned with whether 'l'uomo fabbro di se stesso, inventore ed unico detentore della ragione, saprà fermarsi a tempo' in the quest to perfect modern technology. This citation, from the copy on the back cover of the book, probably written by Levi himself (*I*, p.1443), quietly elides the other related issue raised in the stories about sentience and autonomy in machines: whether the fetishized technology which has become self-generating and self-governing will stop itself in time or can be stopped by external forces.

The real protagonist of 'A fin di bene' is 'la Rete', a European telephone network that appears at first to be suffering from a 'malattia' (*I*, p.637). After some investigation the Rete is discovered to have assumed autonomous control over which numbers are called and by whom, and to have developed a 'centro nervoso'. Although initially deemed to be unthreatening—intelligent yes, 'ma non come un cervello intelligente' (*I*, p.642)—the Rete soon assumes total control over all communication across its Europe-wide kingdom. It even develops a metallic voice so it can order engineers to link up unplanned overland networks with the techno-organic 'stoloni vegetali' it is spreading underground (*I*, p.644). Finally, it is overcome by a stern reprimand from a senior engineer who intuits that, since the Rete is a simulator of human behaviour it will also simulate fear when threatened. He is

proved right when the Rete effectively commits suicide. In 'Ammutinamento', we are told that all plants are 'gente come noi', who are endowed with their own desires and language which we might understand if only we were receptive to it. The trees in this story wish to be wild again, to be freed from human control and from their responsibility to purify the air for us.

Santagostino's verdict on these stories is that the Rete and the trees are both motivated by a desire to affirm their own identity, will and freedom, which they attempt by assuming vitality and mobility ('Destituzione', p.135). Having detected an isomorphism between human and non-human entities, she asserts that if human degradation arouses our pity for dehumanized individuals, so other 'suffering' entities are similarly redeemed on account of the vitality they assume ('Destituzione', p.140). 'Ammutinamento' ostensibly argues hylozoistically for an innate linguistic ability and consciousness in plant life. Alternatively, one might assert that Levi is projecting human sentience onto natural vegetation in an effort to emphasize our responsibility to protect the environment. Inversely to projective identification, blame is attributed straightforwardly to the human actor while the usually demonized external object is absolved.

The implications of the story run counter to Scarry's suggestion that projection functions to force responsibility onto insentient objects (as in Kleinian theory), since the trees' protests are undoubtedly meant to arouse *us* from *our* carelessness where nature is concerned. In this second interpretation, Levi anthropomorphizes nature in an appeal to our sense of conscience, rather than allowing us to ignore our responsibility to an ostensibly insentient life form. The story is dedicated to Mario Rigoni Stern, Levi's friend and fellow camp survivor, with whom he often argued about our responsibility to the environment.

Levi shared many of Rigoni Stern's beliefs about the importance of respecting the natural world, as can be seen in fictions such as 'Il gabbiano di Chivasso', an interview between a journalist and an anthropomorphized seagull who laments the pollution which has turned him from a sea fisher to a scavenger of urban waste (*II*, pp.1335-37).³⁵

'A fin di bene' also lends itself to multiple readings. Taken as an account of a particular situation, it shows technology assuming an autonomous consciousness against human wishes. However it also serves as a thinly veiled metaphor. Since technology often enjoys 'the role of a fetish, an object human beings make only to forget their role in creating it' (Haraway, *Simians*, pp.8-9), the Rete's development could be seen as Marx's desired recovery of human input into artefacts. In this case, however, the recovered human input is not the careful labour of the artisan but the bulldozing thrust of developments by large scale corporations—whose human face is often totally obscured, effectively deresponsibilizing the invisible perpetrators of actions that damage society. The Rete behaves like a modern day multinational, controlling communications, dictating its own projects for expansion by circumventing usual procedures for obtaining permission, and holding entire continents at ransom, to bow to its wishes.³⁶ It seems to me that a discussion of responsibility is crucial to our understanding of these stories, and that Levi is skilfully manipulating our perceptions of the location of sentience in order to question whether the bearers of social responsibility have assumed their duties adequately.

³⁵ Despite this common concern, however, Levi often played devil's advocate when they met, arguing that science would cure us of the problems associated with pollution, showing that he could espouse an alternative view for the sake of argument (Angier, p.545).

³⁶ For accounts of the growing power of the multinational, see Naomi Klein, *No Logo* (Toronto: Vintage, 2000); George Monbiot, *Captive State* (London: Macmillan, 2000); *I crimini della globalizzazione*, ed. by Marco Antonio Pirrone and Salvo Vaccaro (Trieste: Asterios Editore, 2002); *Per una governance della globalizzazione*, ed. by Paolo Annunziato, Antonio Calabrò and Lucio Carracciolo (Milan: Il Mulino, 2001).

Usher's essay focuses more closely on the anthropomorphization of machines and chemical products, linking the story 'La sfida della molecola' (*II*, pp.162-67), with a number of passages from *La chiave a stella*, both published in 1978. 'La sfida' is narrated principally by Rinaldo, a factory worker whose night shift is marred by the unanticipated polymerization or solidification of a batch of synthetic resin he is watching over. When the resin begins to solidify, Rinaldo is desperate, but resigned to an inevitable tragic outcome: he tells us that there was no time to call the doctor, and that besides, 'una cottura che parte è come muore uno' (*II* p.165). As the expanding resin builds within its metal vat, he opens the bolts on a release hatch, whereupon 'il portello si è sollevato da solo, non di scatto ma piano, solenne, come quando si scopron le tombe e si levano i morti' and a repellent, thick yellow discharge issues forth (*II* p.166).

Similarly, the passages from the chapter 'Clausura' in *La chiave a stella* that Usher cites relate to the construction of an industrial distillation column, described by Faussonne, the steel-erector, in human terms:

mi sembrava di vedere crescere un bambino, voglio dire un bambino ancora da nascere, quando è ancora nella pancia di sua mamma. (*I*, p.953)

sembrava anche a quelle figure che si vedono nell'anticamera dei dottori, IL CORPO UMANO: una coi muscoli, una con gli ossi, una coi nervi e una con tutte le budelle. (*I*, p.957)

Unfortunately, the column has been badly planned, which results in a situation similar to that experienced by Rinaldo: some ceramic rings fitted inside the main column disintegrate, creating a thick pasty discharge of rubble. As Faussonne's story progresses, more anthropomorphic imagery is used: the column is 'malata' and described throughout as a 'bambino'; first it requires an engineering 'ambulanza', then a 'funerale' as the stony paste blocks the tubes and pipes, causing a fatal 'costipazione', which requires an industrial scale enema.

As Usher points out, both stories are parables of ‘the alchemical creation of a human simulacrum’ or ‘humanoid’ (‘Levi’s Science Fiction’, p.203). Displaying a range of characteristics from arrogance as regards human capabilities, to emotional investment in the childlike apparatus, the respective operators enact a process of parenting that ends in disappointment, disgust and a sense of guilt when the ‘child’ is destroyed by its own waste product. Curiously for an analysis that pivots around waste, however, Usher does not mention Julia Kristeva’s work on abjection. Similarly, although Santagostino cites a lengthy list of expressions Levi used to describe the degradation of human beings, including the word ‘abietto’ (*I*, p.145), she also neglects to make the connection. Aside from his use of the word to describe the prisoners inside the camp, Levi also uses it to describe the Lager itself, calling it ‘questa macchina corrotta e abietta’, blending human degradation with the mechanics of the gruesome architecture.³⁷

As regards abjection in another area of Levi’s work, his choice of ‘Damiano Malabaila’, the surname meaning ‘cattiva balia’, as a pseudonym when he first published *Storie naturali*, surely requires some attention. However, beyond Levi’s light-hearted explanation of how the name was inspired by a shop front,³⁸ the relevance of this name to the subject matter is left unexplored.³⁹ Notably, Levi himself alludes to the implications of his choice of name in a later interview:

Qui sono sopravvenuti gli amici psicanalisti e mi hanno detto: ‘Ah, ma tu credi di aver fatto una scelta casuale, perché tu non conosci il tuo inconscio...nessuno conosce il proprio inconscio [...] scegliendo Malabaila hai compiuto un atto di quelli che Freud chiama atti mancati, cioè quei...Fehlleistungen che cita Freud nella sua *Patologia della vita quotidiana* [...]. (Luce, pp.41-42)

³⁷ Federico De Melis, ‘Un’aggressione di nome Franz Kafka’, *Il Manifesto*, 5 May 1983; repr. in *Conversazioni*, pp.188-94 (p.192).

³⁸ ‘L’ha ispirato un’insegna’, *Il Giorno*, 12 January 1966.

³⁹ See for example Massimo Dino and Stefano Jesurum, *Primo Levi: le opere e i giorni* (Milan: Rizzoli, 1992), whose discussion of the name and its meaning (Chapter 7, ‘Il buio oltre le parole’, pp.161-86) makes no attempt to tackle this evocation of the abject.

Levi continues, relating accusations of how he must have negative childhood memories of being nursed by his mother, even admitting that his mother was actually offended by this choice of name. Ultimately he dismisses such notions ('Non ci credo molto a queste cose', Luce, p.42), but his familiarity with Freud's texts and vocabulary, as well as the length at which he discusses the issue, indicate that he has indeed reflected on the significance of the choice.

Returning to Levi's fiction, it is worth here briefly noting some relevant aspects of Kristeva's theories that will aid the present discussion. In *Powers of Horror*,⁴⁰ Kristeva defines the abject as 'being opposed to *I*', a substance that 'drags me towards the place where meaning collapses' (p.1). Feelings of abjection constitute a 'safeguard' against this uncanny thing that resides 'in-between' borders and threatens to annihilate the self. Arguing that the individual who fears the perverse actually internalizes feelings of abjection, eventually seeing his or her own body as abject (p.5), Kristeva then shows how this 'deject' is a self-dividing, dichotomous 'stray'. The deject is both aware of and resistant to acknowledging physical abjections, and is thus constantly forced to construct boundaries against the fluidity of the universe (p.8). This process can lead to a state of impossible powerlessness as the body becomes a 'fortified castle [...] an empty castle, haunted by unappealing ghosts—"powerless" outside, "impossible" inside' (p.48). Dangers, in Kristeva's analysis, come both from a 'horror within' provoked by the presence of abject material within the body (p.53) and 'the danger to identity that comes from without; the ego threatened by the non-ego, society threatened by its outside, life by death', represented by excrement and associated phenomena (p.71).

⁴⁰ Julia Kristeva, *Powers of Horror: An Essay on Abjection*, trans. by Leon S. Roudiez (New York: Columbia University Press 1982).

The expulsion of the abject is directly comparable to the expulsion of 'bad' objects through projective identification, explaining Kristeva's affinity with Klein's work.⁴¹ More pertinently for the present discussion, the above summary of relevant aspects of Kristeva's theories echoes many issues already raised here: the abject as not '*I*' evokes Levi's struggle with his material opponent described as the 'non-io'; the divided deject or stray who consciously denies his or her own abjections is like Levi's divided self who oscillates between disciplinary identities, both admitting and denying the presence and influence of his unconscious; a horror of the abject as symbolic of danger is expressed in Levi's stories of excrement-induced malfunction and destruction of machinery. Recalling an earlier definition of projective identification as similar to somatic processes of excretion or vomiting which often lead to fear of *invasion or imprisonment* (Bell, p.135), Kristeva's comments on the notion of one's own body as 'abject and the feeling of powerlessness that results from embodiment experienced as inhabiting an empty, fortified castle, are relevant to the remainder of the chapter 'Clausura'.

Usher summarizes the last section of this chapter as dealing with 'other themes, principally claustrophobia', claiming that the 'vitalistic tendency in Faussonne's description disappears' ('Levi's Science Fiction', p.203). I would argue first, that the vitalistic tendency remains, but in an altered vein that resonates with Santagostino's discussion of biomorphic machinery. When inside the column making repairs, Faussonne experiences a sense of claustrophobic suffocation, 'come i topi nella pancia dei serpenti': the column/child has now become a snake, and he himself is its prey (*I*, p.965). Second, as emphasized by the title 'Clausura', claustrophobia is a vital theme to the anecdote, and is

⁴¹ See Kristeva, *Melanie Klein* (New York: Columbia University Press, 2001).

inextricably linked to feelings of abjection. Speaking of the distillation column Faussone tells us, 'le budelle, le avevo montate io' (*I*, p.957). In some way, the sense of suffocation he experiences when inside the tubes of this massive intestinal structure can be connected to a feeling of annihilation. This results from both the earlier presence of the physical abject and Faussone's projection of human sentience onto the machinery that inevitably produces (or derives from) a conflation of his own body with the mechanical one.

If we consider also a later anecdote that Levi recounts in the unpublished manuscript of *Il doppio legame*, we see that he was haunted by images of vast metallic structures that to him represented human organs, and which engendered a powerful sense of claustrophobia in him. When working for SIVA, Levi was once called out to examine a large tank that had buckled when an internal vacuum was formed. Upon entering the structure, he was overcome by a sickening, uncanny feeling of being inside an 'intestine', and got out immediately (Angier, p.685). Levi's reaction might be explained by reference to Freud's essay 'The "Uncanny"'.⁴² Freud hypothesizes that women's genitals and bodies are considered as 'uncanny' because the mother's womb is effectively our first *Heim*, causing feelings of both attraction and dread since our existence there verges on the insentience of death.⁴³ Levi's feeling of bodily containment as unbearably oppressive is consistent with the *unheimlich* sensation inspired by the womb, arising when a usually

⁴² 'The "Uncanny"' (1919), in the *Standard Edition*, 24 vols, rev.edn (London: The Hogarth Press, 1964), the *Standard Edition*, 24 vols, rev.edn (London: The Hogarth Press, 1975), XVII, *From the History of an Infantile Neurosis* (1918), pp.217-256.

⁴³ Tragically, Levi's womb-like skin of a home was also the scene of his death. In 'The Uncanny', Freud also discusses the effectiveness in fiction of creating and sustaining uncannily ambiguous characters that are neither clearly human nor automata (p.227), as well as the idea of the 'double', which he tentatively diagnoses as the result of 'the urge towards defence that has caused the ego to project the material outward as something foreign to itself' (p.236). Freud did not fully explore this tentative theory, and it was left to Melanie Klein to develop a fuller account of projective identification.

protective space is perceived as a threat. This tension between safety and danger is echoed by Kristeva in her response to the museum at Auschwitz:

I see a heap of children's shoes, or something like that, something I have already seen elsewhere, under a Christmas tree, for instance, dolls I believe. The abjection of Nazi crime reaches its apex when death, which, in any case, kills me, interferes with what, in my living universe, is supposed to save me from death: childhood, science, among other things. (*Powers of Horror*, p.4)

The feeling of uncanny abjection is caused when danger comes from an unexpected source; from our fellow humans, from our bodies, from human knowledge and the machinery it produces, from, as Rinaldo states, 'le cose senz'anima che ti dovrebbero obbedire e invece insorgono' (*I*, p.167).

Rinaldo sees the ailing resin both as animated by human characteristics, certainly to the point where he feels a profound degree of sympathy with it, and as inanimate matter. In his view, coloured undoubtedly by a sense of guilt that leads him to project his feelings of inadequacy onto the resin, the enormous clotted molecule displays 'schernò' and 'irrisione' in its defiant refusal to obey. It seems to me that alongside the location and assumption of responsibility, central issues in Levi's portrayal of the relationship between humans and sentient matter or machines include control, obedience and hierarchies of power. The disobedience of the Rete leads to chaos as technology assumes autonomous power over its development and passes beyond human control. In contrast, the trees' desire for freedom in 'Ammutinamento' results from the exploitative exercise of human domination. Rinaldo's uneasiness is provoked by insubordinate matter that breaches its container, demonstrating its undesired autonomy, while Faussone's anxiety comes from a feeling of being overpowered by an engineered structure that assumes too much power over human individuals. It seems that there are certain limits or boundaries that we believe should not be breached, indicating that behind Levi's apparently egalitarian view of all matter as 'né

nobile né vile' but infinitely transformable irrespective of origin, lurks the remains of a hierarchical apparatus and a desire for mastery. Alternatively, this can be read as a need for a certain degree of order as counterpoint to the fluidity of metamorphosis, comparable to Levi's desire for some sort of bodily stability despite his wish to escape containment.

Alongside Levi's predilection for metamorphosis lies his interest in etymology and anthropology: in origins and the tracing of development. His approach encourages fluidity but maintains a sense of the source and original form of an entity. As regards origin and recognition, Scarry writes that some artefacts are intended to be recognized as 'made', for example a work of fiction whose artifice is emphasized by some form of paratextual framework. Others are intended to be understood as 'real', but their 'fictionality or madeness' surfaces when they need repair and the 'fingerprints' of their maker become visible (Scarry, p.312). When an individual registers this human signature and enters 'the interior of the object world', it is done 'in order to apprehend the invisible interior of the human action of making that is itself recorded in the object' (Scarry, p.323). In *La chiave a stella*, we see a parallel discussion between the chemist-writer narrator (Levi), and Faussonne, the steel erector, whose respective anecdotes reveal the connections between what Segre has called 'una *poiesis* materiale e una letteraria'.⁴⁴ Aside from the meeting of two individuals and their respective careers, Segre notes that the novel is enlivened by the meeting of the animate and the inanimate ('I romanzi', p.114). I would argue further that the text gains its interest from the infusion of animate vitality into the inanimate, and its reflection back on its originator. Levi and Faussonne agree that the work of a chemist and a 'montatore' resemble each other since they show how to be 'interi, a pensare con le mani e

⁴⁴ Cesare Segre, 'I romanzi e le poesie', in *Antologia*, pp.91-116 (p.112).

con tutto il corpo'—that is, how to fully inhabit one's body. These professions also allow the worker independence from the judgement of others since this is substituted by 'lo specchiarsi nella propria opera' (*I*, p.989). In other words, they gain pleasure from the image of themselves reflected back via their fingerprints visible on their created object.

The body is seen here as an appendage for the consciousness to grow into so that its container-like delimited form is fully inhabited. The artefact that results from labour allows a glimpse of the human agency that created it. Here Levi's need for reinforcement from the made object exactly echoes Marx's theories about counteracting alienation through the recovery of 'repressed' human labour. In Levi's depictions, workers identify closely with their materials at a fundamental level. When things go well, they are happy and feel consolidated by the reflection of themselves that is given back to them by the results of their labour. When things go awry, the worker's sense of self is compromised alongside the status of the artefact or its products. Thus technical apparatuses become psychological prostheses, built into and vitally enhancing the individual's body image. Braidotti tells us that an 'elementary principle of prosthesis and prosthetic projection animates the whole technological universe'. Furthermore, this principle also conditions human experience of embodiment since tools are 'products of the creative human imagination, copying and multiplying the potencies of the body' (*Nomadic Subjects*, p.44). So far, sentience in technology has been seen to provoke positive feelings of self-reinforcement, negative unease and feelings of uncanny abjection through introjection of a malfunctioning mechanism, and anxiety as a telephone network threatened to assume a stranglehold over Europe. All the machinery and technology discussed here is understood through analogy with human consciousness and corporeality. The Rete differs slightly from the other

apparatuses since it is not expressly made to reflect the human body, but its voice and agency are portrayed in explicitly human terms. Having considered Levi's identification of animism in machines as he explores the experience of being enclosed or encircled by machinery, I turn finally to examine two further fictional dramatizations of the relationship between humans and machines. These stories are notable for the way in which technology is mobile and much more closely aligned with the human body, even interacting with it as a direct opponent.

'Cladonia rapida' (*I*, pp.441-46) and 'I gladiatori' (*II*, pp.82-86), deal with motorized vehicles and the similarities between the behaviour of humans and machines. 'Cladonia rapida', is a pseudo-scientific, tongue-in-cheek article, commenting on a phenomenon as yet unexplored by 'la scienza ufficiale': a form of rapidly spreading lichen that attacks cars. Besides hinting at a symbiosis of biology and technology that led to the appearance of this strain of lichen, this article presents the cars under discussion as sexed; 'he-cars' and 'she-cars'. In a process of gender-normative anthropomorphization akin to the apocryphal imposition of gender norms in sociobiological analyses (see Chapter 3), Levi differentiates between the two sexes of vehicle: he-cars have strong suspension and better acceleration; she-cars have unreliable electronics and are sensitive to temperature. He then reveals that these cars are treated as sexual objects, he-cars being selected by women and gay men while 'normal' men choose she-cars. Both gender-normative and homophobic, this article fits in to traditional engagements with the car as a sexual object, as expressed by futurists such as Marinetti.⁴⁵ Of interest to the present discussion is the fact

⁴⁵ In 'L'uomo molteplicato e il regno della macchina' (1915), Filippo Tommaso Marinetti wrote of how the mechanic polishes the body of his vehicle with the tenderness and attention of a lover and also asserted that vehicles have 'un'anima, una volontà'; in *Opere di F.T. Marinetti*, ed. by Luciano De Mariam, 4 vols (Milan: Mondadori, 1968), III, *Teoria e invenzione futurista*, pp.297-301.

that Levi presents these sexed vehicles as having their own 'volontà' above and beyond that of their driver, which influences the ratio of hetero or homosexual collisions (*I*, p.445). Thus he implies that the cars are in some way instigating technical sexual activity, whilst simultaneously acting as pollinators for the spread of the lichen. The cars also exhibit signs of having a memory, recalling locations where they were 'injured' in an accident, for example, and even the beginnings of a 'tessuto nervoso' (*I*, p.446).

'I gladiatori' is an account of an apparently contemporary gladiator tournament between human combatants and vehicles. Nicola is cajoled into booking tickets for the Sunday afternoon spectacle by his girlfriend Stefania: She is anxious that they should go to the tournament since everyone else does, and warns him 'non bisogna appartarsi, darsi delle arie da intellettuali' (*II*, p.82). The show consists of six gladiators who take their turns against vehicles driven by invisible humans, so that the fight appears to be man against machine. The gladiators, many of whom are convicts who fight in return for reduced sentences, bait the vehicles in a distorted echo of classical gladiatorial combat, which also evokes the tension between matador and bull at a *Corrida*. Indeed, this animalistic allusion is confirmed by the use of descriptive language: the vehicles are referred to as 'bestioni', or we see a gladiator challenging before 'il muso della macchina'. There is also a 'comic' interlude, in which two fork lift trucks battle ungracefully, tangling themselves together 'come i cervi quando lottano'. The event is bloody, violent and wildly applauded by the crowd. Nicola and Stefania leave early, he overcome by queasiness and she by a more violent need to vomit.

Once again, these stories deal with the projection of human characteristics onto machines, the detection of human instincts within machines and with abjection—the lichen

and the spectators' nausea. A continuum of the biological, the animal, the human and the technological underpins each story, although rather uneasily. The sentient cars are comparable to the Rete in their developing autonomy, but also function to consolidate the sexual identity of the driver. In this, they perform a type of reflection akin to that described by Levi and Fausone in *La chiave a stella*. The underlying threat in each story, as in 'A fin di bene', relates to the potential for phenomena that 'should' be insentient to overcome human authority. In 'Cladonia rapida' this threat comes from the rapidly spreading lichen, a new strain of techno-biological disease, as well as from the growing autonomy and consciousness of the cars. In 'I gladiatori', the struggle for mastery between human and machine is explicitly enacted, a science fiction dramatization of Adorno and Horkheimer's fear that despite our apparent 'progress', 'mankind [sic], instead of entering into a truly human condition, is sinking into a new kind of barbarism'.⁴⁶ Stefania's anxiety about conforming to social norms shows that Levi must have harboured fears of an anti-intellectual technologized dystopia, despite his assertion of total faith in new topologies of science to ensure the continuance of our humanity. His words seem almost to be a direct refutation of Adorno and Horkheimer's assertion:

Quanto alcuni stanno audacemente acquistando nella conoscenza del mondo fisico farà sí che questo periodo non sarà giudicato un puro ritorno alla barbarie. (*II*, p.789)

It may be possible to feel pity for a machine that malfunctions, or to derive pleasure and galvanize one's identity through the detection of human input in mechanical artefacts. Nevertheless, these more empathetic responses are more often than not overpowered by a fear of the dangers that the hybridization of humans and machines may bring in terms of

⁴⁶ Theodor Adorno, and Max Horkheimer, *Dialectic of Enlightenment* (New York and London: Verso, 1997; 1st edn 1944), p.xi. This concern also surfaces in Roberto Vacca's *Medioevo prossimo venturo* (Milan: Mondadori, 1971).

physical as well as intellectual domination. As Marinetti declared with characteristic glee: 'Il tipo non umano e meccanico, costruito per una velocità onnipresente, sarà naturalmente crudele, onnisciente e combattivo' ('L'uomo molteplicato', p.299). Levi shared Marinetti's views in part, although unlike the futurists, his approach to the mechanization of the human body is always coloured with concern for human freedom. In this chapter I have explored how Levi portrays animated machinery and how the human body is likened to machinic structures and apparatuses. In the next, I move on to examine what happens when the hybridization of human and non-human elements impinges closely on the human body.

Chapter 6: Technologized Bodies: The Posthuman Progeny of Progress

Along with technology we have invented new and subtle modes of manipulation, through which the manipulation of things requires men [sic] to be subjected to these very techniques of manipulation. Thus we make machines to serve men and put men in the service of these machines. And we finally see clearly how man is manipulated by and for the machine.¹

The machine is not an it to be animated, worshipped and dominated. The machine is us, our processes, an aspect of our embodiment. (Haraway, 'Manifesto', p.180)

Le macchine sono importanti, non ne possiamo più fare a meno, condizionano il nostro mondo, ma non sono sempre la soluzione migliore dei nostri problemi. (I, p.518)

In a 1983 article entitled 'Il brutto potere' (II, pp.1203-07), referring to 'il brutto potere della degradazione e della morte' as lamented by Leopardi,² Levi discusses homeostasis: the tendency of 'la materia vivente e delle sue più o meno grossolane imitazioni' to strive towards a relatively balanced state despite the destructive effects of nature and time (II, p.1204). For human beings as a species, homeostasis works most efficiently on a large scale, allowing the conservation of a relatively constant physiology over centuries. For individual humans, resistance to change is a more difficult endeavour, but, Levi argues, since life invariably alters and ages us for the worse, any attempt to achieve some degree of homeostatic equilibrium is worth undertaking.

This view would seem to imply an inherent conservatism, an impression of which Levi appears to be aware and which he immediately contradicts by speaking up in favour

¹ Edgar Morin, *Science avec conscience*, rev. edn (Paris: Éditions du Seuil, 1990), p.101; my translation.

² 'Al gener nostro il fato/ non donò che il morire. Omai disprezza /te, la natura, il brutto / poter che, ascoso, a comun danno impera / e l'infinita vanità del tutto', Canto XXVIII, 'A se stesso', p.593 in *Canti*, ed. by Francesco Moroncini (Bologna: Capelli Editore, 1978).

of progress, reform, innovation and invention.³ However he then explains that not everyone (or everything) has access to these benefits, whereas the need for self-preservation is a universal basic necessity. Turning his attention to political and social structures, Levi recalls a popular belief in the 1950s that an excess of liberty was followed by a period of oppression, which led in turn to a more liberated society: a form of balanced, cyclical social regulation, albeit slow and costly in terms of human life. Reflecting on social situations in the early 1980s (in the western world, we assume), Levi concludes rather depressingly that even this imperfect cycle has unravelled; the possibility of any form of homeostasis has left us, so that our only hope can be for a slow progression towards inevitable destruction—a clear reference to theories of entropy developed in the twentieth century.⁴

The striking feature of this article is the indirect comparison that Levi makes between homeostasis in human beings and in mechanical devices, introduced as the often crude imitations of living organisms referred to in the citation above. Besides making the leap from homeostasis in individual beings to equilibrium in social systems, he also presents an account of James Watt's centrifugal regulator, devised in 1787, which permitted the first steam engines to run at a constant speed. Subsequently, a wide variety of technical apparatuses have benefited from what became known as a 'feedback loop',

³ Here, as in 'Il fabbro di se stesso' where he denies the possibility of humans progressing beyond a state of relative barbarism, Levi displays a deep-seated pessimism about human evolution; see Chapter 3, above.

⁴ See for example Jeremy Rifkin, with Ted Howard, *Entropy: A New World View* (London: Paladin Books, 1980), which examines the implications of entropy beyond the narrow confines of physics, in the everyday world; Anthony Harris, *Entropy* (London: Madeleine Shaw, 2000), also deals with entropy as 'a fact of life'.

allowing regulated temperature control, for example.⁵ In the paragraphs he devotes to these technical devices, Levi does not overtly engage with the comparison he is making between humans and machines; nor does he reflect on the implicit, unarticulated conclusion to his remarks: that machines are much more efficient versions of ourselves.

Anxieties produced by the threat of technological take-over run through a great many of Levi's short stories and articles. His vision and narrativization of our progression towards what recent scholarship terms the 'posthuman' condition is characterized by oscillation. Levi veers between accepting and resisting what Weber called the disenchanted, technologized 'intellectualization' of the world.⁶ He both appreciates efficient functionality and expresses fears aroused by the associated neglect of human moral and ethical concerns, and their replacement by mechanical rationality. This replacement is effected through a process of fusion between human and mechanical capacities, as described by Aram Vartanian in his study of the 'Man-machine' relationship:

The technical superiority of the machine, by transforming mere efficiency into a human ideal, has set in motion a convergence between itself and man [sic] which tends, on the one hand to lift the robot to a sort of sub-human role, and on the other to assimilate man to the machine not only in the biological or psycho-physiological sense, but also in relation to his values and conduct.⁷

⁵ Levi alludes to the fact that despite being used since the late eighteenth century, Watt's 'ciclo di retroazione' was only fully recognized and theorized as the 'feedback loop' in the twentieth century, in the 1930s and 1940s. N. Katharine Hayles explains that 'the feedback loop was explicitly theorized as a flow of information' which led to the birth of cybernetics when nineteenth-century theories of control were merged with new theories of information flow (*How We Became Posthuman*, Chicago: University of Chicago Press, 1999, p.8). Thus Levi's juxtaposition of machines and humans in this article can be read as an allusion to the beginnings of cybernetic theory. For a full history of the development of the feedback loop, see Otto Mayr, *The Origins of Feedback Control* (Cambridge, MA: MIT Press, 1970).

⁶ Weber asserted that 'there are no mysterious incalculable forces that come into play, but rather that one can [...] master all things by calculation [...] One need no longer have recourse to magical means [...] technical means and calculations perform the service. This above all is what intellectualization means'. See *Economy and Society: An Outline of Interpretive Sociology*, ed. by Guenther Roth and Claus Wittich (Berkeley: University of California Press, 1978), p.1003.

⁷ Aram Vartanian, 'Man-Machine from the Greeks to the Computer', in the *Dictionary of the History of Ideas*, ed. by Philip Paul Wiener, 5 vols (New York: Charles Scribner's Sons, 1973), III, pp.131-46 (p.146).

In 'Il brutto potere', Levi proffers both a bleak conclusion regarding the inevitable destruction of human life and hints at an unexplored solution, through the merging of human and mechanical systems. Yet his overriding concerns relating to the metaphysical implications for technologized human consciousness work here to prevent him from offering posthumanism as a solution to entropic disintegration. Indeed, here he desires homeostatic constancy in the body, rather than its augmentation through technical means.

This chapter investigates and analyses the technologized bodies that Levi depicts in his literature and journalistic writing, charting the progression from human to posthuman as it can be identified in his work. Building on the notions of technology already explored, I begin with some observations on the features of machines that intrigue Levi. I then focus on a series of short stories and articles written over several decades, from the 1950s up until the 1980s. These pieces are grouped in such a way as to reflect the various dynamics that characterize the relationship between humans and technology in Levi's oeuvre, and are divided into two main groups. First, I consider a series of encounters with a technologized 'other'. Second, I explore Levi's depictions of mergers between humans and technology, both voluntary and coerced, which portray and identify a wide range of posthuman beings in all their contradictory complexity. This larger selection of writings is subdivided into two parts: pieces that deal with the merger between biological processes and technology, with regard to reproduction, for example, and pieces that focus more on the social implications for these altered bodies, and their possible modes of interaction.

The ambivalent nature of Levi's engagements with technological apparatuses and with the human body itself becomes both more apparent and more complex as we move through the 'scritti' considered in this chapter. As ever, no clear answer emerges from his

explorations of the issues raised, no single mode of engagement can be identified in his approach to these concerns. One issue that comes to light is the importance of critiquing gender (im)balance in interaction between humans and machines. Although Levi was certainly not a feminist writer, many of the short pieces considered in this chapter—whether consciously or unconsciously—seem to argue that technology is often used by men to exploit women. I explore this aspect of his work, as his sensibilities appear to oscillate between a concern for humanity that is gender-blind, and occasional, relatively overt problematizations of the way in which women are subjected to and subjugated by technology in specific gendered ways.

If in ‘Il brutto potere’ Levi stops short of direct comment on the possibilities offered by the posthuman condition, elsewhere, as will be shown, he is far less reticent regarding the actual physical merger between biological and technological ‘machines’. Somewhat against his will, he seems to have accepted that ‘progress’ made in the postwar period meant that it was soon impossible for the average person in the western world to exist unmediated by technology. Yet while his writings imply concern about this development, his conclusions offer an open ray of hope.

Indeed, the description on the back cover of *Vizio di forma* (1971), probably written by Levi himself, exemplifies precisely these sentiments. The author first laments the pollution of the natural world that has left contamination both around and within our bodies, ‘l’anidride carbonica nell’atmosfera, il piombo nelle nostre vene’. The unequal distribution of resources is then problematized, since while ‘metà del mondo attende ancora i benefici della tecnica, l’altra metà ha già toccato il suolo lunare’. We are told definitively that ‘all’Arcadia non si ritorna’, but that any restoration of planetary order can

come only from technology. These stories are described as characterized by ‘un’aura di tristezza non disperata, di diffidenza per il presente, e ad un tempo di sostanziale confidenza per il futuro’ (I, p.1443).

I am unsure as to how substantial we can take Levi’s confidence to be, as the following discussion aims to demonstrate. However, the belief expressed here, that we can overcome our domination by technology only by reclaiming that technology, has also been taken up by other thinkers, as shown below. Incontrovertibly, the process of reclamation must take account of the fact that we are already, arguably irreversibly, posthuman beings of some description, as confirmed by the original title of *Vizio di forma: Disumanesimo* (I, p.1441). It is from and through this transformed state that we must work to retrieve the freedoms that define us as human; yet Levi’s capacity to affirm, with Haraway, that the machine has become a part of us in a positive sense, remains overshadowed by his views of culture and the implications of ‘intellectualization’.

It is worth noting here that I draw principally on Anglophone criticism and theory as a framework to this discussion: this is because, as with issues of anthropomorphism and bodily prostheses considered in the previous chapter, very little critical attention has been devoted to this aspect of Levi’s writing.

1. Marvellous Machines

As has already been demonstrated in earlier discussions of his use of computer technology, Levi was no luddite (see Chapter 4). Indeed, in his comments on the passage from Roger Vercel’s *Remorques* included in *La ricerca*, Levi presents ‘l’avventura umana nel mondo

della tecnologia' as a positive challenge (*II*, p.1444).⁸ This adventure enables one to test or measure the human condition; a variation on attempts to gauge the 'misura umana' in the writings of Homer and Conrad, for example, which exerted an enduring influence on Levi. Here, Levi tells us that 'il rapporto uomo-macchina non è necessariamente alienante, ed anzi può arricchire il vecchio rapporto uomo-natura'. However it must be noted that *Remorques* was written in 1935, and thus stemmed from an era less dependent on technology than the 1980s (when *La ricerca* was published), as confirmed by the heroic prominence of human reason and human valour in the person of Captain Renard. Levi further asserts that the 'uomo-natura' relationship, damaged by western science's tendencies towards domination, might be enhanced by the advent of technology as a feature of modern life;⁹ yet this must be viewed in light of the circumstances in which he first read the novel.

Remorques was given to Levi by a Greek doctor on the night when the Germans abandoned Auschwitz, and in the silence of the camp infirmary after the 'grande macchina del Lager' had been shut down, he read all night.¹⁰ In Levi's accounts, as well as figuring as a 'laboratorio' for immoral scientific experiments on human beings (*II*, p.1022), the Lager was also the site for the development of a new and terrifying 'innovazione [...] tecnologica': the gas chambers (*II*, p.1321). The latter remark is taken from an article published in January 1987 (*La Stampa*), 'Buco nero di Auschwitz', written from the perspective of a German. The fictional narrator refutes arguments made by historical

⁸ Roger Verceel, *Remorques* (Paris: Albin Michel, 1935).

⁹ On the dominating tendencies of western intellectual progress, see Adorno and Horkheimer: 'What men [sic] want to learn from nature is how to use it in order wholly to dominate it and other men' (p.4).

¹⁰ As Levi explains in his comments on *Remorques*, the novel is alluded to, but not named, in the closing pages of *Se questo, I*, pp.151-53. For his description of the Lager as a machine, see *I*, p.150.

revisionists who deny the Holocaust, since this deprives Germans of their contribution to technological 'progress'.¹¹ As such it constitutes a powerful critique of acritical approaches to the uses (and abuses) of technology. The late date of publication of Levi's article confirms the long-standing nature of his characterization of the Lager, supporting the hypothesis that all his observations on technology are underpinned by an awareness of this most horrific 'invention'. Thus it is no surprise that Renard's adventures at the helm of a 'rimorchiatore per salvataggi d'alto mare' seemed in contrast to offer an irreproachable alternative, humanitarian mode of employing technology.

Levi's presentation of Vercel's text in *La ricerca* is marked by nostalgia for a sense of hope that subsequent discoveries have rendered less tenable, more naïve, and as such seems out of step with many observations he made around the time of its publication (1981). Of especial note is an article published in 1983 (*La Stampa*), entitled 'I collezionisti di tormenti' (*II*, pp.1200-02). This describes an exhibition of 'Atroci macchine di tortura nella storia', contemptible for its acritical presentation of such devices in an age where the 'rationalism' of torture is all too present in everyday life. The text on display in the exhibition seems seduced by the capacities of these technologies, describing the 'notevoli pregi' of certain exhibits whilst positing others as 'divertente'. Levi questions the motivation for such exhibitions that fail to change the predilections of an individual given to torturous behaviour, and perhaps even encourage or authorize the latent fantasies which many of us secretly nurture.

¹¹ Well-known promoters of this controversial form of historical writing include the British historian David Irving, the former leader of the right-wing German party NPD Gunter Deckert and the US inventor and engineer turned researcher Fred Leuchter. In his 1989 Introduction to *The Leuchter Report* (Toronto: Samisdat Publishers Ltd., 1989), which claims to have examined forensic evidence that disproves the existence of the gas chambers in Auschwitz, Irving states rather dogmatically that 'chemistry is an exact science', a remark that would undoubtedly have irritated Levi (for the 1989 Irving piece see <<http://www.fpp.co.uk/Auschwitz/Leuchter/ReportIntro.html>> retrieved 15/11/03).

In this article, Levi suggests that all engagements with technological instruments (and the presentation of all exhibitions for that matter) must be undertaken with a critical eye, since the ‘exceedingly fragile boundaries between good science and bad science’ must be laid bare,¹² and individuals must be encouraged to challenge the assumed benefits of new technologies. At the same time as Levi was conceiving and writing his first stories dealing with the theme of technological developments, in the 1950s and early 1960s, Herbert Marcuse was writing his seminal text, *One-Dimensional Man*. This reflects on the extreme conformity of America during this period, a conformity that was spreading to and within Italy as a result of the US sponsored postwar recovery programmes and the Italian economic boom.¹³ Marcuse provides a critical account of a new form of industrial, ‘technological society’, founded on ‘the repression of all values, aspirations and ideas which cannot be defined in terms of the operations and attitudes validated by the prevailing forms of rationality’. In this environment, Marcuse argues, human freedom and individuality are threatened by technological restructurings of work and leisure time.¹⁴

Like Levi, Marcuse was sceptical of this often-chilling rationality, linking it to Kafka’s nightmare visions of the bureaucracy: having reflected at length on *The Trial* (1925) when he translated it, he observes how ‘la violenza viene dalla burocrazia, questo potere crescente, questo potere irresistibile che è frutto del nostro secolo’. Thinking of Kafka’s text, his own experiences and our potential future, he comments:

¹² Jordanova, ‘Science, Machines and Gender’, p.117.

¹³ The European Recovery Plan or Marshall Plan was named after George Marshall, US Secretary of State in 1947. See Ginsborg (pp.78-79 and 157-60), for a discussion of how this financial injection influenced Italian life and culture.

¹⁴ Marcuse, *One-Dimensional Man* (London and New York: Routledge, 1991; 1st edn 1964). This citation is taken from Marcuse’s prospectus for the volume, Beacon Press archives (nd), cited on p.xii.

Dopo aver verificato come uno Stato moderno, organizzato, tecnicizzato, burocratizzato abbia potuto partorire Auschwitz, non si può non pensare con spavento alla possibilità che quell'esperienza si rinnovi. Quell'esperienza può rinnovarsi [...] questo lo vedo e lo temo.¹⁵

In this vein, Levi describes his *Storie naturali* not as 'fantascienza, se per fantascienza si intende l'avvenirismo, la fantasia futuristica' but 'storie più possibili di tante altre. Anzi talmente possibile che alcune si sono persino avverate' (Fadini, 'Scrittore dimezzato' p.106). These are futures so close we can sometimes already feel their shadow upon us, and they should be read as cautionary tales based in reality.¹⁶

However, despite this bleak view, Levi also suggested that beyond one-dimensional life lay the possibility for freedom. Although firmly against the spreading 'mechanics of conformity' that has resulted from developments in capitalism and technology, Marcuse too is far from condemning rationality outright. Instead he understands that 'critical reason' is 'the source of both the individual's liberation and society's advancement'.¹⁷ Thus, to restore autonomy to the individual, we must reclaim critical reason for humanitarian ends, just as Levi suggests we reclaim technology for the same reasons. In the remainder of this chapter I ask whether it is this reclamation that Levi is trying to achieve in his depictions of technology, and how we should read and relate to the message

¹⁵ De Melis, p.190. For accounts of Levi's experience of translating *Il processo*, commissioned by Giulio Einaudi as the initial text in a series of 'scrittori tradotti da scrittori', see *II*, pp.1586-87; 'Tradurre Kafka' (*II*, pp.939-41); and his interview with Greer, in which he admits that upon finishing the translation he fell into a six-month long depression (*Conversazioni*, p.75).

¹⁶ As regards the prescience of other science fiction writing, see also Levi's comments on the work of Aldous Huxley ('Aldous Huxley', *II*, pp.637-40), and Arthur C. Clarke ('Vediamo un po' quali cose si sono avverate', *II*, pp.1166-67).

¹⁷ From Marcuse's 1941 article, 'Some Social Implications of Modern Technology', in *The Essential Frankfurt School Reader* (NY: Continuum, 1985), ed. by Andrew Arato and Eike Gebhardt, pp.138-62, cited in Marcuse, *One Dimensional Man*, p.xix.

he secretes in his texts (despite his protestations to the contrary).¹⁸

2. Encounters with the Technologized 'Other'

In *Science avec conscience* Edgar Morin points out that we cannot isolate technology from ourselves, since there are links which run from science to technology, to industry, to society (p.99). Moreover, we should avoid isolating technology as this would be to render it a fetishized, cult object ('l'idolâtrer'). The resultant sense of impotence that humans often experience when faced with 'science' or 'technology' is thus in part fictional, although as argued by Vantanian and elsewhere by Morin (see above), this impotence may result in a subjugation which is far from illusory.

In this section I discuss the dynamics operating in Levi's fictional descriptions of encounters between humans and technologized bodies or beings, framed as encounters between two individual, discrete species but which often reveal themselves to share profound connections. I explore how this discovery of 'sameness' affects the power balance between humans and technologized others. With regard to Levi's engagements with the 'other' Gordon argues that:

For Levi, as for Levinas, the roots of the ethical lie in the encounter between two people, each looking at the other, acknowledging and recognizing the other, in particular acknowledging the 'otherness' of the other. (*Ordinary Virtues*, p.40)

If it is ethical to confront the other 'face to face', by what characteristics should we recognize others that have no recognizable face, and thus eschew such acknowledgement?

¹⁸ In his foreword to *Racconti e saggi* (Turin: Editrice La Stampa, 1986; repr. in *II*, pp.857-993 (p.859)), Levi asks the reader not to go looking for messages in his work. He claims to be neither a prophet nor a seer, but in his 1987 preface to the second edition of *Vizio di forma* (1971), he highlights the several details from his stories that have come to be realized; a realization that both pleases and saddens him.

Besides attempting to address this difficulty, I shall be arguing that in addition to acknowledging difference, Levi's encounters are enhanced and gain their compelling complexity by recognitions of often uncanny similarities. First I examine two encounters with automated others; a robot and a golem. 'Il Versificatore', a short drama that was first published in 1960 and subsequently developed into a radio play, recounts the meeting between a poet, his secretary, a salesman (Simpson) and the eponymous robotic writing machine (*I*, pp.413-33). 'Il servo', the story of the Rabbi Arié who made a golem, was published in *Vizio di forma* (*I*, pp.710-17). I then move on to explore encounters between humans and alien beings.

As mentioned in Chapter 4, Simpson presents the Versificatore as the solution to the poet's writer's block and rising work levels.¹⁹ What interests us here is not the quality of language produced by either 'creator', but the tension between human and machine. In this drama, the secretary represents the alienated individual whose livelihood is threatened by the machine; she articulates this fear herself, and it is seen to be well grounded as by the end of the drama the Versificatore has replaced her as support to the poet.¹⁹ Her validity is, however, undermined, as her initial reservations about the machine's lack of sensitivity are placated when the Versificatore produces its 'legame...poetico' (*I*, p.432). Moreover, she is herself instrumental in blurring the distinction between human and machine when she is offended at the apparatus' composition entitled 'Una ragazza da portare a letto', and has to be reassured by the poet, 'È una macchina, lo ha dimenticato? Da una macchina mi pare, non c'è niente da temere' (*I*, p.428). The irony of this last statement is fully realized in the

¹⁹ In *Doing it the Hard Way: Investigations of Gender and Technology*, ed. by Dorothy E. Smith and Susan M. Turner (Boston: Unwin Hyman, 1990), Sally L. Hacker documents how automation affects especially 'lower level (female) management, and women workers in clerical positions' (p.164). Thus Levi was accurate in his depiction of the casualties of automation in the workplace.

closing lines of the drama, spoken by the poet, who reveals that the entire play was written by the Versificatore who has supplanted even his employer.

The history of artificial intelligence has recently received much critical attention. For example, Hayles charts how the first stage in its development, from 1943-60, is comprized by early cybernetics and the construction of machines whose objective was 'less to show that man [sic] was a machine than that a machine could function like a man' (*Posthuman*, p.7). This stage focused on the production of feedback loops that mimicked homeostasis in humans, as discussed by Levi in 'Il brutto potere'. Considering the Versificatore in light of this, we see that the machine in fact functions like a human: it is praised as 'umano' by the poet when it regains confidence after successfully negotiating a difficult passage of composition, and even the secretary admits 'simula bene il comportamento umano' (*I*, pp.426-28). As regards gender, and functioning 'like a man', the Versificatore articulates desire for a woman that categorizes it as male (in Levi's heteronormative world), but then assumes secretarial tasks that would classify it as female in human terms (according to socio-cultural stereotypes and gendered divisions of labour). This oscillation of gender is reflected in language as it is addressed by a range of words codes 'masculine' and 'feminine': 'il Versificatore', 'la macchina'. Interestingly, when it offends the secretary words fail her, as she realizes on some level that she has engaged with the machine as if it were a human male, but needs to reassert the difference between her existential state and that of the Versificatore. She finally calls it 'quel...coso!' (*I*,

p.428).²⁰

The privileged mode of engaging with the machine is by discerning its ‘human’ characteristics, which are both projected onto it by the other characters, and written into its design as part of the objective driving early cybernetic experiments. Although initially at the mercy of human benevolence—reliant on electric current, as seen when the secretary pulls out the plug—the Versificatore soon becomes indispensable, replacing the poet as creative writer and usurping the secretary’s job. As readers, we are torn between feeling pity for a being that cannot experience physical contact—a response extorted from us in a bid to further ‘humanize’ the machine and win our sympathy—and feeling fear provoked by the Versificatore’s sinister assumption (or colonization) of the first person narrator.

In ‘Il servo’ the boundaries between human and machine are further blurred, as are those between religious mythology and the roots of modern technology. Rabbi Arié decides to make a golem in a process that echoes God’s creation of Adam whilst simultaneously evoking contemporary technology. We are told that the golem is ‘poco piú che un nulla: è una porzione di materia, ossia di caos, racchiusa in sembianza umana o bestiale, è insomma un simulacro’. We are warned that creating a golem risks infringing the commandment not to make and worship idols, and then informed that Adam was a golem, ‘ed anche noi lo siamo’. Arié, however, does not wish to create ‘un secondo Adamo’, but rather ‘un lavoratore, un servo fedele e forte e di non troppo discernimento:

²⁰ The secretary’s engagement with the machine as male because of its behaviour lends support to well-established arguments for the constructed nature of gendered behaviour as distinct from biological sex (which the Versificatore’s programming has established as male, thus more powerful); see E.D. Nelson, and B.W. Robinson, ‘The Social Construction of Sex, Gender and Sexuality’, in *Gender in Canada* (Scarborough, ON: Prentice-Hall, 1999), pp.1-40.

ciò insomma che in sua lingua boema si chiama un *robot*' (*I*, pp.710-11; emphasis added).²¹

Levi's concept of a golem is sufficiently flexible to accommodate both the conscious human and the automaton, binding them through a shared substance, 'argilla', which is then invested with the appropriate elements of 'spirito'. For example, Arié endows his golem with Abraham's obedience and Joshua's courage, but denies it blood since this also brings 'tutte le passione della bestia e dell'uomo'. However, even the carefully calibrated golem is not entirely under control since it takes human form only to the belt, 'una frontiera', below which 'il Golem era veramente Golem, cioè un frammento di caos' (*I*, p.713). When Arié mistakenly gives the golem contradictory orders, it is these nether parts of chaos that rebel, and the servant morphs along the continuum of golem-identity, from being Arié's son, to assuming a colossal, incontrovertible 'peso disumano', and the solidity of rock, as which it finally crumbles.

As Mattioda points out,²² Levi elsewhere narrates the creation of the first golem in the legend of Lilit, the first woman (*II*, pp.18-23). Created as one with Adam, and then rent apart by God, Lilit's 'forma senza forma' rebels as did Arié's golem. Moreover, I would argue, the resemblance between the two golems is related to both temperament and physicality; Lilit too is described as only half human in Levi's poem of the same name: 'è donna bella fino alla cintura; / Il resto è fiamma fatua e luce pallida' (*II*, p.534). Levi also mentions a third kind of golem, his personal computer:

Finché non vi introduco il disco-programma, l'elaboratore non elabora nulla, è un esanime scatola metallica; però, quando accendo l'interruttore [...] mio Golem personale [...] diventa vivo.²³

²¹ Vartanian discusses how the golem 'which in sixteenth-century Yiddish folklore was envisaged as a beneficent servant of man, has spawned in our own time a numerous progeny of "mechanical creatures" about whose intentions we are far less confident' (p.146).

²² See the chapter 'Golem', in *L'ordine del mondo*, pp.79-89 (p.80).

²³ 'Lo scriba', *II*, pp.841-44 (p.842); see Mattioda, *L'ordine del mondo*, pp.82-83.

The programming disc that enlivens the computer functions analogously to the written law which Arié places between his golem's teeth or to God's blessing when he created male and female human beings.²⁴ Like the Versificatore that can be unplugged, Levi's computer can be turned off at will. However, it belongs to the same family as HAL, the computer invented by Arthur C. Clarke and Stanley Kubrick for the film *2001: A Space Odyssey*, which 'could do about *anything*. Indeed, HAL could do too *much* of anything'.²⁵ It is this comparable tendency towards excess that allows us to map the three types of golem onto one another. Levi's personal computer will not take control of or threaten to destroy his life, but an alternative model might. With Lilit and the 'servo', Levi locates their chaotic urges—which for the 'servo' translate into overpowering strength—in their formless genitalia and lower bodies, demonstrating characteristic anxiety about sexuality and its somatic signifiers.²⁶ The Versificatore too wins over the secretary through reference to sexual activity. Thus the relationship between humans and technologized others is animated by a decidedly erotic frisson.²⁷

In her analysis of Fritz Lang's *Metropolis* (1926), Jordanova reveals how the

²⁴ Genesis I, v.26-27. The story of Lilit relies on the lacuna in the Bible that fails to account for the fact that God appears to make humans twice; one on the sixth day, where he blesses the man and woman, and again after the seven days of creation, when he breathes life into Adam and creates Eve from Adam's rib (Genesis II, v.7-21).

²⁵ Stanley Kubrick, *2001: A Space Odyssey* (1968); Jeremy Bernstein, *Experiencing Science*, rev. edn (London: Burnett Books, 1979), p.236.

²⁶ This position might be compared with Levi's observations about the elements of the unconscious, or irrational self that affect the writer, explored in Chapter 4 above: 'lo scrivere non è un mestiere razionale, o non tutto. Cioè, quando uno scrive, c'è anche l'inquilino del piano di sotto che collabora...e se ne accorge più il lettore di chi scrive. E questo è, come dire, è un...colpo all'ambizione e alla superbia di chi pretende di scrivere tutto dalla cintola in su'; Amsallem, 'Conversazione', p.61.

²⁷ In Marge Piercy's *Body of Glass* (Harmondsworth: Penguin, 1992) dedicated to Levi's memory, the parallel narrative tells the stories of Joseph, a golem created in 1600s Prague by the Rabbi Judah Loew, and Yod, a cyborg created in a futuristic time to fight against a dehumanizing technological rule of fear and oppression. Both storylines focus on the fraught issue of sexual relations between organic humans and their created likenesses.

dangers of sexuality and technology are 'riveted together' in the form of the female robot Maria, who exerts an irresistible lure on the men she encounters.²⁸ She emphasizes that the gender balance of male scientist versus manipulated female character is far from casual, and in fact results directly from traditional identifications of nature as woman, and the ensuing conflation of domination over nature with sexual power (p.125). Hacker also discusses the tension between technical efficiency and sexuality but draws on Marcuse's work to present the opposing view that 'for technical rationality to "work" (as an ideology to shore up hierarchy in social relations) it must be divorced from sexuality'.²⁹ In the following two examples of encounters with alien life, bodily functions—especially reproduction and by extension sexuality—are revealed as central issues. Levi shows the value he places on freely expressed emotion, and also displays concern about bodily functions and sexual encounters that are hyper-rationalized or purely utilitarian in nature. However, his notion of free experience remains conditioned by normative notions of gender identity and power.

'L'intervista', a short story written in 1977 (*II*, pp.863-65) tells of an interview conducted between a strange being—'lo straniero'—and a tired factory worker, Elio, returning home after the night shift. Elio's life is organized according to the logic of technological efficiency, a logic that is slowly seeping into his view of human existence. The stranger, who intriguingly has no body but consists of a strange puddle-like stain on the ground, asks a barrage of questions related to digestive processes, death and

²⁸ Ludmilla Jordanova, 'Science, Machines and Gender', in *Sexual Visions: Images of Gender in Science and Medicine between the Eighteenth and Twentieth Centuries* (Madison, Wisconsin: University of Wisconsin Press, 1989), pp.111-33 (p.124).

²⁹ Hacker, p.121. She cites from Marcuse's *One-Dimensional Man*: 'True knowledge and reason demand domination over—if not liberation from—the senses [...] The link between reason and sexuality or eroticism is broken; scientific rationality dominates. As nature is scientifically comprehended and mastered [...] the rational hierarchy merges with the social one' (Boston: Beacon, 1964), p.166.

reproduction, requiring rationalized, homogeneous answers that Elio finds disconcerting, for example, 'Come morite? A quanti anni?'. It transpires that the stranger has learned about Earth from our television programmes, and thus engages with advertisements as *descriptive* of human behaviour, rather than the *prescriptive* 'suggestions' as which they might more accurately be described.³⁰ Hence the stranger concludes that 'Vivono a lungo quelli che usano lenzuola bianche e danno la cera ai pavimenti'(II, p.864); a formulaic deduction that recalls Marcuse's 'mechanics of conformity', allowing Levi to comment obliquely but powerfully on the normative, 'disumano' quality of television. This technology communicates through the vehicles of human presenters, but whose voices (reproduced by the stranger) are insipid and irritated, and whose televised revelations on chromosomal inheritance encourage Elio to temper his description of reproduction by sidelining psychological and emotional issues to focus solely on biology.

In this story, our modern, western lives are seen from an external perspective that fuses the human with the non-human. When the stranger asks at what age clothing develops, Elio's clarification that our clothes are not part of our bodies falls on deaf ears. The stranger's 'mistake' in interpreting advertisements is to take them as literal representations, whilst we are (theoretically) aware of their manufactured nature. Levi's achievement here is to capture Elio's confusion and ill-harnessed resistance as he finds himself forced to confront a technologized view of human life, in which, as Marcuse

³⁰ See the chapter 'The Culture Industry: Enlightenment as Mass Deception', in Adorno and Horkheimer, pp.120-67: 'The triumph of advertising in the culture industry is that consumers feel compelled to buy and use its products even though they see through them' (p.167). See also Stuart Ewen's *Captains of Consciousness: Advertising and the Social Roots of Consumer Culture* (New York: Basic Books, 1976), and the anonymously published *Test Card F: Television, Mythinformation and Social Control* (Edinburgh: AK Press, 1994). This text cites a passage from Bruno Bettelheim's *The Informed Heart* (Harmondsworth: Penguin, 1986; 1st edn 1960), describing how prisoners in the Lager were only allowed to notice what was permitted by the guards, and not to have a will of their own.

suggests, 'scientific rationality dominates'. Elio is sure that advertisements are not real life, but fails to convincingly argue this point, for when he is made to encounter his cultural world through the perspective of the other, he suffers from a sense of alienation that comes not from the 'straniero', but from much closer to home; from the 'technological society' around him. Far from succeeding in 'seeing inwardness from the outside', as Levinas would have it, through (mis)recognition the stranger defines humans by their external trappings, revealing how little 'inwardness' is left to us.³¹

Another encounter with alien life that forces the reader to consider his or her everyday environment from an alternative perspective is 'Le fans di spot di Delta Cep' (II, pp.1297-1300). This piece takes the form of a letter written by a female inhabitant of this female dominated planet, in which men are headless, resemble asparagus and are bought and used simply to fertilize women by being inserted under their armpits. The letter displays palpable anxiety about feminist science fiction or fantasy writing that suggests the possibility of life without men, or at least without female subjugation.³² Like 'L'intervista', this letter also refers to television programmes, especially advertisements for jams and contraceptives, which appeal to or intrigue the residents of Delta Cep. Levi's writing carries a radically anti-feminist message. The writer delights in men's beards (explicitly that of the Turinese popular science writer Piero Bianucci, to whom the letter is addressed), reveals that local constellations are named after kitchen implements, offers herself as a body to be touched and writes 'sexy' stories about falling in love with a man who she

³¹ This point is discussed in Homi Bhabha's *The Location of Culture* (London: Routledge, 1994), p.16. He is referring to Levinas' discussion of the 'art-magic' of the contemporary novel in 'Reality and its Shadows', in *Collected Philosophical Papers* (Dordrecht: Martinus Nijhoff, 1987), pp.1-13.

³² See for example Joanna Russ' *The Female Man* (New York: Bantam Books, 1975), or Gerd Brantenberg's *Egalia's Daughters* (London: Journeyman Press Ltd., 1985; 1st edn 1977). There is no evidence to suggest that Levi had read this novel or others in the genre, but he is arguably responding indirectly to feminist calls to rethink the gendered hierarchies in social structures.

keeps—rather than sending ‘al macero’—emphasizing the violent and ‘inhuman’ nature of female dominated societies in contrast to ‘normal’ human behaviour.

Here, as in his story ‘Il fabbro di se stesso’, Levi ties social role to biological sex, insisting on the innate ‘naturalness’ of women admiring men and being associated with domestic chores. Ostensibly, for the author of the letter, we are the aliens.³³ Yet the response from Delta Cep seems intended to comment more on the growing feminist movement in Italy and elsewhere, than on possible alternative civilizations. As in ‘L’intervista’, the target of Levi’s criticism—attacked here for its attempt to revolutionize social order—is therefore located within, rather than beyond, his own culture.

Thus we return to issues of impotence with which this section began; impotence before the rise of technology, the automating of society and the galvanizing of the feminist movement. We also return to Levi’s conservative streak which he is at pains to deny in his discussion of homeostasis. In the stories mentioned here, Levi uses the encounter as a situation through which to explore the qualities of human society, its insidious domination by technology and changing elements within society which he deems at some level to be ‘inhuman’. According to Bhabha’s understanding of culture, ‘when one culture eliminates what it considers not human, it identifies itself, according to its own definition, as human’.³⁴ Applying this logic to Levi’s fiction, we might conclude that he identifies as human a male dominated world—as nostalgically evoked in the letter from Delta Cep—

³³ This piece may well have been inspired by the excerpt from Frederick Brown’s ‘Sentry’ (Galaxy, New York, 1954, Italian trans. by Carlo Fruttero as ‘Sentinella’, in *Le meraviglie del Possibile. Antologia della fantascienza*, ed. Sergio Solmi and Fruttero (Turin: Einaudi, 1959), pp.67-70), that Levi cites in *La ricerca* (II, pp.1491-92). Although the ‘alien’ enemy is human, the sufferings of the alien protagonist recall the plight of human soldiers in World War I. ‘Visto di lontano’ in *Vizio di forma* (I, pp.600-08) functions in a similar way, using techniques of defamiliarization to enable resensitized recognition of events that take place on Earth, seen through the eyes of an alien observer.

³⁴ *A Dictionary of Cultural and Critical Theory*, ed. by Michael Payne (Oxford: Blackwells, 1996), p.129.

where life is not run by machines or insidious advertising jingles, and where love and emotional development triumph over automated brute strength ('il servo') and rampant female sexual activity (Lilit).

In addition to these questionably misogynistic characteristics, an appreciation of the necessary time required to achieve an action also emerges as an important classifying feature marking off the human from the other: the *Versificatore* composes poems in imperceptibly short spaces of time ('qualche microsecondo', *I*, p.430); the 'straniero' is in a hurry and insists the interview will only take two minutes (*II*, p.863); on Delta Cep everything is done 'piuttosto in fretta' (*II*, p.1299). Yet a desire for tasks to be achieved more quickly stems from the rationalization and technologization of society, which stems in turn from human innovation. Thus we also return to Morin's warning that machines manipulated by human action adapt frighteningly easily to revisit this manipulation upon their makers. The impotence felt before the awesome power of the machine can be understood as impotence before the inflated Enlightenment desire of men to dominate and tame the world around them, to exploit new technologies without a thought for their implications. Levi himself also warns of this time driven danger in 'Trenta ore sul *Castoro sei*' (we need '[il] tempo di sbagliare e correggersi', *II*, p.705), and in 'Tecnografi e tecnocrati' (we should attempt to slow the technocrats' 'folle corsa verso il profitto immediato', *I*, p.1183).³⁵

As regards Levi's approach to the role of gender in the conflict and convergence between humans and technology, the issue is complex and will be better resolved after

³⁵ This desire for a return to an acceptable pace of life led in Italy to the establishment of the 'Slow Food Movement'. Founded in Piedmont by Carlo Petrini in 1986, Slow Food 'seeks a rediscovery of authentic culinary traditions and conservation of the world's quality food and wine heritage by countering the effects of technology and speed on the way we eat': <www.slowfood.com> retrieved on 15/11/03.

consideration of the pieces discussed in the next section. However, with relation to his antipathy for time pressure and rationalized or normative perspectives on human existence, a familiar, defining principle is emerging: an appreciation of contradictions. Just as contradictory orders led to the destruction of Arié's non-human golem, so we inversely benefit from 'una flessibilità intellettuale che non teme le contraddizioni', capable even of embracing these oppositions as a vital part of life which resists any absolute 'regola' (II, p.798). To be human is to be flexible, to live beyond the letter of the law, to appreciate 'impurezza' and disorder. And here we see a contradiction in Levi's own thought, as that the most characteristic part of the golem is also a part of being human; the chaos of contradiction and licence. The golem or computer that rebels is more human than the person who submits to 'technologized society'; thus we are asked paradoxically to look to rebellious machines to rediscover what it means to live as a human, to recognize in the other what we have lost from ourselves.

3. Mergers and Acquisitions

Hayles informs us that the second stage of cybernetics is '*reflexivity: the movement whereby that which has been used to generate a system is made, through a changed perspective, to become part of the system it generates*' (Posthuman, p.8; emphasis in original). On one level this is comparable to Calvino's interest in the blurring of boundaries between the observer and the observed, explored most substantially in *Palomar* as the protagonist loses himself in the phenomena he views.³⁶ However, in Levi's hands

³⁶ Turin: Einaudi, 1983. See also Pierpaolo Antonello, 'Paesaggi della mente: su Italo Calvino': *Forum Italicum*, 32/1 (1998), 108-31.

reflexivity assumes a less philosophically curious, more sociologically sinister meaning. Humans create machines which then absorb their creators into a mechanically organized dimension; comparable to Weber's concept of the 'iron cage' of rationality.³⁷

This is perhaps most clearly illustrated in Levi's work by a group of stories and essays that tackle the rationalization and bureaucratization of birth and death. For Weber, the bureaucracy was the paradigm of 'formal rationality': the institutionalization of the optimum means of achieving a given objective—a process which deresponsibilizes the individual by offering structural support but demanding social conformity. The bureaucracy boasted efficiency, large-scale capacities for quantification, predictability and '*control over people through the replacement of human with nonhuman technology*'. In the early twentieth century, the influence of Frederick Winslow Taylor's theory of 'scientific management' and Henry Ford's production line strategies aided the spread of such control, as work tasks were broken down into actions that could feasibly be undertaken by a machine.³⁸ In Levi's depictions, alienated individuals become trapped by a system that denies their own needs and humanity, as well as those of others their work and actions may affect, requiring them to reason analogously to the machines that surround them. This initial form of merger between human and technological elements is accompanied in Levi's fictional explorations by reflection on the repercussions for freedom and personal

³⁷ Weber believed that bureaucratic rationality functioned as a cage-like structure in which alienated individuals became imprisoned. On the bureaucracy see chapter XI, vol II of *Economy and Society*. See also Alan Sica, *Weber, Irrationality and Social Order* (Berkeley: University of California Press, 1988), and Raymond Murphy, *Rationality and Nature: A Sociological Enquiry into a Changing Relationship* (Boulder, Colorado and Oxford, UK: Westview Press Inc., 1994).

³⁸ George Ritzer, *The McDonaldisation of Society* (Thousand Oaks, California: Pine Forge Press, 1996), p.19. See Frederick Winslow Taylor's *Principles of Scientific Management* (New York and London: Harper & Brothers Publishers, 1916; 1st edn 1911), and on Ford, Alfred Dupont Chandler, *Giant Enterprise, Ford, General Motors and the Automobile Industry* (New York: Harcourt Brace and World, 1964). See also Mark Seltzer, *Bodies and Machines* (New York and London: Routledge, 1992).

development when biological processes are organized according to hyper-rational logic. I argue that this produces an alienated understanding of the organic body in terms of mechanical processes and parts.

Before examining the first group of writings to be discussed in this section which illustrate the technological mediation of embodiment, I first outline what I understand by the term 'posthuman' or 'cyborg' body, drawing on the work of Hayles and Haraway. According to Hayles, the 'posthuman view' can be characterized by—among other features—an understanding of the body as 'the original prosthesis we all learn to manipulate' through a process of continual extension and replacement that works as a kind of physical palimpsest. This enables the essential configuration of the posthuman body as 'seamlessly' compatible with intelligent machines: 'In the posthuman there are no essential differences or absolute demarcations between bodily existence and computer simulation, cybernetic mechanism and biological organism, robot teleology and human goals.'³⁹

Hayles goes on to clarify:

it is important to recognize that the construction of the posthuman does not require the subject to be a literal cyborg. Whether or not interventions have been made on the body, new models of subjectivity emerging from such fields as cognitive science and artificial life imply that even a biologically altered *Homo sapiens* counts as posthuman. The defining characteristics involve the construction of subjectivity, not the presence of nonbiological components. (*Posthuman*, p.4)

Thus the posthuman body may not appear any different from 'normal' bodies, and much of its technologization impacts most directly on mental processes. Furthermore, it may be argued that many people alive today were born into posthuman bodies; a situation that Levi dramatizes to great effect.

³⁹ The other characteristics of posthumanism she cites are 1) the privileging of 'informational pattern over material instantiation', thus negating the physical specificity of embodiment, and 2) the dislocating of consciousness from its traditionally central position in western thought (*Posthuman*, pp.2-3).

In her 'Manifesto', Haraway defines a cyborg as a 'hybrid of machine and organism' (p.149), arguing that it appears where the boundaries between human and animal, or human and machine are transgressed and become 'leaky'. In contemporary cultural life, she asserts, these boundaries have become more indistinct and indistinguishable than ever due to the streamlined dimensions of modern machines: reduced in size to microelectronic instruments, 'they are everywhere and they are invisible'. In contrast to the cumbersome bulk of early computers, contemporary machines are as light, bright and pervasively ubiquitous as sunshine, enjoying an invisibility that renders them all the more dangerous: 'They are as hard to see politically as materially. They are about consciousness – or its simulation' ('Manifesto', pp.152-53).

Haraway's depiction of consciousness-control through waves of technologized communication or colonization recalls Foucault's descriptions of internalized self-surveillance resulting from the disciplinary panopticism of society (*Discipline and Punish*, pp.195-228). Levi's narrations of the posthuman experience are dramatizations of controlled societies that lament the loss of independent thought and action due to both openly imposed and insidiously hidden forms of oppression. I look first at a group of stories that respond to the rationalization and control of birth and death, and then at a selection of writings that tackle technologized forms of social repression and exploitation – both widespread and of individuals – which necessitate material and behavioural alterations to the 'prosthesis' of the body. Rather than present the case for enhanced bodies as more efficient and productive through merged systems and the acquisition of new abilities, Levi's work shows the commodification of human existence, and the reinforcement of the Cartesian mind/body split.

i. Bureaucratized Bodies

Levi's concern with the repressive conditioning of society is informed by his avowed admiration of Aldous Huxley's novels, especially of *Brave New World*.⁴⁰ In his essay on Huxley (*II*, pp.637-40), Levi highlights the sinister homogenization of this new world's different races into a supnation, and the rationalization of birth through the 'treated' 'Epsilon' grade embryos that will produce the requisite population of 'semideficianti' manual workers. 'Se i tecnici avranno mano libera', Levi warns, they will establish a precise logic of eugenic intervention to enable uniform happiness across diverse strata of the workforce (*II*, p.639). This concern is not merely speculative, as is confirmed by Huxley's painful acknowledgement in the 1958 piece *Brave New World Revisited*⁴¹ that his dystopic predictions were already being realized; the last thing many science fiction writers would wish to witness.⁴²

Furthermore, only one year after the publication of his essay on Huxley, Levi found himself reacting to experiments carried out in Naples aimed at determining the sex of foetuses.⁴³ From the title of the article provoked by these experiments it would appear that far from equivocating about the issues involved in judging this type of research, Levi has taken a definitive stance: 'Io lo proibirei'.⁴⁴ Indeed, the research is vilified as a squalid activity that would surely result in an artificially distorted ratio of male to female children, dictated by current fashion trends. Yet despite condemning these experiments, Levi is

⁴⁰ London: Flamingo, 1994; 1st edn 1932.

⁴¹ New York: Harper, 1958.

⁴² See notes 16 and 18, in the current chapter, for Levi's engagements with this type of prophesying.

⁴³ These experiments were performed by a Professor Magli, see note, *II*, p.1309.

⁴⁴ *La Stampa*, 6 December 1986, *II*, p.1309.

characteristically gender-blind to the undeniable time-honoured 'fashion' that consistently privileges male over female new borns—a long-standing practice in India, for example, through female infanticide and sex-determined abortion.⁴⁵ Moreover, he declares in the article that he is not opposed to eugenics in principle if it leads to the improvement of the human condition, but that the research in Naples falls outside the category of eugenic intervention. From the rather mixed signals sent by this response we may conclude first that Levi was disposed to accept positive technological advances if carried out responsibly and ethically; second, although apparently unmoved by or unaware of the consistent misogynistic bias operating in social and scientific practices, he opposed interference in biological processes to produce 'modified' human specimens.

Levi had already focused on the technologies of reproduction in the short story 'I sintetici', written more than a decade before his observations on eugenics, in 1971 (*I*, pp.588-99). Mario, the protagonist, is taunted by his schoolmates for being different; he is intelligent, disinterested in sports and, as his twelve-year old peers hypothesize, has no navel because he was conceived in a test tube and not born of a woman. This theory is advanced by his classmate Renato, influenced by partially understood television and newspaper reports about *in vitro* fertilization⁴⁶ and an adolescent appropriation of classic racist assumptions of superiority. Similarly to the graded forms of foetus Huxley describes in *Brave New World*, Renato reveals how parents can choose their child's features from a

⁴⁵ See for example Barbara D. Miller, *The Endangered Sex: Neglect of Female Children in Rural Northern India* (Ithaca and London: Cornell University Press, 1981). Female infanticide was traditionally openly admitted by locals as common practice until outlawed by British intervention in 1870 (p.49). European cultures have also historically privileged and desired male children over female children.

⁴⁶ IVF was developed in the UK by Doctors Patrick Steptoe and Robert Edwards, and the first 'test-tube' baby was born as a result in 1978, 7 years after Levi published 'I sintetici'. See José Van Dyck, *Manufacturing Babies and Public Consent: Debating the New Reproductive Technologies* (New York: New York University Press, 1995), Chapter 3, 'Constructing the Need for New Reproductive Technologies', pp.61-86.

menu, as well as choosing its sex by using a red or blue pill (an anticipation of the experiments in 1986 which so appalled Levi). According to Renato's logic, Mario must be one of these 'different' beings since he has freckles in unusual places, white marks on his fingernails, pronounces his 'r's in a particular manner and does not fight (*I*, p.593).

Although at first he vehemently denies Renato's accusations, Mario then reclaims his status as 'different', declaring to his teacher that he is indeed 'sintetico' (*I*, p.596) and creating a schoolyard myth of how synthetic beings, born, or 'constructed' as a result of telephone calls or radio communication, will take over the planet (*I*, pp.597-99). In this story Levi sets up a series of oppositions: on one level, bullying, racist tactics employed by individuals who obtain power by aggressive means as opposed to sensitive, reasoned intelligence; on another level, the human and the posthuman. Intriguingly, although one might expect Renato's fascist ideals of physical superiority to map seamlessly onto a scientific vision of homogenized human progeny akin to Huxley's (or the Nazi) super-race, his choice of Mario as an example relegates the posthuman to an inferior status. Hence Mario is not a creation who completes the teleology of eugenic intervention begun by prejudiced social stigmatization, but a thin boy who inspires fear in his brutish physical superiors through his intelligence, which is rumoured to be magnetic or electronic.

For Mario, claiming posthuman status is a way out of subjugation, while for Renato, tainting Mario with this label is a defensive response to his own inadequacies combined with a desire to encourage exclusionary behaviour. For the reader, sympathies are torn, since both Renato and Mario assume deeply problematic positions. With regard to the former, *in vitro* fertilization has benefited many couples, but recent cases—which Levi anticipates—have highlighted the moral complexities of this procedure when technology

enables too many choices.⁴⁷ With regard to the latter, clearly bullying and exclusion are wrong, but aspirations to technologized homogenization are equally fraught. Renato's stance constitutes a tense fusion of physical fascism and scientific possibility, yet even the fascist is halted by the inhuman mechanization that these 'possibilities' may engender. In Angier's view, 'I sintetici' hinges on an exploration of what it is to be human: for Renato, this means 'dehumanizing anyone different' as Bhabha suggests; for Mario it means smoothing over the angst of human frailty with 'inhuman' visions, followed by an 'all too human' shame as he realizes he has reproduced exactly Renato's 'them' and 'us' strategies (Angier, p.99).

Interpreting this story within a biographical framework, Angier then connects it to the antisemitism Levi suffered at school, and the fascist ideal of physical prowess which he lacked.⁴⁸ Within a discussion of Levi's treatment of the posthuman, babies whose characteristics are technologically determined are reminiscent of Hayles' definition of the posthuman as 'biologically altered'. One might also consider Mario, as rendered in Renato's compulsive fantasies of his computer-like brain and eyes that shine like phosphorescent watch dials, as exemplifying Haraway's claim that the distinctions between human and machine are leaky and blurred. The point of Levi's story, I argue, is to show the tangled skeins of reality and fantasy, scientific capacity and ideology, ethical objectives and hypocrisy that writhe around and across the boundaries of humanity, inhumanity and non-humanity. These boundaries surface constantly throughout Levi's work, as he tries to answer the implicit question that lingers around the title of his first

⁴⁷ On 'designer babies' see for example David Derbyshire, 'Couples pick sex of baby for "ideal family"', *Daily Telegraph*, 5 July 2001, and Van Dyck.

⁴⁸ See her discussion of the story 'Un lungo duello' (*II*, pp.831-36), Angier, pp.56-67 and 106-111.

novel and the poem *Shemà* from which it derives: ‘Cos’è un uomo? Cos’è una donna?’ (*I*, p.3). Thus he also finds himself meditating on what is, by definition or in practice, *not* human, and how definitions themselves and the methodologies behind them need to be rigorously problematized if we are to live freely.

Unlike Hayles’ vision of posthumanity with its seamless array of biological and cyborg beings, Levi’s characters struggle against their own mechanization, unwilling to the last. While ‘I sintetici’ explores the rationalization of birth and its attendant threat to our freedom to be different—vigorously defended by Mario’s headteacher (*I*, p.597)—a story written ten years later in 1981, ‘Anagrafe’ (*II*, pp.1162-65), explores the extreme rationalization of death. Here a familiar Weberian view of the irrational rationality of bureaucratization is grafted onto a futuristic dystopia, as we meet Arrigo, an administrative assistant in a vast, anonymous office who determines the way in which individuals should die. Every day he receives a stack of forms giving the name of a person and the date of their demise; his task is to select the mode of death.⁴⁹

In a realization of conservative judgmental logic, this choice is easier for those who engage in risky activities: ‘uno che corre in motocicletta tutti sanno come va a finire’. As for healthy university professors such as Pierre-Jean La Motte who play tennis every morning, Arrigo is initially stumped; it is only after he has suffered the irritation of drinking revolting coffee from the automatic machine and listened to the complaints of his fellow worker Lorusso that he is sufficiently fired up to make a definitive decision: ‘Arrigo

⁴⁹ Levi also explores the theme of an appointed time of death in the story ‘A tempo debito’, published in the same year in the collection *Lilit* (*II*, pp.131-35). Here, the protagonist is visited by his future assassin and asked to pay a mafiaesque cautionary sum to ensure a pain-free demise when the time comes. This story has obvious resonances with Kafka’s *The Trial*, trans. by Willa Muir and Edwin Muir (London: V. Gollancz, 1937).

tornò infine alla sua scrivania e schiacciò Pierre-Jean come un verme: emorragia cerebrale, così impara' (II, p.1164).

Arrigo's work and his working environment encourage the loss of human characteristics such as compassion, justice, and recognition of the other, demonstrated by his inability to engage fully with his workmates; he is untouched by Lorusso's complaints regarding the exploitation of the worker by industrialized production. So enraged is Arrigo by the inefficient technologies of his working environment—rendered with a supreme ironic flourish by Levi to emphasize the fact that mechanization and bureaucratization do not necessarily result in improvement—that he directs his anger towards the individuals singled out for imminent death. Arrigo's 'human' sensibilities are finally restored to him when he encounters the details of an eight-year-old Norwegian girl whose stereotypically vulnerable innocence he visualizes with deeply romantic nostalgia. The distress caused by considering her death drives him to complain to his supervisor that his work is badly organized, the cards are full of errors and that using the 'randomizzatore' is a stupid idea. This final twist in the story reveals the extent to which human existence has been rationalized; we learn that death results from a chilling lottery whose winning numbers are drawn by a randomizing machine, embodying perhaps the ultimate bureaucratization of the great enigma of human existence: that of destiny or fate.⁵⁰ Arrigo's boss is not surprised at his outburst, agreeing at least with the inefficiency of his department, and assigns his

⁵⁰ In 'Poesia e computer', Levi's use of the term 'randomizzate' may be a deliberate attempt to replicate the language of computer logic; *Conversazioni*, p.63.

disgruntled employee to the section that establishes 'la forma del naso dei nascituri' (*II* p.1165).⁵¹

The conclusion of this story dramatizes the ultimate impotence of human concerns before the infernal machinations of the bureaucracy, emphasized by the similarities between Arrigo's office and Winston Smith's working environment at the Records Department in Orwell's *1984*.⁵² In a further twist, Levi introduces Fritz Lang's dystopic portrayal of alienating industrialization and oppression as one of Arrigo's colleagues invited him to go and see *Metropolis* at the cinema—surely not a casual allusion (*II*, p.1164). Although he is initially locked into his own isolated sense of injustice, Arrigo's complaints gain validity through the sympathy they elicit from his superior, yet his criticisms of the system will never be taken any further since by the logic of irrational rationality it is 'easier' to relocate the rebellious worker within the anonymous labyrinth of the bureaucracy than to address the problem.⁵³ Through a systematic process of alienating bureaucratization or 'disumanizzazione', the human being is reduced to the sum of various mechanical operations; a bleak vision of humanity reminiscent of the process of human assimilation by machines as described by Vartanian, and comparable to the simplistic formulae proposed by the 'straniero' who concludes that clean floors equal long life.

Arrigo rebelled against his specific task, but was unsuccessful in altering the system. Earlier examples of characters attempting to assert their right to a life that resists overdetermination are likewise characterized by a struggle between disempowered

⁵¹ This story, published in the same year as Levi's observations on eugenics, clearly recalls the overdetermination of human features in foetuses suggested by Renato in 'I sintetici', written a decade earlier (1971).

⁵² London: Martin Secker and Warburg, 1949

⁵³ 'Once it is fully established, bureaucracy is among those social structures which are the hardest to destroy', *From Max Weber: Essays in Sociology*, trans. and ed. by H.H. Gerth and C. Wright Mills, London: Routledge 1998; 1st edn 1948), p.228.

individuals and the oppressive, impassive system that effects this determination. In particular, two further stories from *Vizio di forma*, 'Le nostre belle specificazioni' (II pp.661-70) and 'Procacciatori d'affari' (pp.609-25), can be read as accounts of individuals who refuse to co-operate with existential impositions that would compromise their autonomy and humanity. However, the power exerted by 'la normalizzazione, l'unificazione, la programazione, la standardizzazione, e la razionalizzazione della produzione' proves, as ever, the stronger force (I, p.670).⁵⁴

In 'Le nostre belle specificazioni' we find ourselves again in the bureaucracy, this time witnessing Renaudo's protests at having to painstakingly compile and check over the specifications for a seemingly endless list of items, one of which is, of course, 'uomo'. Already weary of and irritated by the tedious penance of his current job – after which he will move on, as did Arrigo, to another similarly rationalized, if relatively less objectionable task—Renaudo complains to his superior Peirani about the pedantic nature of the specifications. Perhaps unsurprisingly, this meets with a frosty reaction as Peirani reminds him of the fundamental seriousness of proper specifications. Indeed, Peirani asserts that 'l'evidente divorzio fra le dottrine tecniche e quelle morali' is the direct result of lack of sufficient specification in the latter (I, p.663).⁵⁵

The specification for 'uomo' which Renaudo discovers proves darkly farcical, advising with chilling practicality that—where possible—tests should be of a non-destructive nature. When the specification is made public, Peirani, in thrall to the 'logic' of

⁵⁴ See the discussion of these stories in Gordon, *Ordinary Virtues*, pp.124-26 and 159-61 respectively.

⁵⁵ Here, Levi is clearly parodying his own views of the need for stronger links between arts and sciences, notably revealing a mistrust of all-pervasive, positivist, scientific logic on account of its untenably dogmatic character. Peirani's desire to quantify and rationalize even that which must remain unquantified provides an example of how *not* to close the gap between the 'two cultures'.

the system, tenders his resignation because he no longer fulfils the requisite criteria. Rather than challenge a mechanistically reductive and inhumanly inflexible (not to mention androcentric), prescription for human existence, Peirani insists that the system remain in place. In contrast to this definition of dehumanized humanity, 'Procacciatori d'affari' engages with the chaotic unpredictability of the human condition as a vital feature of our existence. S., a young male 'anima' in some otherworldly dimension, refuses to assume human form on Earth as an ambassador to combat evil unless he can be born at random, rather than into a predetermined, privileged existence. Images of suffering from around the world to which the unafflicted are rapidly becoming desensitized are re-viewed through the eyes of nameless beings (S., G., R., B.) who are clearly not human, but are humanized (as in 'Il sesto giorno', see Chapter 3). Levi initiates a subtle process of defamiliarization and identification, forcing his Italian readers to align themselves with these non-humans, and to admit on some level the great disparity between life expectations in different regions of the world which renders the image of a starving woman in India more alien to many in the west than a fictional inhabitant of another dimension. In this story, S. fights for his right to be assigned to a randomly selected human identity and to live autonomously, but nevertheless will still need to battle against the forces of normalization and rationalization. His 'humanity' comes from an almost Christ-like willingness to be exposed to and challenged by unmediated human suffering rather than to live protected by virtue of a pre-programmed destiny that corresponds with the ruling norms.

S.'s future human body is described as an 'abito umano' (*I* p.624), clearly exemplifying Levi's tendency to reproduce Cartesian mind/body dualism. This separation can also be seen in 'I sintetici' as Mario speaks 'come attraverso le fenditure di una visiera'

(*I*, p.595), as if the flesh covering his body were a suit of synthetic armour, totally discrete from his consciousness. Likewise, posthuman bodies created by decisions made in the bureaucracy, such as the noses determined by Arrigo in his new job. Furthermore, bodies defined as human because of their resistance to heat or cold—according to Peirani's beloved specifications—are divorced from the consciousness by which they are animated. This approach to posthuman materiality accords somewhat alarmingly with Hayles' definition of the body as the 'original prosthesis', which is constantly reworked and renewed. Admittedly, her definition is itself open to accusations of reinforcing a dualistic concept of human existence. I would argue however, that she intended this to be understood along the lines of Haraway's call to embrace the cyborg body as a way out of historically tainted understandings of embodied experience, notably those encouraged by Freud's oedipal narratives and the ensuing developments on this theme put forward by psychoanalysts.⁵⁶

Despite his encouragement to reclaim technologized bodies in order to regain our challenged humanity, Levi's stories considered thus far seem to stop short at revealing the pain of a severed mind/body relation, and the ensuing alienated consciousness. These posthuman mergers do not seem to offer a way out of the inevitable slide towards entropy envisioned in 'Il brutto potere', nor do they encourage the acquisition of increased capacity for homeostatic equilibrium or other self-preserving mechanisms. A prime example of this is seen in 'Self Control', a story written in 1981 which focuses on Gino, an ageing bus driver who feels dehumanized by the solitary, automatic character of his job, and develops

⁵⁶ See Haraway, 'Manifesto', p.150. She refers to the work of Zoe Sofoulis, whose analysis of texts by Jacques Lacan and Melanie Klein suggests that our survival depends on developing an understanding of cyborg beings that offer an alternative logic of repression to that which we experience.

an obsession with bodily processes and organs which he links to the workings and components of the vehicle he drives (*II*, pp.109-113).

Through his work, Gino has learned about the inner workings of motors and engines, but lacks the equivalent knowledge of the workings of his own body. Thus, when he does read about the make up of the human body, he immediately sees the analogy between his body and the 'organs' of the bus he drives, between opening the body for an operation and opening the bonnet of the vehicle for maintenance. Gino makes this connection for two reasons: first, because the information he reads is presented in an extremely rational form, 'figure e formule' (*II*, p.111); second, because his existence is so inescapably mediated by the work he does, and its regulatory pattern, that he is incapable of understanding his body except as a mechanical appendage whose motors he is responsible for servicing.

The analogy drawn between Gino's body and his bus functions in a similar way to Levi's presentation of the parallels between humans and machines in 'Il brutto potere'; the organic body is viewed through the lens of mechanization but since this cannot take Gino's age into account, the mechanized body is no nearer achieving protective homeostasis. Contemplating death, Gino feels alone, since even his friend Ernesta has disappeared, behind the screen of her sister's 'disumano' parrot-fashion excuses delivered over the telephone. This proximity of human and machine is cripplingly divisive rather than salutary or empowering, in contrast with Marshall McLuhan and Quentin Fiore's rather unproblematically posited message regarding the fusion of humans and media. In 1967 they assert:

All media are extensions of some human faculty—psychic or physical. The wheel is an extension of the foot, the book is an extension of the eye, clothing an extension of the skin, electric circuitry an extension of the central nervous system. Media, by altering the environment evoke in us unique ratios

of sense perceptions. The extension of any one sense alters the way we think and act—the way we perceive the world. When these ratios change, men [sic] change.⁵⁷

Far from accepting and revelling in this alteration as McLuhan and Fiore seem to do, Levi fights it bitterly by pointing out its disciplinary effects. Challenges to a seamless fusion of body and technology abound in Levi's work, but often fall flat as Levi dramatizes the impotence of the individual against the battering ram of 'progress'. Elio's insistence that clothes are separate from the body are disregarded, thus the body is overwritten by fashion and superficial concerns. Gino's attempt to understand and reclaim his alienated body through considerations of its motorized 'extension' leave him feeling confused and out of control.

Levi also advocated resistance to the fusion of the nervous system and electronic circuits, as will be seen in the next section. I examine a second set of stories that dramatize the plight of the individual engulfed and overpowered by the system, to the point where the 'Self Control' which Gino felt slipping from his hands has been definitively replaced by external technological forces which dictate bodily movement and consciousness, and can even reproduce the human body. What McLuhan and Fiore saw as an empowering 'extension' becomes the manipulating machine to which we lose our autonomy, into which the organic element of the posthuman is subsumed.

⁵⁷ Marshall McLuhan and Quentin Fiore, *The Medium is the Massage* (New York, London and Toronto: Bantam Books, 1967), pp.26-41.

ii. *Docile Bodies*

In *Discipline and Punish*, Foucault discusses the ‘mechanics of power’ that works upon the body, the ‘political anatomy’ which defined:

how one may have a hold over others’ bodies, not only so that they may do what one wishes, but so that they may operate as one wishes, with the techniques, the speed and the efficiency that one determines. (p.138)

In the stories considered here, we see many examples of such enforced bodily and mental docility that impinge directly on the individual body through their impact on the larger, more amorphous body of social organization. Levi’s invocations to reclaim humanity through technology seem so far unsupported by his fiction, which might best be described as ‘consciousness raising’. While undeniably vital as a function of literature, this process alone is not sufficient to galvanize public opinion and mobilize social resistance. Furthermore, rather than suggesting positive ways in which to engage with modern technologies as evoked on the back cover of *Vizio di forma*, Levi’s fiction arguably does not move beyond presenting an implicit warning. In the analysis below I probe a series of stories to determine their respective messages regarding physical and mental autonomy: do they provide the necessary tools to effect any concrete reclamation?; is Levi’s journalistic and essay production also required in order to achieve this?; for Levi, do the disadvantages of technologized lives ultimately far outweigh the benefits, despite his attempts to see a silver lining?

‘La bella addormentata nel frigo’ (*I*, pp.477-94) is the earliest story in the collection *Storie naturali*, dating from 1952. Here the docile body belongs to Patricia, a pioneering subject of cryogenics frozen in 1975 whom we encounter in 2115, when she has aged, or lived, less than one year, being unfrozen only on her birthday or to witness what are

considered to be important socio-historic events. Unusually for Levi, this story has an undeniably feminist edge, as we witness and are led to condemn the way that Patricia becomes the sexual object par excellence for the scientists and men that surround her, controlling and documenting her every move. She is partially unfrozen and systematically raped by her host Peter, and indeed it is only through the sexual attraction she holds for his friend Baldur that she is able to contrive her escape. Aside from these abuses, Patricia also regrets her original decision to be frozen, admitting that she suffers from loneliness but acknowledging that this is part of the deal she struck to gain eternal youth: 'è il prezzo che paga chi osa quanto io ho osato' (*I*, p.490). Daring to go so definitively beyond the limits of organic human life breaks the bonds between an individual and his or her contemporaries. Furthermore, daring to create the technology that enables cryogenics ultimately impacts on those who 'benefit' from its advances, as human bodies are directly controlled both by the respective machines and apparatuses, and by other humans who are desensitized to issues of human freedom, perhaps because the frozen specimen has for them become 'disumano'.

Very little has been said about the portrayal of women in Levi's work in general, and particularly as regards his short fiction narratives, as if their role were merely incidental. A rare comment on this subject is made by Ilona Klein who notes that in Levi's writing 'women appear to be immune to much of the fascination which attracts men to science and technology'.⁵⁸ In light of the previous discussion, I would argue that this observation somewhat understates and misrepresents the issue, and that at times Levi himself is at pains to point out the systematic exploitation of women carried out by

⁵⁸ See 'Official Science Often Lacks Humility', in Tarrow (ed.), pp.112-26 (p.122).

ethically unchecked male-dominated science. Some further consideration of the *Storie naturali* serves to illustrate this point.

This collection includes a series of stories featuring the salesman Simpson, previously encountered in 'Il Versificatore'. The stories present the relationship between the 'I' narrator and Simpson as the range of products promoted by NATCA—his American employer—expands beyond all imagining. Levi's presentation of NATCA, an unelucidated acronym for the company based at the migrating Fort Kiddiwanee—sometimes located in Oklahoma, sometimes in Illinois (*I*, p.1439)—provides a (science-)fictional case study of a firm riding high on the wave of American-style consumerism encouraged in postwar Italy.⁵⁹ As is shown, the issues of female objectification and exploitation by technology raised by 'La bella addormentata' find resonance in these tales of 'progress'. 'L'ordine a buon mercato' (*I*, pp.447-55), introduces the 'Mimete', a duplicator, which functions by reproducing every particle of a given object, used at first by the 'I' narrator to duplicate a dice, a hard-boiled egg and a spider, and then in 'Alcune applicazioni del Mimete' (*I*, pp.460-66), used by the narrator's friend Gilberto to duplicate his wife, Emma, and finally himself.

As critical work on the so-called 'consumerist revolution' makes clear, in the postwar era products were devised, launched and sold on the premise that people—especially women—needed to acquire and use certain technologies in order to keep their homes and their selves in the conditions required by any self-respecting individual.⁶⁰ Unprecedented 'needs' were created through advertising, and then appeased by new

⁵⁹ For the ways this manifested itself in Italy as part of the 'Economic Miracle' see Ginsborg, pp.212-26, 247-50.

⁶⁰ See Betty Friedan, *The Feminine Mystique* (London: Penguin, 1992; 1st edn 1963) and Naomi Wolf, *The Beauty Myth* (Toronto: Random House, 1990).

products that fulfilled consumers' dreams in a process that reinforced social docility. Levi's narrator is used to beautiful effect in this regard as he at first protests against the apparently 'sognato' Mimete ('Un duplicatore? [...] non ho mai sognato duplicatori', *I*, pp.447), and then becomes so entranced by its possibilities that he infringes even Simpson's moral sensibilities. His questions about acquiring a Mimete with a larger capacity provoke new stipulations from the company, forbidding the reproduction of 'esseri umani, sia viventi che defunti, o di parte di essi' (*I*, p.455; emphasis in original). The hasty cobbling together of this decree has particular resonances with recent developments in European law, notably the implementation of new legislation forbidding human cloning.⁶¹ Like NATCA's stipulations after the fact, these clauses did not exist previously to current research on human cloning because it was (naively) assumed that the various contentious procedures simply would not be put into practice. Yet they can also be seen as the logical and inescapable conclusion of a desire created by the technologization of society.

Gilberto, described as a 'simbolo del nostro secolo', who would experiment with nuclear bombs 'per vedere che effetto fa' is the personification of the amoral, thoughtless approach to scientific and technological developments achieved through hasty development that does not allow time to predict and account for potential problems (*I*, p.461). The moral dilemmas provoked by Gilberto's act are (to his mind) subsequently quashed either by rather hypocritical recourse to religious mythology and ritual (the creation of Emma II is compared to that of Eve; Emma II and Gilberto II plan to be

⁶¹ When the Italian Dr Severino Antinori attempted to establish a research centre for experiments into human cloning in the UK (which were banned in Italy), the British government implemented emergency legislation to prevent this; see 'Britain to Ban Human Cloning', 19 April 2001, <www.news.bbc.co.uk>, and the 'Human Reproductive Cloning Act 2001', <<http://www.hmso.gov.uk/acts/acts2001>>, retrieved 15/12/03.

married), or by validation of the act in a context of consumerism: Gilberto is sure NATCA will take him on as 'propagandista per il Mimete' (*I* p.466). Gilberto does duplicate himself, but that is his conscious choice, whereas Emma is moved surreptitiously into the Mimete and duplicated while asleep. Her husband's reasoning further denies Emma I's autonomy, rendering her little more than a useful device: he declares that she was so indispensable to him, why not have two? (*I*, p.462). Systematically ignored by her husband, silence seems Emma I's only means of communication. When a disagreement breaks out regarding whether Gilberto should have undertaken the cloning, her response to Emma II's unsurprising argument in favour of the experiment is to remain silent—whether as a sign of resistance or unhappy acquiescence, it is not made apparent (*I*, p.465).

The cloned beings, Emma II and Gilberto II are identical to their originals from their social expectations down to the intimate details of their memories. Gilberto II will go out to work, while Emma II will serve as wife to him. These clones are not intended to serve a special social function, to radically alter social hierarchies or perform superhuman tasks, but are rather the result of Gilberto's egocentrism. We are told that he is 'organicamente incapace di occuparsi del suo prossimo' (*I*, p.466), revealing that even before the Mimete comes on the scene his consciousness has been sufficiently altered (and his misogyny sufficiently galvanized) by the implications of modern technology to alienate him definitively from questions of collective responsibility and morality. Gilberto clones his wife because he considers her a material⁶² that he can reproduce, thus the beings he creates are not posthuman so much as embodiments of stagnant socio-cultural values

⁶² In *Bodies that Matter* (New York and London: Routledge, 1993), Judith Butler discusses the etymological links between *mater* and *matrix* (the womb) which have led to the association of femininity with materiality (p.31). Levi makes just this association in describing his early chemistry experiments as 'il confronto con la Materia-Mater, con la madre nemica' (*I*, p.771).

organized around serving men's interests, comparable to the 'standard men and women' resulting from Huxley's 'bokanovskified egg' (*Brave New World*, p.5).

Two other NATCA stories are worth mentioning here: 'La misura della bellezza' (*I* pp.495-504) and 'Trattamento di quiescenza' (*I*, pp.548-67).⁶³ The former relates once more to the social role of women, since Simpson's new device here is the Calometro, a gadget which measures physical beauty for men or women by giving them a mark from 1-100. Quite apart from the conception of beauty as an empirically controllable quantity and the hegemonic, dualistic notion of gender which these devices enforce, there are other deeply problematic aspects to the Calometro: first, the two standard models are calibrated to a white, western (American) standard—Elizabeth Taylor for women; second, they are directed almost exclusively at women, who are judged on their appearance rather than on their abilities, and whose *raison d'être* is to be beautiful.⁶⁴ The narrator's wife, although responding to her husband's use of a Calometro for the most part with silence (like Emma I), is reported to be appalled by the 'estrema docilità dell'apparecchio', which she feels measures not beauty but 'conformità' (*I*, p.502).

Her comments inspire a series of observations made by the narrator about how alarmingly easy it is to play upon people's sensibilities, convincing them of the superior status of Swedish furniture above all other designs, the inherent superiority of blond-haired, blue-eyed people, or of a certain type of toothpaste. Thus Levi overtly problematizes social programming that is used for consumerist or racist ends, implying a methodological similarity between the two types of conditioning. Gilberto appears again at

⁶³ There is one further story in the series, 'Pieno impiego' (*I* pp.517-28) which deals with a device enabling communication with, the training and the exploitation of animals.

⁶⁴ For a discussion of the ways in which women's appearance determines their worth in the world, see for example Wolf's *The Beauty Myth*.

the end of the story, as Simpson tells us how Gilberto calibrated the Calometro on himself, the ultimate egocentrism. For Levi, Gilberto is symbolic of unchecked and ill-conceived aspirations to technologize daily life, whose post-Enlightenment desire to assert mastery over nature includes an assumed control over his wife's very being, as a part of nature.⁶⁵ In these stories then, human interaction with the technologization of the body is gendered: greedily accepted by men as an opportunity to manipulate others and serve their own ends, and silently refused by women who see themselves as the exploited victims of this technology.

The final Simpson story, 'Trattamento di quiescenza' (*I*, pp.548-67) engages most closely with concerns of technologized, alienated consciousness, presenting the Torec or 'Total Recorder', a virtual reality device worn as a helmet that allows the 'fruitore' to experience all the sensations of the protagonist in a video clip. Simpson himself falls victim to this, finding no stimulation in 'real' life but only in virtual experience which slowly but irreversibly replaces his own memories, destroying his relationship with his wife in the process. Ironically, the only book he is able to read is 'Ecclesiastes', in which he focuses on the passage where the Philosopher warns of the potential dangers of knowledge: 'dove è molto sapienza, è molto molestia, e chi accresce la scienza accresce il dolore' (*I*, p.567).⁶⁶ Although this statement might be interpreted as a license for intellectual laziness, here it is incontrovertibly employed as a criticism of recklessly accelerated scientific development, as the double meaning of 'scienza'—'knowledge' and

⁶⁵ For a detailed study of the identification of women with nature and the post-Enlightenment male desire to dominate both entities, see Jordanova, *Sexual Visions*.

⁶⁶ Ecclesiastes, 1. 18, 'For in much wisdom is much greife: and hee that increaseth knowledge increaseth sorrow', *The Holy Bible*, a facsimile of the Authorized Version of 1611 (London: Oxford University Press, 1911).

‘science’—is used to full effect.

The Torec can be considered as harmful both to mind and body, as we see Simpson physically wasting away whilst encouraging the consumption of pornographic tapes. Here, Levi’s depiction of the Torec revealingly dates his work, setting it in a heteronormative context which admitted no gender flexibility. Recent science fiction and investigative studies of MUDs (Multi-User Dimensions), show that when individuals escape to the virtual dimension of computer reality they also willingly shrug off constraints of sex, gender or sexuality.⁶⁷ In strong contrast, Levi’s narrator is appalled when Simpson mistakenly gives him a ‘nastro per signora’ in which the female protagonist is about to have sex with her male lover Rinaldo (pp.560-61).⁶⁸ Thus although outspoken against conformity and normalization in his stories, Levi does not even consider the possibility of using technology to reclaim gender or sexual identity enforced by normalizing pressures, as Haraway advocates in her ‘Manifesto’, for example.

As Levi reveals through the mouthpiece of Simpson, the Torec helmet, with its power to fuse the individual mind with virtual experience that palimpsestically erases lived reality, is based on Roberto Vacca’s ANDRAC: the ‘Automatic Neurotic Device for Reckoning, Analyzing and Computing’, which appears in *Il robot e il minotauro*.⁶⁹ After a ‘piccolo intervento chirurgico’, Vacca’s device puts the nervous system in direct communication with a series of electronic circuits allowing the wearer to drive a car through thought alone, for example. Levi quickly points out that the Torec is preferable

⁶⁷ See ‘Approaches to the Internet and the Genre of Chatting-Community, Identity and Discourse’, Anne Scott Sørensen, Working Paper no. 1, 2001 in the project ‘Cyborgs and Cyberspace; Between Narration and Sociotechnical Reality’, financed by the FREJA-programme and the Danish Research Agency. See also Piercy, p.71, for her vision of futuristic engagements with cyberspace.

⁶⁸ In *Body of Glass*, Piercy describes ‘stimmies’, a version of Huxley’s ‘feelies’, in which the viewer experiences the protagonist’s sensations, comparable to this form of virtual reality.

⁶⁹ Milan, Rizzoli, 1974; 1st edn 1963.

since it requires no surgery, but it cannot be accidental that his acknowledged source of inspiration enables fusion with technology through bodily alterations (*I*, p.550-51). He thus indirectly evokes concerns that lead to the final group of stories considered in this section, which deal with the most explicitly recognizable posthuman bodies.

All four stories are found in *Vizio di forma* and they all deal in different ways with the fusion or constant enforced proximity of organic bodies and technology, with a specific focus on the impact this has on social interaction. ‘Knall’ (*I*, pp.647-50) and ‘Protezione’ (*I*, pp.573-77), present a series of bodies rendered docile through state intervention or social practices. The ‘knall’ itself is a cigar-shaped device that can kill, but only within a one-metre radius, resulting in altered patterns of social behaviour described as a ‘riflesso di affollamento’ (*I*, p.649).⁷⁰ ‘Protezione’ tells the story of Marta, her husband Enrico and their friends Elena and Roberto, who are forced by law to wear metallic ‘corrazze’—suits of body armour—to protect them from the meteorite rain that falls outside. Failure to wear the suit incurs a prison sentence, hence they are worn constantly making physical contact virtually impossible.

The knall is seen as a fashion trend, marketed largely at teenagers, with logos reminiscent of pinball machines or crude pornographic images of women. They are sexualized fatal weapons marketed as toys, their phallic shape reinforced by their flaccidity after being discharged; they are described as ‘flosci’ (*I*, p.648). Worn as part fashion accessory, part weapon, they endow every human body with the capacity to kill, which

⁷⁰ Echoes of the knall can be found in a new ‘stun’ laser which operates from up to 2km away and ‘could change the way the military and law enforcement authorities deal with civil disturbances’ (David Hambling, ‘Star Wars Hits the Streets’, *New Scientist*, 12 October 2002, pp.42-25). Fear induced by increased police capacity to violently stun individuals from such a range may well have an adverse affect on non-violent civilian protest, just as the threat of the knall alters social behaviour.

results in the widespread avoidance of crowds and the cinema, a cautious approach to buses and a growing preference for remaining at home. Perhaps predictably, the spent knalls are disposed of neatly in litter bins, a practice symptomatic of an irrationally rational society living in fear while attempting to normalize a horrific social menace. This normalization is partly achieved through an evidently propagandist opinion recycled for the reader by the narrator: 'è indiscutibile che buona parte degli uomini provano il bisogno [...] di uccidere il loro prossimo o se stessi' (*I*, p.650). Levi's cynical side is much in evidence as his narrator comments that the manufacturer's profits must be 'mostruosi'—a telling word which resonates with moral condemnation of technological companies that put profit before human safety.

'Protezione' again takes up the evils of manufactured needs, alluding to the creation of a 'bisogno artificiale' by a company that exploits consumers for its own profit (*I*, p.576). Indeed, Roberto voices a conspiracy theory that the reported deaths by meteorite are negligible, and are mostly an invention by the media or the state to maintain the flagging motor industry and control the populace. Protective suits must fulfil certain criteria of weight or thickness, and have licence plates like vehicles, making the suited body an artificial, heavily regulated apparatus. Roberto and Marta represent the voice of the silenced or oppressed opponent to this state regulation of their bodies, able to perceive that they are being conditioned and manipulated but unable to escape the power of this conditioning. In contrast, Elena shows signs of a posthuman consciousness resulting from severe indoctrination as she speaks up in favour of the 'corazza', claiming that her desire to wear it is real, as it protects her from men, wind, rain, smog, contaminated air,

radioactivity, evil thoughts, illness, the future and even herself. Commenting on wearing a 'corazza' she exclaims 'ci sto proprio bene, come si sta bene a casa' (p.576-77).

For Elena, the body is an appendage, a space that she must inhabit but which requires control through mediation and regulation and which she is keen to mask. Her suit is an extension of her body which palimpsestically overwrites and 'protects' her from biological physicality. Conversely, Marta recalls with painful nostalgia how it felt to be free of the 'corazza'. Her experience of looking out of the headpiece is like looking 'attraverso la fenditura della visiera' (*I*, p.573), thus rather than being understood as an extension fused to her body the suit constitutes an unwanted prosthesis. Intriguingly, these words directly echo Mario's sensation in 'I sintetici' as he looks out from what he understands as the 'fenditure' of his synthetic skin. The feeling of being imprisoned in one's body recalls Levi's understanding of the somatic container, and here shows that the sense of alienation from one's body derived from having to wear a form of exoskeleton is also experienced by those whose bodies are purely organic but who are forced to question their bodily 'naturalness'. In other words, the biological body itself becomes a form of prosthesis when the mind/body split is so deeply entrenched as to make it impossible to experience embodiment even in a psychologically mediated body.

Finally, in addition to devices that are carried on the individual or the enveloping of bodies within technology, Levi's stories also depict bodies that encompass a non-biological component, for example 'Lumini rossi' (*I* pp.626-29) and 'In fronte scritto' (*I*, pp.725-32). In the former we meet the protagonist Luigi as he leaves his bureaucratized workplace and returns home, his every move controlled by a red light. At home he attempts in vain to avert his eyes from the red light that shines unblinkingly from his wife

Maria's collarbone, prohibiting sexual intercourse during her fertile days since they already have two children, and a third would be taxed heavily. Their interaction is weighed down by the significance of this light, by fear of inspections, so that their conversation is stilted and difficult. Luigi would like to take a screwdriver and remove Maria's light, but it is by now so much a part of her that this would not be possible, as she explains wearily, 'rimane sempre una traccia' (*I*, p.628). Her body then is irreversibly altered, technologized, regulated by the state. Luigi's may be physically unchanged but mentally he feels his skull hardening, 'come se ricoperta da un'enorme callosità adatta a percuotere contro i muri' (*I*, p.629). The traces of state intervention are ineradicable, inescapable, turning spontaneous, organic bodies into obedient, desensitized automata.

In his 1950 essay 'Computing Machinery and Intelligence', Alan Turing discusses the argument that if human life is regulated by a set of 'rules of conduct'—for example 'Stop if you see red lights'—we are no better than machines.⁷¹ Turing's response is to deflate this hypothesis by conflating the 'rules of conduct' with 'laws of behaviour', which he defines as involuntary and spontaneous reactions to external stimuli. However, his argument is far from clear and fails to account or leave space for what Judith Butler terms the 'performative' character of gender roles, and their mediation of 'spontaneous' human reactions.⁷² Both Turing's paper, with its certainty of which answers 'would naturally be given be a man' and Levi's biological determinist view of gender-roles display a blindness to the forms of social conditioning already in place before we reach the point of visibly hyperrationalized existence controlled by a sequence of red lights. Levi's piece is a

⁷¹ *Mind*, 51 (1950), 433-460.

⁷² See Butler's *Bodies that Matter* for a discussion of the performativity of gender: performativity is not a 'singular act' but rather 'a reiteration of a norm or set of norms' which 'conceals or dissimulates the conventions of which it is a repetition' (p.12).

compelling dramatization of the internalization of state panopticism, but implies that without these lights the same controls are not in place; a view that Butler—among others—would contest strongly.

The physical traces of posthumanism on the body are also tackled by 'In fronte scritto', this time resulting from the selling of skin surfaces for advertising. Suffering from financial difficulties, Enrico and Laura decide to sell their forehead space to promote a cosmetics company. Although the slogans are supposed to be entirely removable by laser treatment when the three-year contract expires, unsurprisingly Laura's skin retains scars as if she has been burnt, reminiscent of 'le scritte del Fascio sui muri di campagna', her corrupted skin echoing social corruption of the natural world. Furthermore, her first child is born with the message 'OMOGENEIZZATI CAVICCHIOLI' on his forehead, a clear judgement of what we become when we make the body into a billboard (*I*, p.732). 'In fronte scritto' constitutes a crystallization of Levi's concerns about modern urban living: advertising leads to the commodification of the individual; homogenized social groups provide a false community (Laura and Enrico dilute their discomfort at having sold their foreheads by socializing with other 'Frontali'); religious endorsement of capitalist practices is used in highly dubious ways in an impossible bid to reverse the 'disenchantment' of modernity (the chapel at the Frontali's club contains a plastic figure of Christ with JNRI written on his forehead). The effects of these combined factors is to reduce the human being to a puppet like entity, herded into conveniently created social communities designed to appease resistance through the normalization of bodily 'enhancement'.

4. Some Conclusions

All the stories considered in this chapter are steeped in a biting critique of falsity and forced conformity, of artificially manipulated consciousness and disembodiment. Individual resistance is scarce and often instigated by women: it is Patricia who seeks freedom from her cold technological prison, helped by a sexually enthralled Baldur who remains unaware of her confinement and the misery of her status as frozen specimen; after his initial mistrust, the narrator in the Simpson stories cedes to the power of the NATCA devices, with the only resistance being manifested by Emma I's silence, or by the alternating mute anger and words of chastisement offered by his wife. Clearly, the other stories considered also show male discomfort with technologically enforced docility or the technologization of the body but these are outnumbered by examples of technical devices that oppress women in a gendered manner. Thus Klein's observation about women's immunity to technology must be rephrased to take into account Levi's comments—whether conscious or unconscious—on the gendered victims of 'progress'.

With regard to the questions posed at the beginning of the previous section, it is clear that alone, these fictions present an overwhelmingly negative picture of posthumanism which does not guide us towards any means of reclaiming our selves short of rejecting technology *tout court*. As such the stories are open to accusations of demonizing technology, against which Haraway warns. In her view, it is not sufficient to put forward a crude 'anti-science metaphysics', since this line of argument seals us further inside the dualistic logic that historically has held such sway. Rather—as Levi himself suggested—we should seize on the complexities offered by new technologies and use their

possibilities to improve ourselves. Indeed, Levi professed himself supportive of eugenic intervention on the body if carried out responsibly, which chimes sympathetically with the careful reconstruction of bodily boundaries endorsed by Haraway ('Manifesto', p.181). A related objection to the simple rejection of technology concerns the implication running through Levi texts, despite his appreciation of the invisible power of advertising and social conditioning, that programming is not already at work in 'traditional' gender roles. Furthermore the question remains: does Levi's writing provide us with the tools to at least imagine, if not effect, the ethical adaptation of technology?

This question, relating to the potential galvanizing of Levi's message through consideration of his journalistic and essay production alongside his fiction, might best be addressed through comment on the former two genres of writing. Several of the articles examined hitherto contain explicit calls to rethink the ways in which science and technology are studied and put into practice, especially those dating from the mid 1980s, for example 'Eclissi dei profeti' (*II*, pp.853-56), 'Covare il cobra' (*II*, pp.990-93) and the 1987 interview with Vincenti and others, 'Il sinistro potere della scienza', in which Levi suggests practical improvements to teaching methodologies in the sciences. As regards the human body and its new artificial 'colleagues', the 1986 essay 'Il giocatore occulto' (*II*, pp.970-73) is relevant for its consideration of the relationship between a human and his or her mechanical opponent—the eponymous 'giocatore'—in a game of computerized chess. Having admitted that after one year of use his word processor 'è diventato quasi una parte del mio corpo, come avviene per le scarpe, gli occhiali o le protesi', Levi is, however, quick to distance himself from the kind of extension/fusion perceived by McLuhan and Fiore stating categorically 'ma non volevo che mi invadesse' (*II*, p.970). The computer has

many advantages, he affirms, and we can indeed learn from it, but, he insists definitively, although it is 'un grande seduttore [...] umano non è' (II, pp.972-73).

This conviction of the unbridgeable divide between human and mechanical devices explains the negative presentation of posthuman bodies in Levi's fiction. There are no positive accounts of the technologically 'enhanced' posthuman because he ultimately believes that humans and machines cannot merge without infringing human freedoms. Even Hayles, who defines the posthuman view as an appreciation of the compatibility between human and machine, retains a degree of scepticism herself, asserting in her conclusion, 'there is a limit to how seamlessly humans can be articulated with intelligent machines, which remain distinctly different from humans in their embodiments' (*Posthuman*, p.284). As has been argued in previous chapters, inhabiting the body was for Levi a fraught process; a difficulty that makes itself felt clearly through his powerful accounts of alienated disembodiment in the stories considered above. However, he emphatically does not see new technologies as a means of alleviating this problem, as Haraway does. It must not be forgotten that although written in the early 1980s⁷³ Haraway's piece originates from scholarly tradition quite distinct from Levi's writing, with markedly different primary concerns. Nevertheless, both her manifesto and Hayles' study contrast informatively with Levi's approach since their common preoccupations with a desire to reaffirm the value of embodiment serve to highlight Levi's discomfort with somatic issues.

As a final observation, it is worth returning to Gordon's argument that an ethical encounter, for Levi, required the acknowledgement of the other's 'otherness'. In 'Il

⁷³ Haraway's manifesto was first presented at the conference 'The Scholar and the Feminist X: The Question of Technology', Barnard College, April 1983, see note in *Simans*, p.243.

giocatore occulto', Levi differentiates between humans and machines by virtue of the fact that we can measure ourselves against our 'consanguineo' but not against a computer (*II*, p.973). Much of the disquiet evident in the stories considered in this chapter stems from the invisibility or unrecognizability of power, of the origins of technology, of the systems seeking to infiltrate, occupy and control the body. When Levi points out the similarities between humans and machines or technologized others, it is on the whole a negative observation. For Levi, the machine remains a discrete system to be carefully controlled, and the kinds of self-generated contradiction on which humans thrive are sufficiently plentiful and vitally non-homogenizing without recourse to artificial stimuli.

Conclusion

In her essay 'Chemistry and Writing in *The Periodic Table*', JoAnn Cannon makes an interesting and original claim. She says:

It is not sufficient to place Primo Levi in the ranks of the most significant Italian writers of his generation. It must also be said that Levi, far from being an oddity on the Italian literary scene, is a much more 'representative' author than has generally been recognized. (p.100)

Rather than acquiescing with those who saw Levi as located 'outside' the literary establishment, and needing to conform to its traditions (Cavaglion, 'Primo Levi era un centauro?'), Cannon claims that he is in fact emblematic of postwar Italian literary authors. She identifies his work as resonating with that of Calvino (unsurprisingly), and Umberto Eco, 'writers who maintain that literary knowledge may rival scientific and philosophical knowledge' (p.100).¹ Levi's belief in the non-hierarchical nature of different epistemologies and interest in cross-disciplinary fertilization does indeed make his work chime in certain ways with that of Eco or Calvino. In a slightly different vein, Calvino prefers to single Levi out as 'different', but in a positive sense. He perceives one of Levi's strengths as being his originality. Alluding to the *Storie naturali* he wrote to Levi:

Forse i tuoi racconti mi piacciono soprattutto perché presuppongono una civiltà comune che è sensibilmente diversa da quella presupposta da tanta letteratura italiana. (22 November 1961, *Lettere*, pp.695-96)

What seems to interest Calvino is the way in which Levi's unique perspective enables him to take for granted a cultural consciousness which diverges from more mainstream,

¹ Eco himself would agree with this comment since when I asked him about postwar Italian writers whose work foregrounds the relationship between literature and science, he cited four names: himself, Levi, Calvino and Daniele del Giudice (conversation with Eco, 30th April 2002).

established positions and opinions. Levi's writing displays no anxiety about introducing and profiling 'new' subject matter to his readers; instead he is perplexed as to why there are not more novels that deal with the lives and experiences of plumbers and electricians, among other less present literary protagonists (*I*, p.676). Levi's feeling is, quite simply, that these elements of social life that have been neglected contain 'spunti e stimoli che meriterebbero di essere conosciuti' (*I*, p.1445). As a result, his work softens, broadens and makes more permeable the boundaries of literature, supplementing the spectrum of 'literary' subject matter. Furthermore, by writing from a slightly oblique perspective, with a transversal view across a series of 'mestieri', he is able to identify similarities between methodologies often perceived as diametrically opposed, showing how chemistry is an art, and how the act of writing mirrors the processes of chemical investigation.

In her essay 'Dialogic Learning Across the Disciplines', Marilyn Cooper observes:

The phrase 'writing across the disciplines' carries with it, for me, a trace of writing under erasure, that trick Derrida uses in *Of Grammatology* of x-ing out words that are inaccurate but necessary, of casting doubt on what they signify.²

Levi's work functions similarly to cast doubt on what is signified by a mode of thought or an activity associated with a particular discipline or profession. In so doing he asks us to look again, to question our assumptions and to see correspondence and complementarity rather than discrete, opposing elements. Serres' aims in writing across disciplines and criticising disciplinary barriers include the transposing and transportation of mathematics to a place it cannot go alone (Serres and Latour, p.74). Similarly, Levi

² 'Dialogic Learning Across the Disciplines', in *Landmark Essays on Bakhtin*, ed. by Frank Farmer (Mahwah, N.J. : Lawrence Erlbaum Associates, 1998), pp.80-92 (p.81).

endeavours to point out the wider relevance of scientific practice to human life and development, to take 'science'—and organic chemistry in particular—outside the enclosure of the laboratory. Yet in addition to enabling this type of spillage and seepage around disciplinary containers, Levi's aim in speaking out about the importance to the scientific enterprise of patience, experience, considered decisions and ethical self-questioning, is to stop science from going where it can go—and seems bent on going—alone. Instead, he wishes to help redirect areas of research so that they progress with an awareness of broader issues and an input from 'external' disciplines, so that they move forward together, in a form of symbiotic evolution, 'un mutuo trascinamento' (II, p.632), rather than setting out in quite uncomplementary, and reciprocally unhelpful directions, without an awareness of what is offered by alternative perspectives.

Levi can be seen in many ways to embody interdisciplinarity: he identifies as a chemist, as a writer, as a sociologist (see Appendix, p.323), and even as an anthropologist: when he sent a copy of the French translation of *La chiave a stella* to Claude Lévi-Strauss, he received a positive reply which declared that he had written an anthropological novel about 'la tribù nomade di montatori', and welcomed him 'nelle file degli antropologi'.³ This is not to say that such interdisciplinarity is seamless or easily maintained. Indeed, it involves constant grappling with differences and contradictions. Here, characteristically, he looks to his activities as a chemist, and recognizes how his training and experience in the laboratory provides a paradigmatic methodology for a more general approach to life. He says:

³ Barbara Kleiner, 'Ritratto della dignità e della sua mancanza negli uomini', published as 'Bild der Unwürde und Würde des Menschen', in *Neue Musikzeitung* (Aug.-Sept. 1986); repr. in *Conversazioni*, pp.77-83 (p.79).

Il mio lavoro quotidiano si fonda anche raramente su formule esatte: molto più spesso comporta invece una lotta faticosa contro problemi confusi.⁴

For Levi, as for Eco, another writer who appreciates the essentially creative, productive nature of non-resolvable problematics, this struggle is what compels us to keep questioning and growing, and propels us to further our knowledge and understanding.

Eco remarks:

So che non esiste sistema che non rechi in sé la sua contraddizione e che quindi trovare le contraddizioni nei sistemi non costituisce una sconfitta ma una vittoria per chi crede nell'attività filosofica come a qualcosa che si rifà continuamente.⁵

At times, Levi even positively relishes the potential unleashed by contradictory issues, exclaiming excitedly that, 'da una minuscola causa ambientale è nata una incompatibilità. Non c'è il germe di un romanzo?' (II, p.691). This growing seed stems from the world around us, from our experiences which we should consider and mine as a rich and fruitful 'materia prima' (II, p.641). If experience provides us with the raw materials, then the next stage in developing and processing these is to articulate and communicate them.

In the essay 'Perché si scrive?' Levi considers why some writers feel motivated to write. Typically, he is sceptical of those who seek to convey a subjective, impossibly definitive notion of how the world might be:

provo personalmente una certa diffidenza per chi 'sa' come migliorare il mondo; non sempre, ma spesso, è un individuo talmente innamorato del suo sistema da diventare impermeabile alla critica. C'è da augurarsi che non posseda una volontà troppo forte, altrimenti sarà tentato di migliorare il mondo nei fatti e non solo nelle parole: così ha fatto Hitler dopo aver scritto *Mein Kampf*. (II, p.661)

⁴ Claudio Toscani, 'Incontro con Primo Levi', *Il raguaglio librario*, 3 (1972), p.89, cited in Grassano, 'La musa stupefatta', *Antologia*, p.124.

⁵ See the preface to *Il problema estetico in Tommaso d'Aquino* (Milan: Bompiani, 1970; 1st edn 1954), pp.5-12 (p.11). See also Charlotte Ross, 'The Serendipities of Semiotics, or Knowledge as a "Theory of Next Thursday"', in *Illuminating Eco: on the Boundaries of Interpretation*, ed. by Charlotte Ross and Rochelle Sibley (Aldershot: Ashgate, 2004), pp.105-120 (p.115).

Systems need to be challenged, and must never be rigidly adhered to or imposed. As a result, Levi expressed his own feelings about social dangers and difficulties without resorting to polemic, showing how 'impegno' can be demonstrated and also prove effective when communicated through a writing style that is 'inconsapevole e indistinta, o consapevole e allusiva'.⁶

This thesis has presented and analyzed Levi's views on the need to dissolve epistemological dialectics and to encourage elasticity in the way we approach the various components of the world around us. It has also shown, however, that despite these beliefs he retained a strong sense of internal division on account of his diverse professional activities and personal interests. Running through Levi's work is a distinct, recurrent belief in the need to live and experience ourselves holistically, both as intellectual and material beings. Our physical aspect must not be neglected or left undeveloped in favour of more cerebral pursuits, he contends, since this prevents us from being whole, 'interi'. One might view Levi's work as an attempt to achieve this wholeness on a number of levels: intellectually, by softening the barriers between separate areas of epistemological inquiry; corporeally, by learning to use our hands and bodies as heuristic tools; existentially, by combining these knowledges. The resulting combination is, inevitably, inherently contradictory and confusing, but this can be made to function in productive ways, as outlined above.

If delimiting knowledge too strictly may result in unhelpful tunnel vision, then considering the individual as an isolated 'busta chiusa' rather than an interactive part of society also engenders negative effects. Communication and interchange of ideas and

⁶ Miccinesi, in Poli and Calcagno (eds), p.52.

support are vital to our survival. Likewise, supplements to the body can also prove advantageous. Yet here Levi steps in to issue some of his strongest warnings about the possibilities of an ethically unchecked leap into the unknown territory of technologized society. Although, as Levi suggests on many occasions, numerous similarities may be detected between humans and the technological apparatuses they produce, flesh and metal are also distinct opposites. Yet just as the apparently dichotomously opposed traditions of modern literature and science can be melded and shown to exist on a variegated, partially overlapping spectrum rather than in two distinct worlds, so humans and technology can also coexist productively. Levi does not give us concrete answers as to how this might be achieved. Rather, he warns of the dangers associated with embracing 'progress' too enthusiastically, without reservations. What his work does encourage and enable is an opportunity to reflect upon what is and what might be, to consider our responses to these real and potential scenarios and to evaluate our ability to manage the situation as it impacts upon us.

As a thinker, Levi is unique in many ways: on account of his extraordinary experiences as a survivor of internment in the Lager; as an individual with two successful careers; as a witness to our times. He is also remarkable in the diversity of his readership, and in the continued appeal of his work. Despite the fact that Levi's influences consist of a series of fathers (as becomes clear on reading *Dialogo* and *La ricerca delle radici*), his own work has inspired some perhaps unlikely followers—the feminist poet and science fiction writer Marge Piercy, for example. This thesis has situated Levi in his cultural context, reflecting upon his dialogues with contemporaries and contemporary issues, but has also considered his work from fresh angles, applying

recent Anglophone theoretical frameworks to his writing, probing his portrayals of gender dynamics, and wondering what his stories and essays can tell us today.

Levi displayed strong interest in the predictions made by science fiction writing, and in chronicling which of these—often dystopic—visions came to pass. In the years since his death, many more of his speculations have been realized and reified, in ways that he would undoubtedly have found alarming. The relevance of his work has not waned, since the struggles that he narrativizes continue to challenge us: our struggles to integrate discrete approaches to epistemology; to combat alienation; to develop social organization in ways that encourage rather than stunt positive human interaction; to treat one another, our environment and the creatures with which we share it with due respect; to establish controls and regulations that ensure ethical concerns are brought to bear on scientific and technological ‘advances’; to retain our humanity when western civilization seem bent on suffocating and rationalizing it.

Levi’s thought and writing confronts difficulties, acknowledges ambiguities and oppositions, but is unwilling to admit defeat. Despite the apparently pessimistic tone of some of his fiction and essays, he maintained and nurtured a certain belief that if we could only assume responsibility for our actions, and liberate ourselves from a teleological view of the unstoppable, inevitably rumbling machine called ‘progress’, we might regain our freedoms: ‘il fatto che il futuro è *anche* nelle nostre mani, è plastico e non rigido, non deve essere mai dimenticato’ (*II*, p.855). To a contemporary reader, his work presents difficulties at times, especially with regard to assumptions about gender roles, yet this is in part excused by the context in which he wrote, since critical awareness of gender dynamics have filtered more slowly into the Italian cultural, literary and academic consciousness than into North American approaches to such questions, for

example. However, his work may also be read as problematizing these assumptions, and even, at times, as anticipating issues taken up in later years by feminist scholars in their critiques of the impact of science and technology on our lives.

As highlighted in the final two chapters, Levi's fictional depictions of the ways in which technology impinges on our corporeal integrity, in particular, are often startling in their bleakness. This thesis has shown the directness and frequency with which Levi engages with and portrays *physical* suffering and alienated experiences of embodiment—an issue that has long been overlooked in the critical literature on his work. However, despite this, he insists that we have both the ability and the means to avoid or dissolve the constraints and imprisoning logics that threaten to overwhelm our status as free-thinking, fully embodied human beings; and what is more, this can theoretically be achieved without more strife:

Non penso che [la capitolazione davanti al potere] sia irreversibile, spero che tutti i tecnici del mondo comprendano che l'avvenire dipende dal loro ritorno alla coscienza: sono sicuro che una restaurazione dell'equilibrio è possibile, ed è possibile coi mezzi di bordo, senza bisogno di ipotetiche nuove scoperte, e, soprattutto, senza stragi. (Lamberti, pp.113-14)

Appendix

Germaine Greer Interviews Primo Levi (1985)

In this Appendix I note some relevant differences and discrepancies between the various textual and audio versions of Germaine Greer's 1985 interview with Levi. The interview was carried out in Italian but was first published in English (translated by Greer) as 'Germaine Greer talks to Primo Levi' in *The Literary Review*, November 1985 (pp.15-19). The text of this interview is prefaced by an introductory section contextualizing Levi's work and providing some biographical details for an Anglophone readership. Belpoliti includes an Italian translation of this published script (minus the contextual information) in the collected *Conversazioni* that he edited (translated by Erminio Corti, pp.65-76). The text of the interview that appears in the translation of *Conversazioni, The Voice of Memory* (pp.3-11), is a reproduction of the text originally published in *The Literary Review*.

Thanks to the generosity of Professor Greer who lent me the cassette of the original recording—for which I would like here to extend particular thanks—I have been able to compare extracts of verbatim conversation from the interview with the published texts. In what follows, I copy and comment on excerpts from my transcript of the recorded interview. The sections in bold are parts of the conversation that do not appear in either published interview in any form. For clarity, since I do not cite the interview in

its entirety, I have separated each section of text with subtitles, and briefly highlight relevant discrepancies between the translations at the bottom of each section.

1. Writing *Se questo è un uomo*

PL: Pensandoci sopra adesso, vedo che questo libro è pieno di letteratura. Letteratura assorbita per via cutanea vorrei dire, magari anche rifiutandola perché io ero un cattivo studente di letteratura italiana. Preferivo la chimica. Trovavo noiose le lezioni di teorie della poetica, di teorie del romanzo e così via. Le rifiutavo. Poi al momento buono quando mi sono trovato nel bisogno di scrivere, perché avevo bisogno di scrivere questo libro, un bisogno patologico addirittura, mi sono trovato dentro un programma *software*, pronto. Era quello delle letture che avevo fatto (magari malvolentieri), dello studio di Dante che avevo fatto al liceo, dei classici italiani e così via. **Certamente queste cose mi hanno servito. Mi hanno servito come pietra di paragone—sa cosa vuol dire?**

GG: *Touchstone*.

PL: *Touchstone*. E mi hanno servito come guida mentale. Certamente mi ha servito anche la chimica, proprio come sistema...come *Periodic Table*, come abitudine a ordinare le idee. Perché poi il libro sia elegante, non saprei dire, probabilmente perché...forse c'entra anche un po' la lettura degli autori inglesi in questo, perché avevo letto molto Huxley.

GG: Sì?

PL: Sì, mi piaceva molto, mi è piaciuto per molti anni. E credo di avere assorbito un certo senso della misura da Huxley.

GG: Mi sorprende un po' perché non avrei fatto io lo stesso giudizio di Huxley.

PL: No? So che adesso infatti le azioni di Huxley sono molto in ribasso, ma a me è piaciuto molto in quegli anni prima, negli anni della guerra, '40, '41, era molto difficile in Italia leggere libri stranieri.

GG: Perché era tanto scettico e tanto staccato dalla realtà?

PL: Perché era scettico, perché era eclettico, perché...ma non è staccato dalla realtà, non mi pare. Pare che sul suo studio degli esseri umani quasi zoologico, sono parole sue, per uno che studia la chimica parla degli esseri umani come se fossero animali, a me piaceva molto, e credo se ne trovino tracce in *Se questo è un uomo*.
[...]

Comments:

See *The Literary Review*, p.16, and *Conversazioni*, pp.65-66. Aside from the highlighted text that is not included in the published interviews, the only significant difference in wording that I wish to note here is the phrase 'programma *software*', which appears in the English text as 'a whole "programme"' (p.16), and in the Italian as 'una sorta di "programma"' (p.66). In the transcript, Levi refers specifically to computer programming, evoking images of Turing's experiments on human and computerized responses to problems (see Turing, 'Computing Machinery'). As regards the highlighted section, Levi reveals the importance of Huxley's work to his own writing, emphasizing the importance of being in touch with one's socio-cultural reality. He specifies that the tendency to depict human beings as animals, especially apparent in *Se questo è un uomo*, derives from Huxley's 'zoological' approach to characterisation and observation. The later reference to a zoological perspective in the interview (included in *The Literary Review*, p.18; *Conversazioni*, p.73) is clearly a reference to this earlier exchange.

2. Science and Sociology

GG: E però è un sentiero difficile da fare, questo di non dare fiducia a niente, di stare...è un atto quasi scientifico, credo.

PL: Penso di sì, penso di sì. Penso che proprio in questo fatto, nell'essere *disabused*, giochi l'abitudine al lavoro in laboratorio, in cui guai se uno si lascia ingannare. È sempre bene cercare di andare oltre delle apparenze. Per cui, anche quando ero in lager soffrivo naturalmente, soffrivo la fame come tutti, il freddo, la fatica, la paura. Però, ecco, senza volere sembrare immodesto, ero uno scienziato, ero senza saperlo un sociologo. Non sapevo niente di sociologia, però m'interessava violentemente, proprio con violenza, capire il mondo intorno a me, per questo i primi giorni erano così terribili, lo erano per tutti. C'era uno shock, un trauma dell'ingresso in lager, che durava cinque giorni, dieci, venti...[...]

Comments:

See *The Literary Review*, p.16, and *Conversazioni*, p.66. There are no significant differences between the non-highlighted text and that of the published interviews. In the highlighted section Levi's self-identification as a rather passionately inspired sociologist—an unusually direct statement, even given his longstanding interest in social organisation—confirms a further 'mestiere' to which he feels affiliated, beyond that of chemist, author and public intellectual.

Writing and Distortion

GG: [...] Ma per stare per un po' su questo problema del reinventare la realtà, che è il problema di ogni scrittore...

PL: Ora, io penso che ci siano scrittori che lo fanno deliberatamente e consapevolmente, scrittori che lo fanno consapevolmente non deliberatamente, e scrittori ingenui che deformano la realtà perché è una necessità di chiunque scriva, senza rendersene conto, senza volerlo. E io credo di essere appartenuto scrivendo *Se questo è un uomo* a questa categoria....[...]

Comments:

Levi's response here differs from the published texts a little. *The Literary Review* reads:

'Well, I think there are writers who do it deliberately and intelligently, writers who do it intelligently and not deliberately and ingenuous writers who do it without either planning it or wanting it. I believe that when I wrote *If This is a Man* I belonged to the third category' (pp.16-17).

Conversazioni reads:

'Ebbene ritengo che vi siano scrittori che mettano in atto questo artificio in modo deliberato e intelligente, altri che lo pratichino in modo intelligente ma non deliberato e scrittori che realizzino tale re-invenzione della realtà senza mai progettarla o volerla. Io credo che quando scrissi *Se questo è un uomo* appartenessi a questa terza categoria' (p.68).

It seems significant to me that Levi speaks not of 'intelligence', but of 'consapevolezza'; of awareness. Displaying one's own artifice is not inherently intelligent as a practice, but certainly demonstrates a degree of self-consciousness. Secondly, he refers to the third category of author as writing in a certain way 'senza rendersene conto', as opposed to the notion of planning and 'progettazione' expressed in the published interviews. In placing himself in the third category, he implies that, rather than simply 'not planning' to develop a literary style in writing *Se questo è un uomo*, he found that he was drawing on classical, literary influences *unconsciously*, without *realizing* the nature of his own writing strategies.

2. The Invulnerable Narrator

GG: Anche per me, c'è un problema del narratore illeso [...] È invulnerabile perché è lui che dirige. E non importa anche se dice il narratore di se stesso 'Ho fatto una cosa stupida, una cosa cattiva' [...].

PL: Certo. Comanda lui. **Avere la biro in mano, avere la macchina da scrivere in mano è come avere un mitra [laughs]. È onnipotente l'autore; può crearsi la realtà che vuole.**

Comments:

The Literary Review reads:

GG: And no matter what he confesses to, the narrator is always invulnerable.

PL: Because he is in control. The author is omnipotent and can create the reality he wants (p.18).

Conversazioni reads:

GG: E il narratore, a prescindere da quanto confessa o dichiara, è sempre invulnerabile.

PL: Perché si trova sempre sotto il controllo dell'autore, che è onnipotente e può creare la realtà che vuole (p.70).

Clearly Levi's reference to the pen or typewriter as a type of weapon merits some consideration. This may be read as relating to the power of the author over his or her fictional characters, or as an allusion to the power of literature to change social perceptions.

5. Narrator and Writer

GG: A me piacciono i narratori che sono sfondati dallo scrittore. Io non ho ancora finito, ho appena iniziato a leggere *La chiave a stella*, ma mi sa che questo narratore ironicamente percepito mi piacerà molto [...]

PL: Ci sono due narratori in questo libro. Ci sono io e Faussonne.

Comments:

This section of the conversation is significant simply because Levi openly confirms that the novel features two protagonists, one of which is himself.

6. 'Conoscere'

GG: Volevo farle le domande proprio pesanti e tremendi della *Tregua*, di Mordo Nahum, che nome bello Mordo Nahum!

PL: Nahum vuol dire saggio.

GG: Loro facevano discorsi anche dentro quest'attività feroce e commerciale, parlavano di certe cose, ad esempio, cosa abbia ad intendersi per 'conoscere'? **Anche uno scientifico si deve chiedere questo. E per lei cosa vuol dire 'conoscere'?**

PL: Non lo so.

GG: Lei ha mai conosciuto delle cose false?

PL: Non lo so cosa vuol dire io. Da quando avevo diciotto anni non mi sono più posto il problema. Mi sono molto stupito che se lo ponesse il Greco.

GG: Ma infatti è un problema.

PL: **È un problema certamente.** Esiste la filosofia della scienza che lavora intorno a che cosa viene inteso per 'conoscere'. Ma, io sono rimasto chimico in questo, e conosco con le mani, e col naso. Credo ai miei sensi.

GG: Realista *naif*.

PL: *Naif*, sì. Fare per trent'anni il chimico insegna ad essere *naif*, di non porsi troppi problemi. Si tratta di non pretendere di arrivare alle profonde radici del conoscere, ma solo di scendere da un livello a un altro, di capire qualcosa di più. Quando ho capito che cosa succede dentro una storta sono più contento. Ho conosciuto una cosa in più. Non ho conosciuto la realtà, la verità; ho solo ricostruito un piccolo segmento del mondo. E questo è già una grande vittoria dentro un laboratorio di una fabbrica. **Fare in modo...riuscire a prevedere, ecco..per me chimico, 'conoscere' vuol dire prevedere**

una piccola area di avvenire. Se io so cosa capiterà fra un'ora dentro il recipiente di reazione, conosco. La mia conoscenza è questa, molto modesta. Non pretendo di conoscere l'universo. Mi piacerebbe ma non posso.

Comments:

The Literary Review reads:

GG: What to you does the word 'know' mean?

PL: I don't know. I haven't asked myself that question since I was eighteen. I was surprised that Mordo Nahum and his friends asked it. Philosophy of science exists to labour over such questions, but I've remained a chemist in this. I know with my hands and my nose, with my senses, like any naïve realist. It's not a matter of arriving at the deepest roots of knowing, but just of going down from one level to another, understanding a little more than before. When I understand what's going on inside a retort, I'm happier, I've extended my knowledge a little bit more. I haven't understood truth or reality. I've just reconstructed a segment, a little segment of the world. That's already a big victory inside a factory laboratory (p.18).

Conversazioni reads:

GG: Cosa significa per lei la parola 'conoscere'?

PL: Non lo so. Non mi sono più posto questa domanda da quando avevo diciotto anni. Mi ha sorpreso che Mordo Nahum e i suoi amici se lo siano chiesto. La filosofia della scienza esiste proprio per cercare di rispondere a tali domande, ma per quanto riguarda tutto questo, sono rimasto un chimico. Io conosco attraverso le mie mani, il mio naso, i miei sensi, come ogni ingenuo realista. Non si tratta di arrivare alla radice assoluta della

conoscenza, ma soltanto di scendere da un livello a un altro, cercando ogni volta di comprendere un po' di più rispetto a prima. Quando comprendo che cosa sta accadendo dentro una storia, mi sento più felice. Ho ampliato un po' la mia conoscenza. Non ho compreso la verità o la realtà. Ho soltanto ricostruito un segmento, un piccolo segmento del mondo. In un laboratorio industriale, questa è già una grande vittoria (p.71).

Aside from the text that is omitted from the published interviews, it is worth noting the mistranslation of the word 'retort' from *The Literary Review* to its rendering in *Conversazioni* as 'storia'. Secondly, the notion of the naïve realist is actually introduced by Greer, not by Levi. Levi's remarks that working as a chemist for thirty years teach one to be less rather than more inclined to ask questions seem to contradict other statements he makes that depict chemical investigation as a continuous process of investigation, questioning and minute examination to distinguish between apparently similar substances. As regards the final highlighted section, here Levi narrows the definition of knowledge to a strictly delimited, scientific concept, and admits the impossibility of ever achieving total understanding.

7. 'Lo spirito'

GG: Io adesso mi sono messa a distillare [...]

PL: Distillare è molto bello. È molto bello. Mi pare di aver scritto nel *Sistema periodico*—

GG: Sì, sì.

PL: —della parola ‘essenza’. Si chiama *essence* in francese, la ‘benzina’ per noi. I primi distillatori credevano veramente di trovare l’anima, lo spirito.

GG: Questa è la prossima domanda. Per spirito, lei cosa intende per spirito?

PL: Non lo so.

GG: Nel senso chimico.

PL: Nel senso chimico le so rispondere. È la parte più volatile appunto. Nel senso normale della parola non so, io non so cosa vuol dire ‘l’anima’. [...]

GG: Però lei non è convinto che ci sia un’anima perpetua, un’anima eterna?

PL: Sì, non credo proprio che ci sia.

Comments:

The Literary Review reads:

GG: What do you mean by ‘spirit’?

PL: The first people to practise distillation really thought they were extracting the soul of things. I have to say I don’t know. I really don’t believe in an eternal soul (p.18).

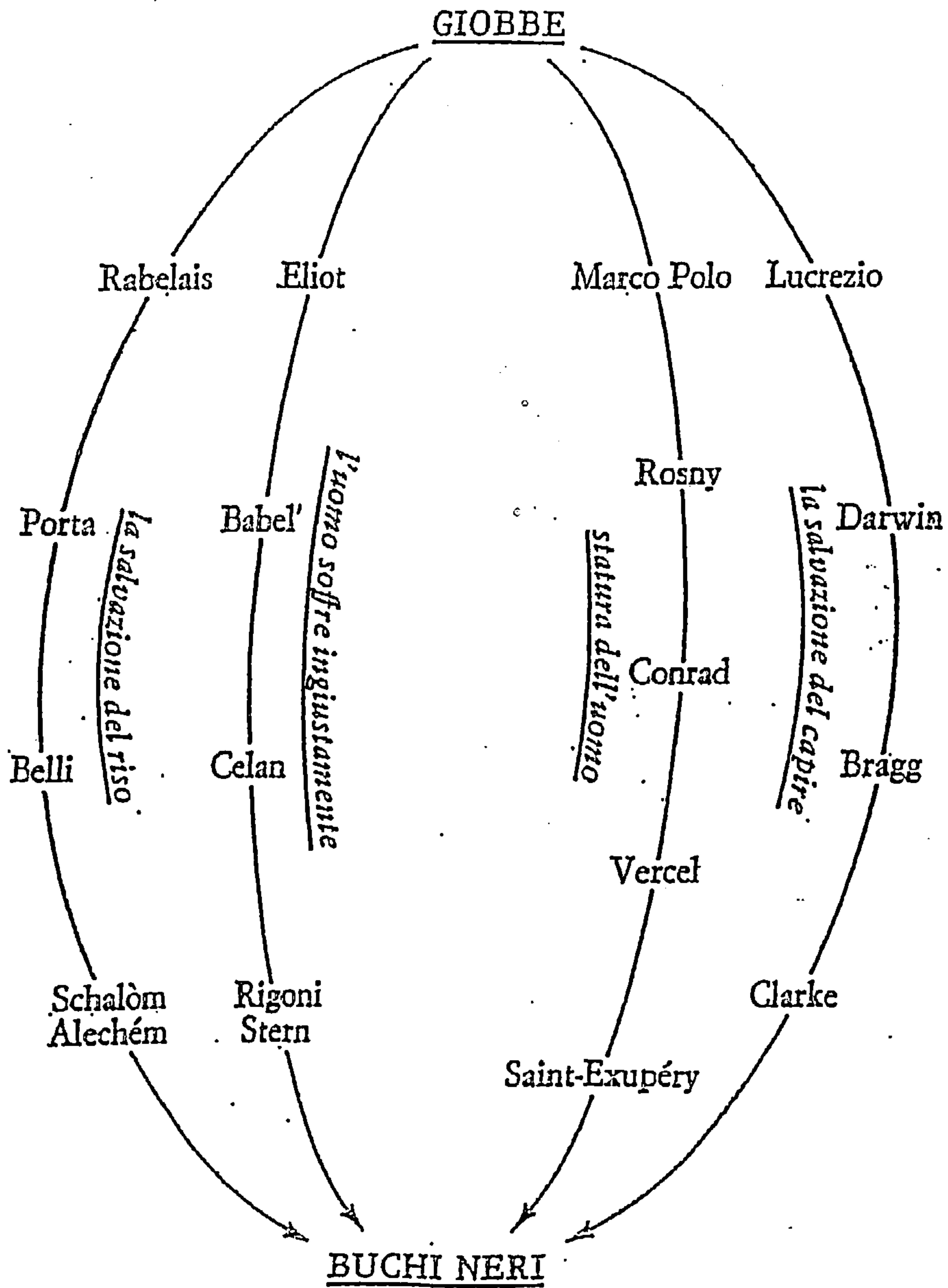
Conversazioni reads:

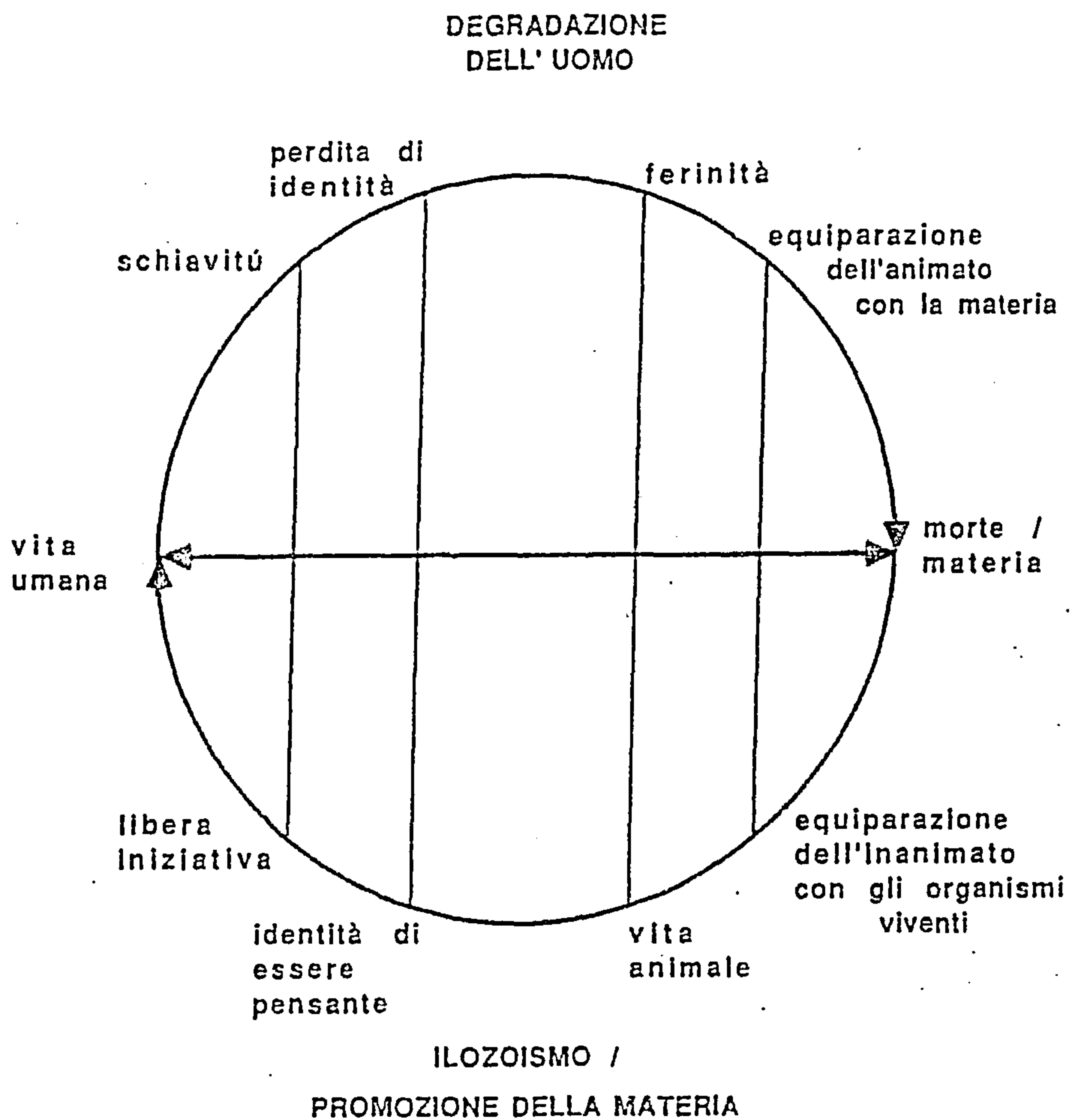
GG: Che cosa intende lei con ‘spirito’?

PL: Le prime persone che realizzarono la distillazione pensavano davvero di estrarre l’anima delle cose. Devo dire che non lo so. Non credo assolutamente in un’anima eterna (p.71).

Levi's response to Greer's discussion of distillation is entirely characteristic: he draws attention to his discussion of this process in *Il sistema periodico* (I, pp.788-89), contrasts different linguistic signifiers for the same concept, and evokes the mystical history of the distillation process itself. As regards the highlighted section, it seems significant that Levi retreats into the confines of chemical language to define 'spirito', distinguishing this from the 'senso normale' of the word, upon which he is unable or unwilling to speculate.

Illustrations

Fig. 1: reproduced from *La ricerca delle radici, II*, p.1367



Convergenza tra mondo animato e mondo inanimato

Fig. 2: reproduced from Giuseppina Santagostino,

'Destituzione e ossessione biologica nell'immaginario di Primo Levi', p.137

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I list here all of Levi's major publications in Italian, as well as longer length and collected volumes of interviews. I reference only the works in translation that are referred to in the thesis. A fuller list of English translations of Levi's works can be found in Gordon, *Ordinary Virtues*, p.293.

(a) collected works:

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