

FLORENCE PRODUCTION

editorial and production services

GENERAL TYPESETTING PORTFOLIO

www.florenceproduction.co.uk

(+44) 1398 351556 info@flopro2.co.uk

Stoodleigh Court / Stoodleigh / Devon / EX16 9PN / UK

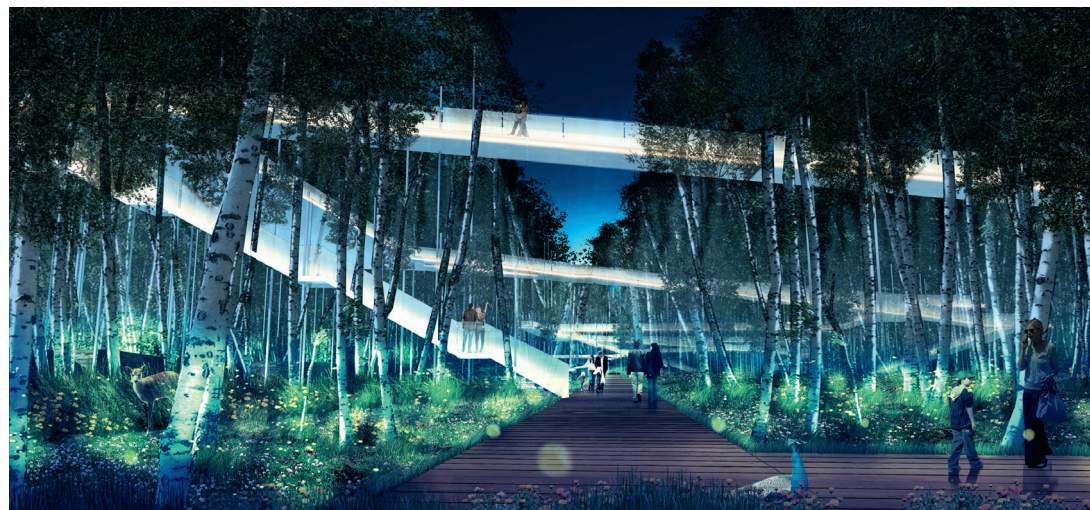


FIGURE 3.16 (above and facing page) Turenscape, Zaryadye Park, The Blue Circle of Moscow, 2013. In June 2013 the Turenscape Consortium was selected from a shortlist to prepare a design proposal for Zaryadye Park, Moscow. The park concept revolved around the creation of a living puzzle that locks together the city's memory, culture, ecology and people, which reveals the memory of the past and makes a prophecy for the future. In this case the Turenscape sequential images address both seasonal time and usability, but refer back to the base concept.

The third strategy involves truer census and density of the spaces to be designed. Often, people are added to perspective composites for scale reference. These assets are too often generic in addition, creating a kitsch perspective of elated people positioned in the most leisurely poses garbed in high fashion. The positioning of these digital persons is often highly spaced, indicating a low-density inhabitation even in the largest metropolis. Ethnicities are also often under-represented and these factors all contribute to a composite far different from the place itself. The lighting on figures is also telling of the generic nature of the composite, often sharper than the surrounds,



and the shadows cast by figures often look like those cast by a photographic studio rather than natural daylight conditions.

Finally, a sequential strategy may offer the most benefit in breaking perspectival limits and indicating a time-based approach. Sequences of perspective 2D composites highlight the multiple uses of a site, but can also be used to evidence seasonal change to a fuller degree. This option is more time intensive, but offers clients a more considered use in the design proposal. The perspective thus provides static snapshots

3D MODELLING TYPOLOGY

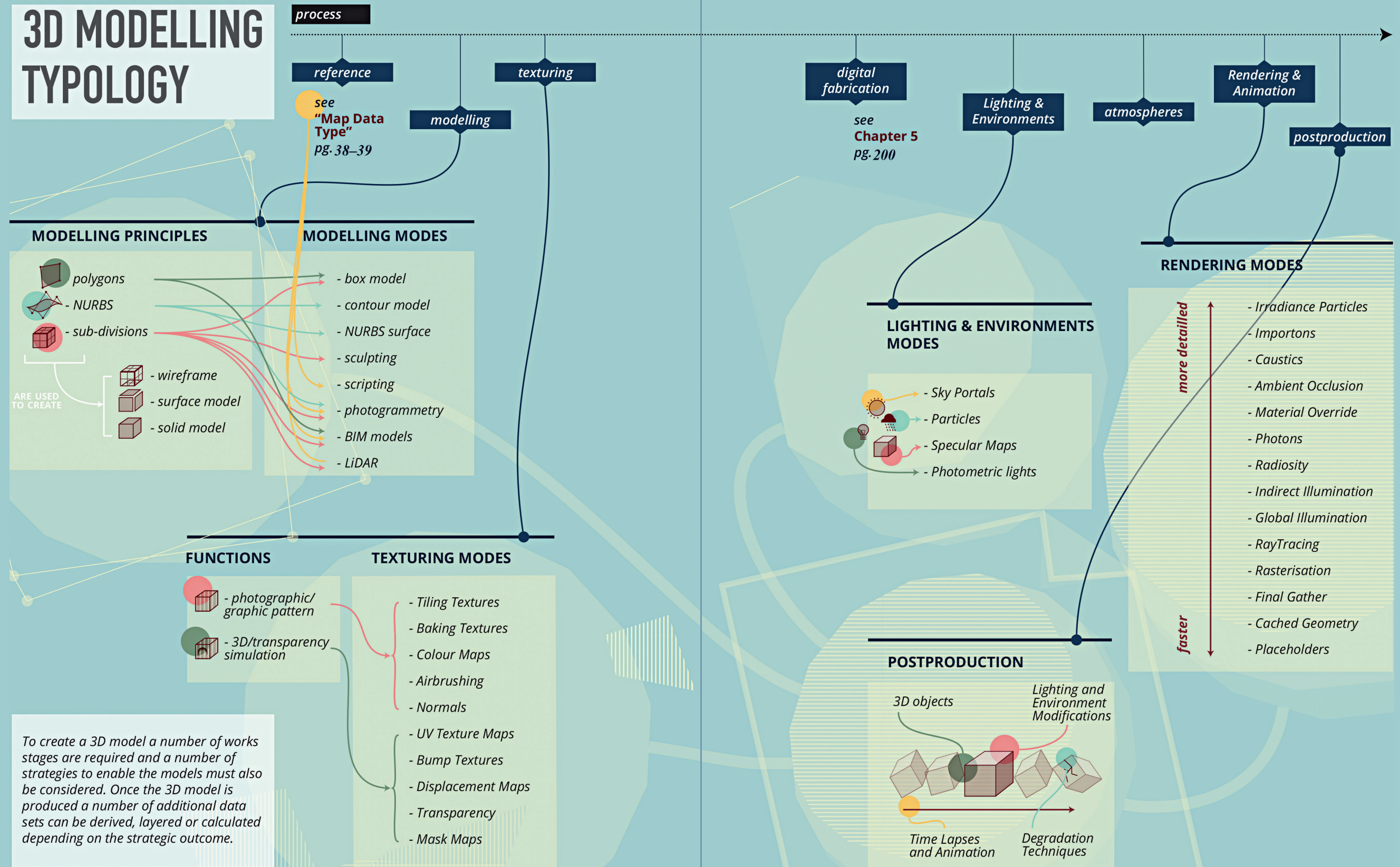


FIGURE 4.19 Serena Pollastri, Imagination Lancaster, Lancaster University, 3D Modelling Typology, 2016.



Convention Center and park above Interstate Highway 5 (September 2012)

wanted to locate the footings for one of the spans across the freeway. The outcome was an agreement whereby Hedreen located his building, Park Place, at the northwest corner of the lot and his parking garage (as then conceived) would not be in the afternoon shade of Park Place and that the park could extend over the roof of the parking garage. The park was to continue over the roof of the city's East Plaza Garage – further north, on the east side of the freeway.

Construction began in 1972 and the park was ceremoniously opened on the bicentennial Independence Day – 4 July 1976. The total cost was \$13.79 million. The bridges cost \$5.53 million derived from federal and state funds. The parking garage cost \$4.20 million raised through city council bonds but was expected to pay for itself. Construction of the park itself cost \$4.07 million. The majority of that figure – \$2.80 million – came from the Forward Thrust bonds. The remainder was largely drawn from various federal and city funds. As Ellis pointed out, constructing the park in the air space above the freeway cost about \$45 per square foot at a time when

the purchase price of land in the downtown was about \$50 per square foot (Marshall 1977: 400). Moreover, the annual property tax on the Park Place building was \$175,000 compared with a figure of \$50,000 for the previous buildings on that site.

Freeway Park was extended twice during the 1980s. First, in 1984, the city extended it eastward into the First Hill residential neighbourhood – the Pigott Memorial Corridor. This linked a retirement community with the original park. Then, in 1988, the park was extended northward over the freeway as part of the construction of the 370,000 square foot (49,000 square metre) Washington State Convention Center – another project inspired by James Ellis. This led to an increase from 400 feet (120 metres) to 1,500 feet (460 metres) in the overall length of freeway spanned by the park.

Key figures in establishment of the park

Clearly, the key figure in the initial establishment and subsequent extension of the park was James Ellis. The *Forward Thrust Program* that Ellis inspired led to the



involvement, in turn, of architects NBBJ, of Lawrence Halprin and of his associate, Angela Danadjieva, and landscape architects Edward McLeod and Associates. Walker and Simo noted that 'as Halprin confronted problems of urban landscape design in cities ... he began to focus on process rather than immutable product'. They suggested that 'he discovered a new role for the artist – not the solitary hero but the person who choreographs ... activities ... for and with the community' (Walker and Simo 1994: 146–7).

Ada Louise Huxtable described Ira's Fountain in Portland, Oregon – also by Halprin and Danadjieva – as 'one of the most important urban spaces since the Renaissance' (Thompson 1992: 68). And we have a picture of Halprin as the facilitator / catalytic choreographer working with individuals who gave physical form to his dance scores. Halprin has been compared with Frederick Law Olmsted in that 'his singular achievements rest on his unusual skill at harnessing the efforts of others' (ibid: 64). Danadjieva confirmed that she was given 'all the opportunities you can ever imagine for creativity' and that 'her imagery came from a month long tour of western canyons she took while working for Halprin' (ibid: 68). She trained as an architect in Sophia, Bulgaria and in Paris, moving to the United States after winning an international competition in 1965 for a new civic center plaza for San Francisco (Danadjieva 1977: 406). She left Halprin's office in 1977 to establish a partnership with Thomas Koenig. Danadjieva and Koenig Associates designed the Pigott Memorial Corridor (1984) and Convention Center (1988) extensions to the park.

PLANNING AND DESIGN

Location within city

As the I-5 descends into Seattle from the north it offers stunning panoramas across Lake Union to Gas Works Park and the more distant Space Needle and downtown. It heads directly towards the downtown, curving around the foot of First Hill before veering away onto a north-south alignment between Sixth and Seventh Avenues, parallel with the grid of downtown streets. First Hill is a residential neighbourhood and the park creates a physical link between there and the downtown. The park, which has sometimes seemed to be shunned by both neighbouring areas, has consistently reflected this transitional location. This was more evident before the demolition in March 2004 of the Jenson Hotel at 1214 Eighth

Top: Upstands to prevent 'horizontal use' of bench (September 2012)

Left: Part of original park above freeway (September 2012)



Stadtpark, Hamburg

- 1 The Jahn Arena
- 2 Water Tower/Planetarium
- 3 Neue Welt Play Area
- 4 Otto-Wels-Straße
- 5 Drinking Hall and Spa Garden
- 6 Bathing Women Sculptures
- 7 The 'Landhaus Walter'
- 8 Borgweg Entrance
- 9 Festwiese
- 10 Paddling/Play Pool
- 11 Open Air Theatre
- 12 Plane Tree Allée
- 13 Sports Complex
- 14 Rose Garden
- 15 Penguin Fountain
- 16 Toronto Bridge Entrance
- 17 Stadtparksee
- 18 Swimming Area
- 19 Site of Restaurant
- 20 Main Entrance

made slope is between the Festwiese and the lake. Equally, there is a vertical drop from the terrace at the east side of the lake. Otherwise the visual effects of the design are achieved with gentle changes of level over long distances – making further comparisons with Le Nôtre's work inevitable.

Design concept

Lichtwark and Schumacher both intended that the park should be designed for active recreation. This is expressed in Schumacher's statement that it should be used 'not in the sense of a passive enjoyment of the scenery, but in an active participation . . . in the open air: playing, taking part in sports, lying on the grass, paddling in the water, riding on horseback, dancing, going far beyond the appreciation of music, of art, of flowers and of physical pleasure' (in Maass 1981: 125). Its development also coincided with recognition of the healthier aspects of exposure to the sun. This all conforms with the ideologies of Cranz's 'Reform Park'. 'The Stadtpark was to be a transcendent *Gesamtkunstwerk* [total work of art] . . . stripped of its historic content . . . [t]he structure reflected the ideal of modern, industrial production;

the park must be organized like a factory in order to accommodate the large number of city-dwellers in an ordered pattern of activities' (Steenbergen and Reh 2011: 330). The visual impact of the already long axis is strengthened by the deliberate narrowing of the clearing towards the water tower between the trees. The axis is the anchor for the rest of the park. All other spaces are secondary to, but not dominated by it, and all main paths relate to it. 'Straight and curved lines have been placed close to each other. As a result, a simple direct connection between the elements of the park is created' it is 'an efficient arrangement' with 'no residual spaces or left over corners' (Baljon 1992: 194). The main axis is supplemented by the shorter north-south axis, also running through the centre of the Stadtparksee.

The gently falling landform and the layout of the planting reinforce the pre-eminence of the main axis. The surface of Otto-Wels-Straße where it crosses the axis is easily concealed by the landform. The abrupt slope between the lake and the Festwiese is also well concealed. There is no vagueness. There is a predominance of horizontal elements contrasting with the water tower and there are no statues 'of whatever hero, but only some contemplative statues' (Pohl

New allée of plane trees north of Stadtparksee (July 2012)



Unit 1 Section 1 Applied exercise physiology

Links

- The heart, blood vessels, and the role of carbon dioxide in breathing and heart function will be studied in more depth in Chapter 4 – Blood transport system (page 41).
- To find out more about the role of ATP, see Chapters 1 and 2 in *AQA Physical Education for A2 Level*.
- Efficient processes of breathing and respiration play a vital part in being healthy and fit, as you will have seen in Chapter 1 – Improving fitness and health (page 2).

Activity

Whilst sitting and reading this book, count (or get a partner to count) the number of breaths you take in a minute. Note how deep your breathing seems to be (look at the rise and fall of your chest) and listen to other body functions such as the sound of your breathing and beating of your heart. Note down your observations.

Now take a brisk walk around the room for 60 seconds. Repeat the observations. Do a similar activity the next time you are engaged in more intense physical work.

The mechanics of breathing

To understand how we breathe we need some understanding of the structure of the lungs and the respiratory airways (the tubes that take air to and from the lungs).

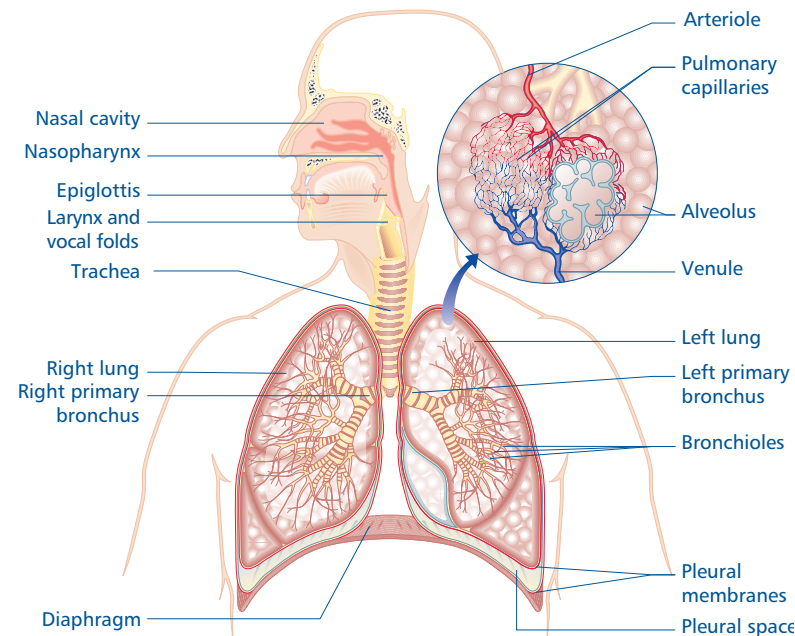


Fig. 3.1 Diagram of the lungs and associated respiratory airways

Air is a mixture of gases – oxygen, nitrogen, carbon dioxide, inert gases and often some water vapour. We are only interested in oxygen and carbon dioxide. Air enters the mouth and travels through the nasal cavity, through the larynx, down the trachea, into the right or left bronchus, then into the bronchioles and finally into the alveoli or air sacs.

If you were studying human biology you would need to learn much more about the structure of the lungs and respiratory passages than is required here. We are only concerned with the overall structure of the lungs, the pleural membrane, diaphragm, alveoli and the small blood vessels surrounding the alveoli known as capillaries.

Lungs

The lungs are two sac-like organs, spongy in appearance that lie in our chest or thoracic cavity. The spongy appearance is due to the millions of small air sacs or **alveoli**. The lungs are surrounded by a membrane called the pleural membrane and bordered on the bottom by a sheet of muscle known as the diaphragm. See Figure 3.1.

Air moves from areas of higher pressure to areas of lower pressure. To breathe in (inspire) it is necessary for the air pressure in our lungs to be lower than the pressure of the air in the atmosphere. Atmospheric air pressure is 100 **kPa** and when we inspire we lower the air pressure in the alveoli to 99.74 kPa. This allows air to flow into the lungs from the outside air.

Inspiration (breathing in)

During **inspiration**, we lower the air pressure in our lungs and therefore alveoli by increasing the volume of the lungs. During quiet breathing (when at rest) this increase in volume is achieved by the diaphragm muscle contracting and therefore flattening. This increases the volume inside the chest cavity or thorax. At the same time the intercostal muscles between the ribs contract and lift the ribcage up and out also increasing the volume inside the chest cavity. The lungs are connected to the pleural membrane, and therefore to the ribs, so the lungs are pulled outwards. Because the intercostal muscles and diaphragm are actively working this is known as an active process.

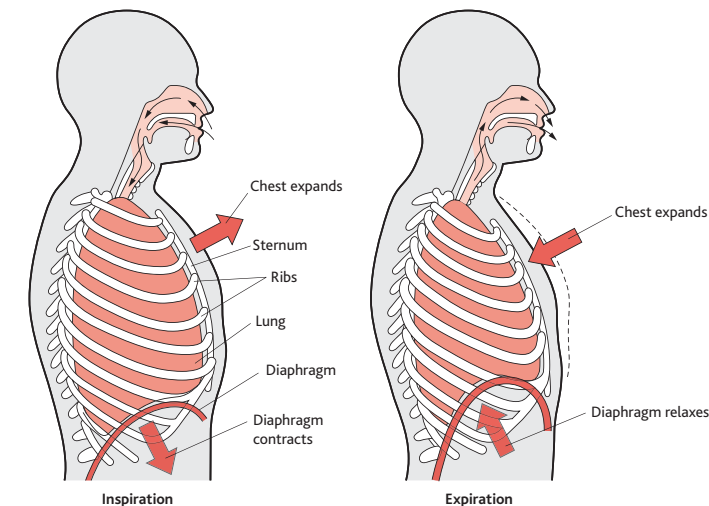


Fig. 3.2 Increase in lung size to achieve inspiration

During exercise the rate and depth of breathing increase (look at the notes you made after the learning activity at the beginning of the chapter). The depth of breathing is increased by a greater expansion of the thoracic cavity. This is caused by the action of three other muscles – the sternocleidomastoid raises the sternum (breast bone) and scalene and pectoralis minor lift the ribs further. The greater expansion of the ribcage stretches the lungs further and allows for a larger inspiration of air.

The amount of air we can inspire in one breath, known as the tidal volume, can vary from 0.5 lt at rest to 3.5 lt when exercising. Our rate of breathing can also increase from 11–14 breaths per minute up to approximately 45. This allows for a significant amount of air breathed during exercise as we shall see in the next section.

Chapter 3 Lung function

Key terms

Alveoli: tiny thin-walled air sacs found in large numbers in the lungs.

kPa: kilo Pascal (measure of pressure).

Inspiration: the act of breathing in.

AQA Examiner's tip

You will not be examined on the structure of the lungs or the respiratory airways.

Activity

Draw a flow chart to show the passage of air from the mouth into the alveoli. Make up a mnemonic to remember the route, e.g. 'No Little Time Before Breakfast Again' – Nasal cavity, Larynx, Trachea, Bronchus, Bronchioles, Alveoli/Air Sacs.

Activity

After quiet breathing for about ten seconds, breathe in and out as hard as you can. Note the muscles you have used, chest and abdominal action.



Sheenjek River II: A Gwich'in Homeland. Oil and the Caribou.
Photograph by Subhankar Banerjee, 2002.

photograph, one dedicated young environmentalist asked me a question: How could there be a hunting camp in a wildlife refuge? So, a photograph raised that question, and it caught me off guard because I had not really thought about it myself. I had taken it for granted that these things are there and I am photographing them. But that question led me on to many years of research into environmental history in America, and what came out from that was the sheer scale of the injustice done to Native Americans. And sometimes what environmental history has

missed I have tried to retrieve by going into art history. A lot of my current research is at the intersection of those two perspectives.

To give you an example of how that works, I am conscious when I come back to the photographs that I begin to question the difficulties people might have in seeing certain images. In 2009 when I was the Artist-in-Residence at Dartmouth College, I presented a large Caribou migration photograph, with four small caribou harvest photographs and there were three



points of tension I was seeking to discuss with the juxtaposition: emotive response, scale and viewing distance, and environmental conservation. I have noticed that many viewers are attracted to the caribou migration photograph but repulsed by the harvest images in which blood is visible. Our modern cultures have got used to purchasing meat neatly packaged in plastic that seeing blood in meat has become disturbing for many people. The suite of caribou harvest photographs is addressing a historical problem and is an attempt to decolonise American

environmentalism. It is also addressing a philosophical problem and is an attempt to recognise where our food comes from. The next point of tension is scale—to see the large caribou migration photograph we pull back, but to see the small harvest photographs we draw near. And, finally, environmental conservation as we feel compelled to protect the caribou and its habitat as wilderness that is untouched by humans. But humans have lived and depended on that caribou and the very same wilderness for many millennia and have established an ecospiritual³

At the Corral – Nikolayev Matvey Gathering Reindeer. Even and the Climate.
Photograph by Subhankar Banerjee, 2007.

Categorizing Motor Abilities

Fleishman's taxonomy groups motor abilities in two categories: (1) perceptual motor abilities and (2) physical proficiency abilities, which are identified in Table 1.2, along with an example of a skill for which the ability is elemental. It should be noted that this list is not all-inclusive, nor is it likely that all abilities have yet been identified.

Practical Implications

We all have different abilities that enhance or limit our capacity to become skilled at a particular task. But even if we possess the prerequisite abilities for accomplishing a task, there is no guarantee that we will become skillful. We only have the *potential* to become skillful. Practice and experience play a role in realizing that potential. Consequently, children should be provided with as many varied movement experiences as possible. Those experiences should be developmentally appropriate. Learners will modify skills according to their current level of ability.

FIGURE 1.7

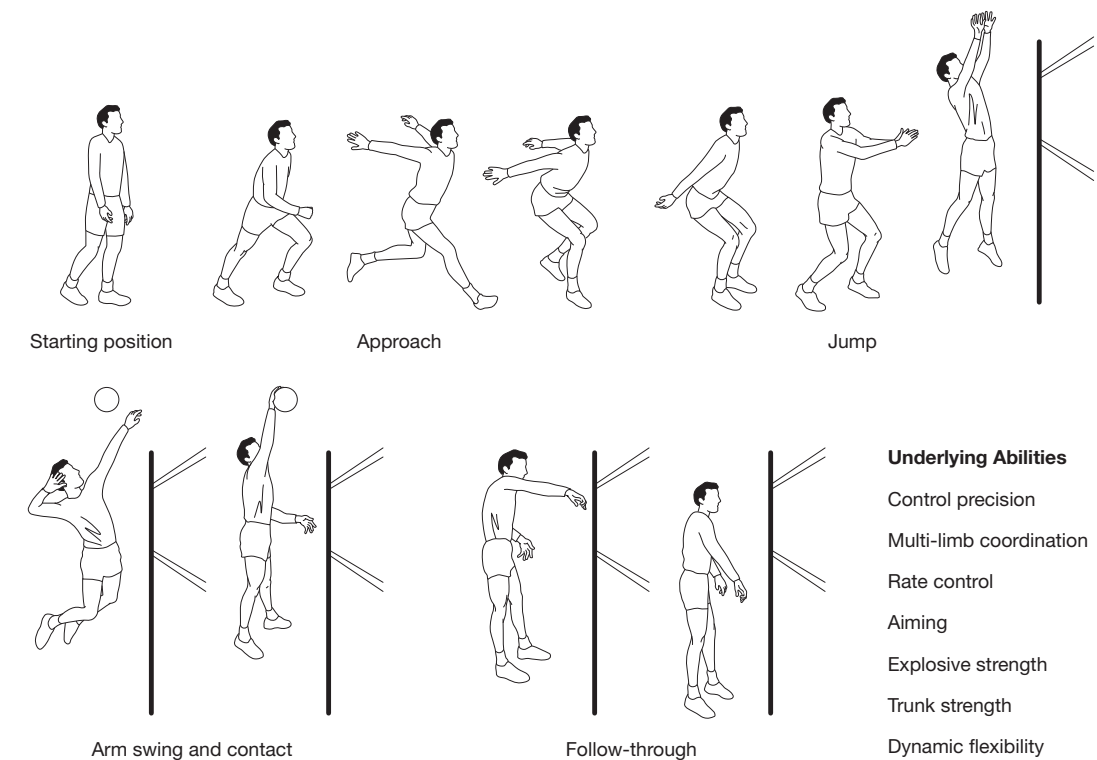


Can future success in a skill be predicted?

For example, successful performance of a regulation free throw requires a prerequisite level of strength. A young learner who has not yet developed sufficient strength will modify his or her performance accordingly in an attempt to make a basket. Rather than employing correct technique, the learner may instead execute the free throw using more of a "shot put" type movement in order to generate enough force to project the ball high and far enough. Practitioners should lower the basket to a more suitable height and encourage the learner to employ the correct technique with the nearer target. As learners' physical maturity advances, change the height of the basket accordingly. Note that learners will not progress at the same rate, and that there exists a genetic ceiling for each learner's level of skill regardless of the amount of practice.

The concept of abilities is also useful for skill classification. Through a method known as **task analysis**, we can determine the underlying abilities important to the successful performance of a specific skill. Skills can then be grouped accordingly. To perform a task analysis, a skill is first broken down into its key elements or component parts. Once the key components have been

FIGURE 1.8 Task analysis of a volleyball spike



identified, the abilities that are necessary to meet their requirements can be more readily determined. By conducting a task analysis, the practitioner can develop a greater understanding of the skill's requirements. Figure 1.8 illustrates a task analysis and subsequent examples of ability prerequisites for a volleyball spike.

If underlying abilities are important to the successful performance of a specific skill, it would stand to reason that an individual who possesses those abilities would be predisposed to achieve a high level of proficiency. Imagine the impact this would have on sports programs, as we could predict future performance simply by screening individuals for certain abilities. In fact, talent identification programs have existed for decades. They screen children and adolescents using a battery of tests constructed to determine the extent to which they possess certain abilities. The test results are then used to select those individuals who appear to have the potential to succeed in a given sport. Other tests screen candidates for professions such as firefighting. Visit the websites provided in the margin to view and hear additional examples of agility and talent identification programs.

COMMON MYTH
Future success in a specific skill can be easily predicted



33.15N, 151.15E. From the series: *SHOAL*.

Included with trawl: tatami mat, part of the floor of a Japanese home, fishing related plastics; buoys, nylon rope, buckets, fish trays, polystyrene floats shampoo bottle, caps, balloon with holder and petrol container. Photography by Mandy Barker, 2012.

a shred of bag that looked like a face or a piece of Styrofoam that looked like a bone.

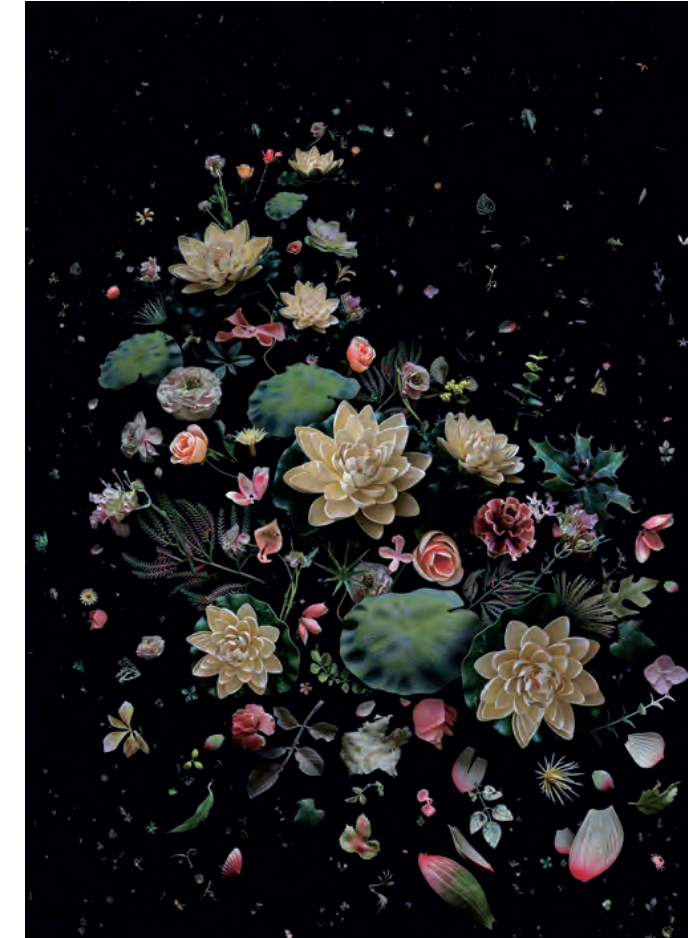
Because of the demands of their disciplines scientists have to remain detached and there is no room in scientific study for personal responses to the subject. I feel it's important for artists to be involved with issues such as this as art can connect with people in different ways and offer a new perspective. The series *SHOAL* was developed from trawls and net samples at various points on the voyage between Japan and Hawaii, and also from the tsunami-affected shoreline in Fukushima Prefecture. Each image included a different trawl sample and is captioned with the grid reference of where each sample was collected, a marker to pinpoint a specific location.

Recently, I visited Hong Kong to speak at the inaugural conference for a charity called Plastic Free Seas. I was shocked by the statistics and to discover that over 50 tonnes of polystyrene was going into landfill in Hong Kong everyday just from takeaway cartons, and the beaches are piled high with it. I visited some of the beaches and was taken to one of the islands that is particularly affected and I collected samples and photographed the debris. This led to the creation of a new project specifically about Hong Kong.

I wanted to create an opportunity to connect the people of Hong Kong with the problem of plastic pollution, and

therefore included elements in the design of the images that would be of specific cultural relevance. For example, in 2012 they had a container spill of plastic pellets or nurdles,² and that's one image. There are also plastic lotus flowers, which are linked to notions of beauty in Hong Kong. Tea packaging was another key element and a cigarette lighter with an image of a panda, the national animal of China, printed on the side. The final series *Hong Kong Soup* was nominated in the WYNG Masters Award³ and was series winner in the Lens Culture EARTH Awards.⁴ But I would never have thought about doing that if those links that my research had created hadn't added another dimension to my thinking about waste in different parts of the world.

Keeping my work fresh is something that I need to be aware of if I am to connect more people to the problems of marine pollution. This means that as part of my research process I have to think and plan ahead, so being alert to the possibilities and looking for potential new ideas is an essential activity. 2014 was the year of the football World Cup and this became the catalyst for the series *Penalty*. Rather than concentrating on different types of plastic I decided to focus attention on one single plastic object, the football, as a global symbol and one that would potentially reach a global audience. I put a call out via social media for people to collect and post footballs or pieces of footballs that had washed ashore on beaches around the world; and I have to say I was surprised by the response.



Lotus Garden. From the series: *Hong Kong Soup*: 1826.

A collection of different species of discarded artificial flowers (that would not exist at the same flowering time in nature) should not be found in the ocean. The flowers were recovered from various beaches in Hong Kong over the past three years (includes; lotus flowers, leaves and petals, peony, carnation, rose, blossom, holly, ferns, castor and ivy leaves). Photography by Mandy Barker, 2014.

15

Regular verb conjugations

1 ★ Present, imperfect and preterite indicative

⇒ MBPG 15.3–15.5

Give the indicated form for the present, imperfect and preterite of these regular verbs.

Example:
cantar (vocês/eles/elas) > cantam, cantavam, cantaram

- | | |
|-------------------------------|-------------------------------|
| (a) puxar (nós) | (m) partir (você/ele/ela) |
| (b) viver (você/ele/ela) | (n) meter (vocês/eles/elas) |
| (c) dividir (eu) | (o) adorar (eu) |
| (d) cumprir (vocês/eles/elas) | (p) desistir (nós) |
| (e) duvidar (você/ele/ela) | (q) jantar (vocês/eles/elas) |
| (f) receber (nós) | (r) correr (eu) |
| (g) escutar (eu) | (s) exhibir (vocês/eles/elas) |
| (h) defender (você/ele/ela) | (t) ajudar (nós) |
| (i) omitir (nós) | (u) ceder (eu) |
| (j) bater (vocês/eles/elas) | (v) expandir (você/ele/ela) |
| (k) tirar (você/ele/ela) | (w) roubar (vocês/eles/elas) |
| (l) imprimir (eu) | (x) depender (nós) |

2 ★ Present subjunctive

⇒ MBPG 15.6, 20.3, 20.6

Change the infinitive in brackets into the appropriate form of the present subjunctive.

- (a) Espero que vocês (gostar) do presente.
(b) É importante que eles (assistir) à reunião.
(c) Tomara que nós (ganhar).
(d) Talvez ele não (entender) português.
(e) Eles querem que eu (lavar) toda essa roupa.
(f) Ela prefere que nós (comer) mais tarde.
(g) É possível que ele (decidir) ficar.
(h) Não me surpreende que eles (sofrer).
(i) Sugerem que nós (dividir) um quarto.

Now translate the above sentences into English.

Regular verb conjugations

3 ★ Imperfect subjunctive

⇒ MBPG 15.7, 20.3–20.6

Change the infinitive in brackets into the appropriate form of the imperfect subjunctive.

- (a) Eles queriam que nós (deixar) as bolsas na entrada.
(b) Se eu (vender) o meu carro, teria dinheiro para viajar.
(c) Acho que seria melhor se vocês (imprimir) o documento em preto e branco.
(d) Por mais que ele (insistir), ela não cedeu.
(e) E se a gente (pintar) o banheiro de verde?
(f) O povo exigia que as autoridades (prender) o suspeito.
(g) Era inevitável que a eleição (coincidir) com o feriado.
(h) Ele pediu aos alunos para avisá-lo quando (terminar) a prova.
(i) Ela não gostava que nós nos (meter) na vida dela.

Now translate the above sentences into English.

4 ★ Future subjunctive

⇒ MBPG 15.8, 20.4–20.5

Change the infinitive (in parentheses) into the appropriate form of the future subjunctive.

- (a) Se vocês (precisar) de ajuda, podem me chamar.
(b) Nós podemos fazer da nossa vida o que bem (entender).
(c) Quem (desistir) da viagem terá que pagar uma taxa.
(d) Se eu (acordar) cedo amanhã, vou à feira comprar peixe.
(e) Quando nós (decidir) o que vamos fazer, avisamos você.
(f) Se (chover), eu não vou sair.
(g) Se vocês (permitir), gostaria de fazer um comentário a esse respeito.
(h) Nós vamos mandar notícias assim que (chegar).
(i) Isso depende do que eles (responder).

Now translate the above sentences into English.

5 ★ Future and conditional

⇒ MBPG 15.9

Give the indicated form for the future and conditional of these regular verbs.

Example:
cantar (nós) > cantaremos, cantaríamos

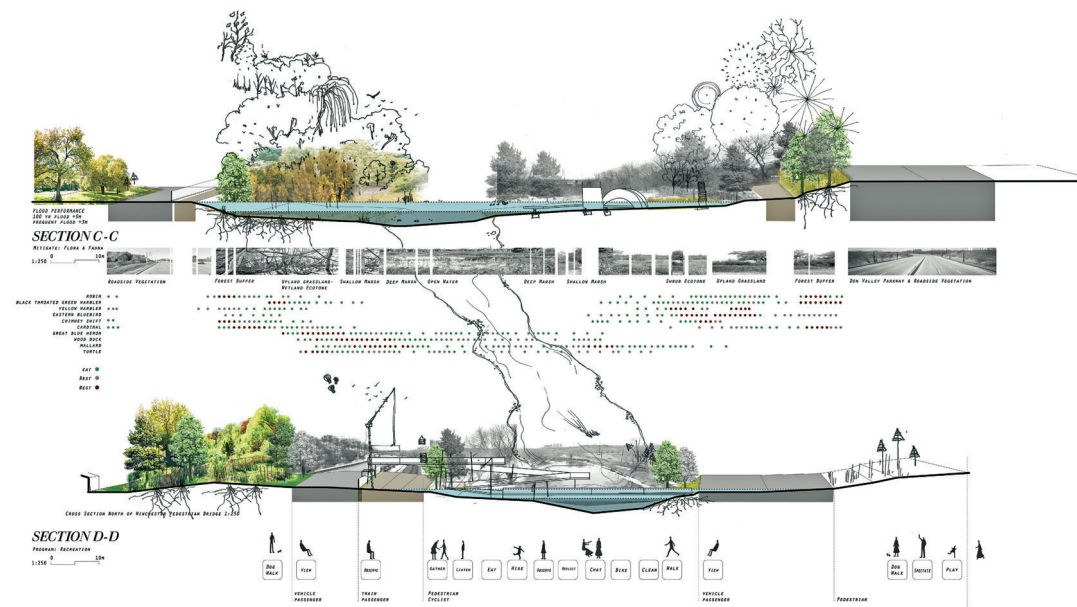
- | | |
|------------------------------|--------------------------------|
| (a) vencer (nós) | (e) pagar (eu) |
| (b) voltar (você/ele/ela) | (f) resistir (vocês/eles/elas) |
| (c) demitir (eu) | (g) colaborar (nós) |
| (d) perder (vocês/eles/elas) | (h) escolher (você/ele/ela) |

Nina-Marie Lister ■

What does landscape design for resilience look like? What tactics do we need to engage to design for resilience? To activate such a model for design, we can summarize key principles of contemporary ecology in terms of adaptive complex systems generally, and of resilience specifically.¹³ First, change can be both slow and fast, at multiple scales. This means that it's essential to look beyond one scale in both space and time, and to use various tools to understand the system. Slow variables are arguably more important to understand than fast ones, as they provide necessary (if temporary) stability from which to study change at a distance, safely. Yet there can be no universal point of access or ideal vantage point. Mapping, describing and analyzing the system from multiple perspectives, using different ways of knowing and with a diversity of tools is critical. If uncertainty is irreducible, and predictability is limited, then the role of the traditional expert is also limited—and the role of designer is more akin to facilitator or curator.

Second, some connectedness, or modularity across scales is important, and feedback loops should be both tight and loose. Resilient systems are not so tightly coupled that they can't survive a shock throughout the system that moves rapidly and destructively. For example, it is understood that children ought to have some limited exposure to viruses to develop immunities, but at not too large a scale of impact so as to endanger long-term health. In the same way, design strategies for resilience must consider both novelty and redundancy in terms of structures and functions. A useful example is a trail system in a park, which is somewhat connected using a hierarchy of paths that is legible and efficient, and yet not so tightly connected that it compromises habitat, folds in on itself, or prohibits spontaneous exploration.

Figure 5.6
Bird migration in the
Don Valley.
S. Long & G. Yang, 2014.



Is landscape ecology? ■

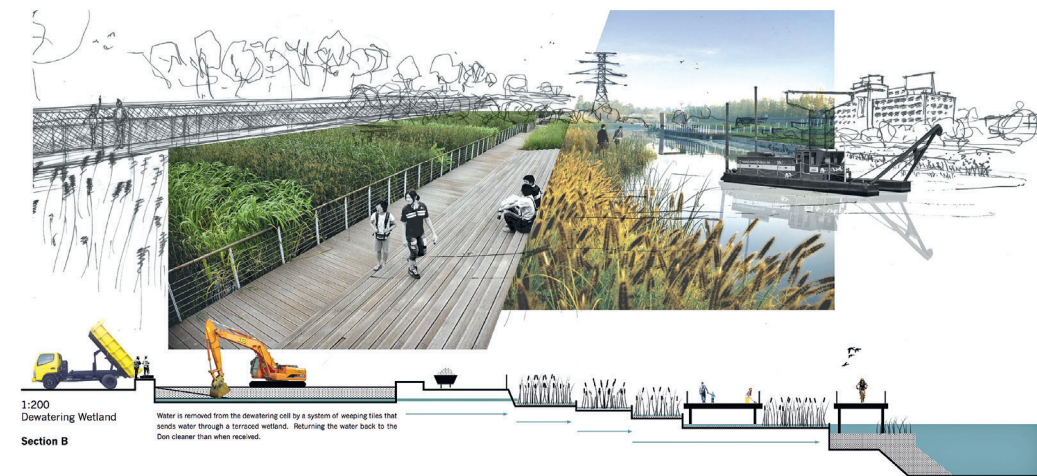


Figure 5.7
Soil washing as
productive landscape in
the Lower Don.
L. Littlefield & R. Felix,
2014.

Third, there are multiple possible states in which an ecosystem can function. There is no single correct state. It is important to determine where in the adaptive cycle the system of interest is, such that decision-makers and designers can learn patterns, and anticipate change (if not predict it). Eventually, perceived stability in any phase will end, and the system will move to a new phase in its adaptive cycle. A non-linear approach to landscape design that encompasses oscillating or changing states within various phases of ecosystem development will help facilitate change (Figure 5.8). For example, it may be desirable to design for seasonally flooded landscapes or along a gradient of water that changes rapidly in a short period of time.

In this way, ecological succession is a useful metaphor—perhaps also a heuristic model—for dynamic change in urban ecosystems, in which one quality of urban fabric is replaced by another over time, whether through relatively slow or fast processes of, for example, slum removal, building demolition, gentrification, densification, post-industrialization, economic market shifts, demographic changes in neighborhoods, etc. Increasingly, as urban landscapes grow and become more complex in both structure and function, it is reasonable to expect continuing hybridization between cultural and natural domains of the city. For example, urban biodiversity is often rich in species that are non-native, but acclimatize favorably and become well-adapted to the urban and suburban conditions, eventually evolving into hybrid species, such as the coywolf, which thrive in the similarly recombinant spaces between the city and the wild (Del Tredici 2014; Velasquez-Manoff 2014)¹⁴.

Finally, resilient systems are defined by diversity and inherent—but irreducible—uncertainty. Successful strategies for resilient design should use a diversity of tactics through *in situ* experimental and ecologically responsive approaches that are safe-to-fail, while avoiding those erroneously assumed to be fail-safe (Lister 2007). This is an important distinction, as conventional engineering relies on

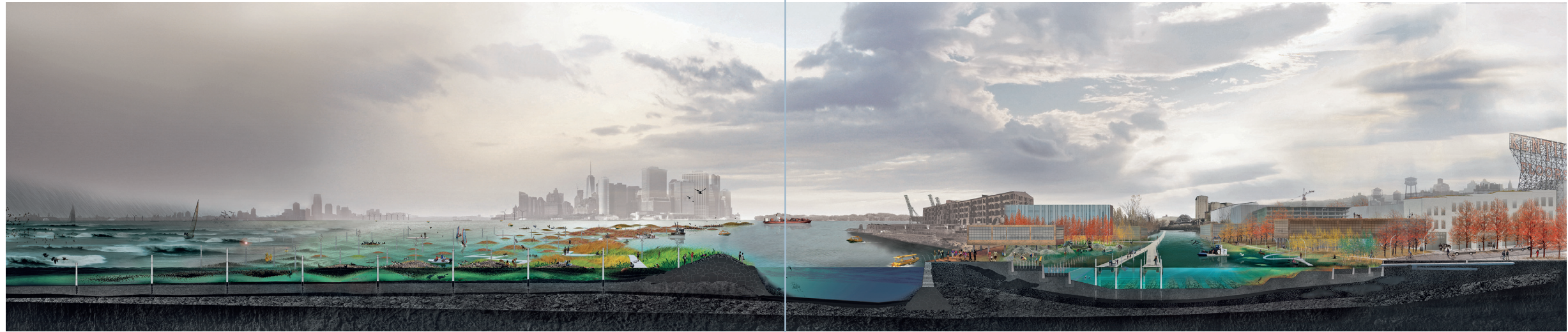


Figure 6.5
Oyster-tecture,
New York, 2010.
SCAPE/Landscape
Architecture.

and grow with the threat of sea level rise. The US Environmental Protection Agency (EPA) defines green infrastructure as “An adaptable term used to describe an array of products, technologies, and practices that use natural systems—or engineered systems that mimic natural processes—to enhance overall environmental quality and provide utility service.”¹⁹

Ecological infrastructure can serve as tissue in the urban fabric, weaving together the natural and built environments. Ecological infrastructure strategies provide an integrated approach to mitigating the negative impacts of extreme weather on vulnerable coastal populations. A growing proportion of the world’s urban population inhabit coastal regions. The poor, the disabled, and older and younger people in those urban areas are especially vulnerable to extreme weather events. Ecological infrastructure systems can help mitigate natural disaster impacts and foster significant improvement in the health of the environment, the economy, and the people living in vulnerable communities.²⁰ When such systems are carefully integrated into a city-region, they can also lower public and private expenditures by increasing the efficiency of service provisions and reducing the burden on existing infrastructure systems.²¹ In addition to cleaner water, air, and soil, these interventions can lead to lower utility bills and more climate-change-resilient, beautiful, and walkable urban environments.²²

However, the implementation of ecological infrastructure in vulnerable communities presents considerable challenges. Due to a lack of economic resources and political will, such communities often lack the most basic infrastructure, including water, sewage, and solid waste management systems. To cope with these conditions, many vulnerable communities have developed informal, creative, and sustainable solutions to infrastructure provision. Communities might adapt what has been called “infrastructural opportunism” or “tactical urbanism” to take strategic advantage of circumstances where time-sensitive interventions are possible.²³ However, local and community-based knowledge is often overlooked, the principles and benefits of ecological infrastructure are poorly understood, and new

(but frequently not very green), infrastructure systems are often implemented without sufficient consideration of local knowledge and social context. The primary working hypothesis is that access to, the design of, and the performance of green infrastructure is shaped by social relations, environmental conditions, economic incentives and constraints, and political and regulatory systems.²⁴

By identifying interventions like bioswales, rain gardens, green roofs, and living walls as infrastructure, new approaches towards urbanism arise to the scales of planning, management, and regulation. When reframed as infrastructure, these interventions now require more investment, monitoring, and coordination. Coordinated interventions can lead to multifunctional landscapes that include both built infrastructure and existing natural areas. In this context of developing functional ecological infrastructure, such landscapes can convey both stability and resilience.

HEALING URBAN WOUNDS

Aldo Leopold observed that “one of the penalties of an ecological education is that one lives alone in a world of wounds.”²⁵ Our species certainly has inflicted considerable damage on the planet. In recent years, we have begun to mend those wounds and, in the process, we have created wonderful new urban places. Pioneering projects such as Richard Haag’s Gas Works Park in Seattle and Latz + Partner’s Duisburg-Nord Industrial Landscape Park in Germany set the stage in the late twentieth century. Porto’s city park, the Cheonggyecheon project in Seoul, Madrid Rio, and the High Line in New York City have expanded the possibilities for larger-scale urban landscape restoration.

Each of the projects named above reclaimed urban wastelands. The city park of Porto, Parque da Cidade Porto, is an example of a long-term planning effort that transformed a largely degraded landscape (Figure 6.6). Its planning began when the city set aside the land near Porto’s Atlantic beaches for the park in its 1961 City Master Plan. The 208-acre (84-hectare) site includes abandoned farms and a landfill.

Phrase Model 10

Phrase Model 10 features a chromatic phrase identifier tonicizing: the flat supertonic key area. More often than not, however, a $[ii-V^7]/bII$ progression occurs in an incomplete form without resolving to bII . Figures 21.15a–21.15c illustrate a harmonic layout of **Phrase Model 10**, show a contrapuntal framework derived from a chromatic $\hat{1}-b\hat{2}-\hat{1}-\hat{7}-\hat{1}$ melodic pattern, and realize the A section of “Darn That Dream” using jazz chorale texture in four voices.¹⁷ In **Phrase Model 10**, $b\hat{2}$ functions as a minor 7th of the underlying ii/bII harmony. The resolution to $\hat{1}$ over V/bII satisfies the rules of voice leading.

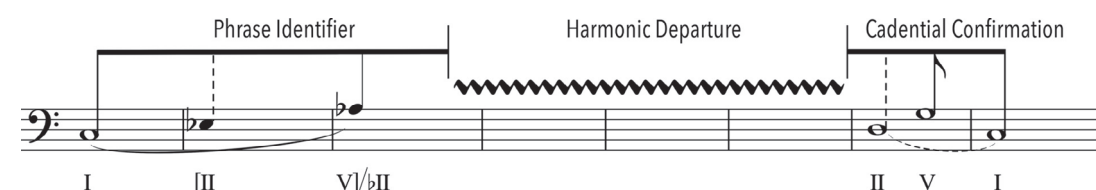


FIGURE 21.15a Phrase Model 10

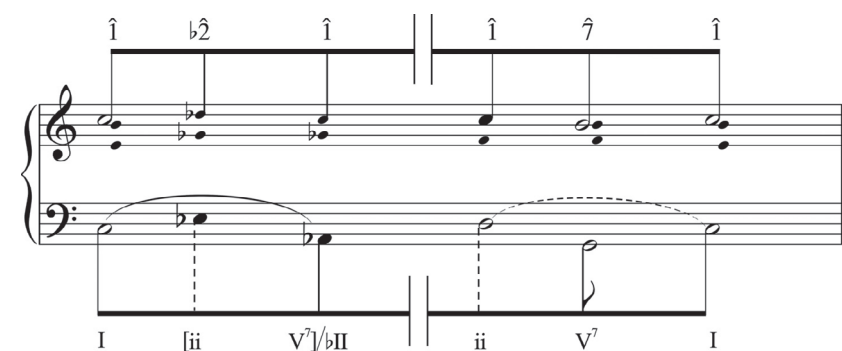


FIGURE 21.15b Phrase Model 10: Contrapuntal Framework

Jazz Chorale 4-Part

Darn That Dream

GΔ7 Bbm7 Eb7 Am7 B7(b9) Em7 A/C# Cm7 Bm7 E7(b9) Am7 Cm9 F9 Bm9 Bbm9 Eb13 Am9 D7(#11) Bm7 Bb7(b5) Am9 Ab13

I [ii V⁷]/bII ii - (V⁷)/vi vi - #iv iv iii V⁷ ii [ii V⁷]/bIII iii [ii V⁷]/bII ii - V⁷ - iii bIII⁷ ii Tr/V

FIGURE 21.15c Phrase Model 10: “Darn That Dream”

What is interesting about the $[ii-V^7]/bII$ progression is that it frequently functions as an effective harmonic substitution provided that the melody note establishes a convincing chord/scale relationship with the underlying harmony. After all, it is situated a minor 2nd away from the structural $ii-V^7$ progression and, as discussed in Chapter 6, the $[ii-V^7]/bII$ often functions as a chromatic sidestepping progression. In the context of “Darn That Dream” or “Out of Nowhere,” however, the $[ii-V^7]/bII$ is fully integrated within the harmonic structure of these tunes. In “The Lady Is a Tramp” and “I Guess I’ll Hang My Tears Out to Dry” only the $[ii]/bII$ is employed as a chromatic elaboration of the otherwise diatonic opening.

STANDARD TUNES—PHRASE MODEL 10

Darn That Dream	The Lady Is a Tramp
I Guess I’ll Hang My Tears Out to Dry	Three Little Words
Out of Nowhere	We’ll Be Together Again
San	

Phrase Model 11

Phrase Model 11 features a descending major 2nd cycle beginning on the tonic and—following the subsequent tonicizations of $bVII$ and bVI —ending on bVI . Even though there are only a handful of tunes that use this progression in its entirety, an incomplete **Phrase Model 11** (with a partial descending major 2nd cycle) can occur in the context of different harmonic progressions. Figures 21.16a–21.16c show a chord structure of **Phrase Model 11**, illustrate a contrapuntal derivation from a $\hat{1}-\hat{7}-\hat{1}$ melodic pattern, and realize the A section of “How High the Moon” using jazz chorale texture in five voices.¹⁸

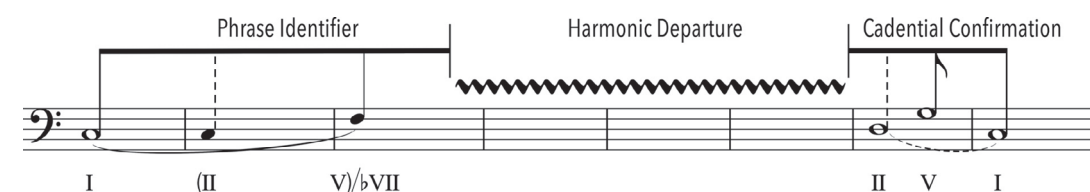


FIGURE 21.16a Phrase Model 11



FIGURE 21.16b Phrase Model 11: Contrapuntal Framework

Jazz Chorale 5-Part

How High the Moon

G⁹ GΔ⁹Gm^(Δ9) Gm⁹ C⁹ F⁹ FΔ⁹Fm^(Δ9) Fm⁹ Bb⁹ Eb⁹ EbΔ⁹ Am¹¹(b5) D7(b13) Gm^(Δ9) Am¹¹ D7(b13) GΔ⁹ Am⁹ D13(b9) Bm⁹ E7(b13) Am⁹ D7(b13)

I (ii V⁷)/bVIIbVII (ii V⁷)/bVI bVI ii⁹ V⁷ i ii V⁷ I ii V⁷ iii V⁷ ii V⁷

FIGURE 21.16c Phrase Model 11: “How High the Moon”

BIOLOGY

Had a look ☐ Nearly there ☐ Nailed it! ☐

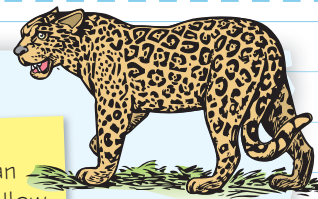
Variation

When we find an organism that we don't know, we can use a **key** to help identify what species it is.

Worked example

Use the key for big cats to identify this animal.

1 Has no spots? Has a spotted coat?	Choose the statement that matches the organism most closely.	go to 2 go to 4	Your choice might give you an instruction to follow.
2 Has stripes? Has no stripes?		tiger go to 3	Your choice might tell you what the organism is.
3 Has ring of dark fur round nose and mouth? Has no ring of dark fur?		puma lion	
4 Has simple spots of same size all over? Has rosettes (patterns of spots)?		cheetah go to 5	
5 Rosettes have small dots inside? Rosettes have no dots inside?		jaguar leopard	

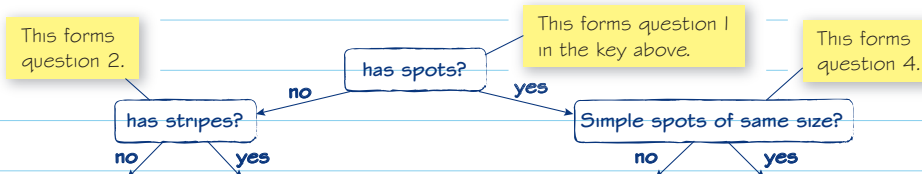


The animal has a spotted coat (1→4), has patterns of spots (4→5), and has small dots inside the rosettes. So it is a jaguar.

Constructing a key

Start by separating the organisms into groups using obvious **characteristics**. The key above starts by separating the big cats into those with spots and those without spots. Continue separating each group into smaller groups using obvious characteristics until you have only one organism in each group.

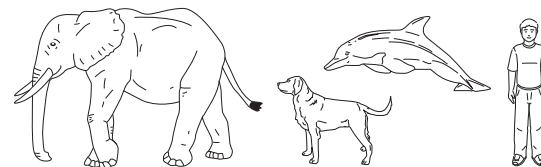
A diagram like this can help you construct your key.



Now try this



1. Explain what an identification key is used for. (1 mark)
2. Construct a key to identify these four animals. (4 marks)



BIOLOGY

Had a look ☐ Nearly there ☐ Nailed it! ☐

Reasons for variety

Different species are **adapted** to living in different environments. Organisms that live in extreme environments need special adaptations.

Deep-sea hydrothermal vent organisms		Polar organisms	
Environment	Adaptations	Environment	Adaptations
little light	no eyes	white snow and ice	white fur for camouflage
extremely hot water	sense organs that detect dangerously high temperatures	very cold in winter	to reduce the amount of heat leaving the body organisms may have: <ul style="list-style-type: none"> • thick fur • extra fat below skin • bulky body • small ears
acidic water, at high pressure and full of minerals	soft parts strengthened by iron scales		
low oxygen concentration in water	haemoglobin to help take oxygen from water	slippery ice	wide feet with rough soles to help grip the ice

Worked example

Before the Antarctic winter begins, Emperor penguins build up a thick layer of fat beneath their skin. Explain how this helps them survive.

The Antarctic winter is very cold. A thick layer of fat acts as insulation against the cold air and prevents the inside of the penguin's body losing too much heat.

EXAM ALERT!

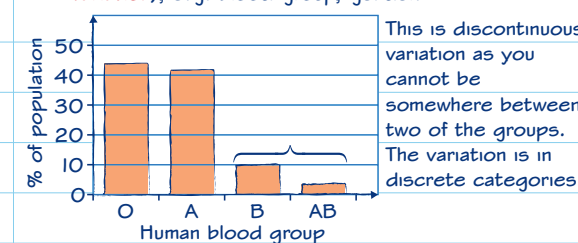
In an exam answer be clear about which environmental conditions an organism is adapted to, and how each characteristic helps them to survive those conditions.

Students have struggled with exam questions similar to this - **be prepared!** **ResultsPlus**

Types of variation

Discontinuous variation

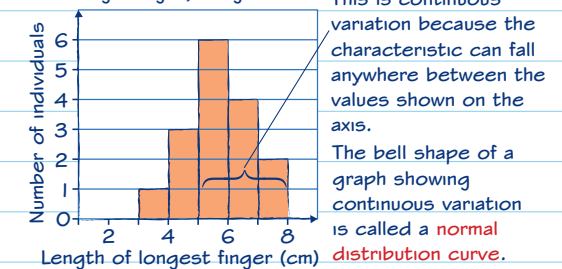
Characteristics controlled by genes (**genetic variation**), e.g. blood group, gender.



This is discontinuous variation as you cannot be somewhere between two of the groups. The variation is in discrete categories.

Continuous variation

Acquired characteristics controlled by genes and the environment (**environmental variation**), e.g. height, weight.



This is continuous variation because the characteristic can fall anywhere between the values shown on the axis. The bell shape of a graph showing continuous variation is called a **normal distribution curve**.

Now try this



1. Name two extreme environmental conditions that occur near deep-sea hydrothermal vents. (2 marks)
2. Choose the right words to make these sentences correct.
 - (a) When a characteristic only occurs in distinct forms, it shows *continuous/discontinuous* variation. (1 mark)

- (b) Human blood group is an example of *continuous/discontinuous* variation. (1 mark)
- (c) Discontinuous variation is caused by *genes only/by genes and the environment*. (1 mark)
3. Arctic foxes have thick fur and are white in winter. Explain how these characteristics are adaptations to the environment. (2 marks)



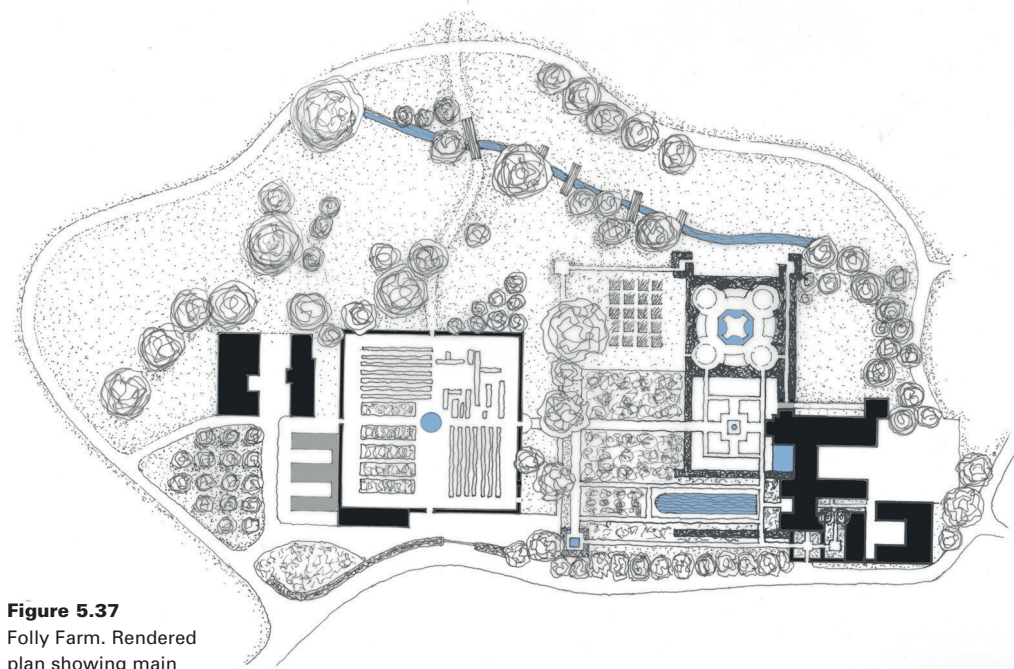


Figure 5.37
Folly Farm. Rendered plan showing main paths, walls, hedges and planting.

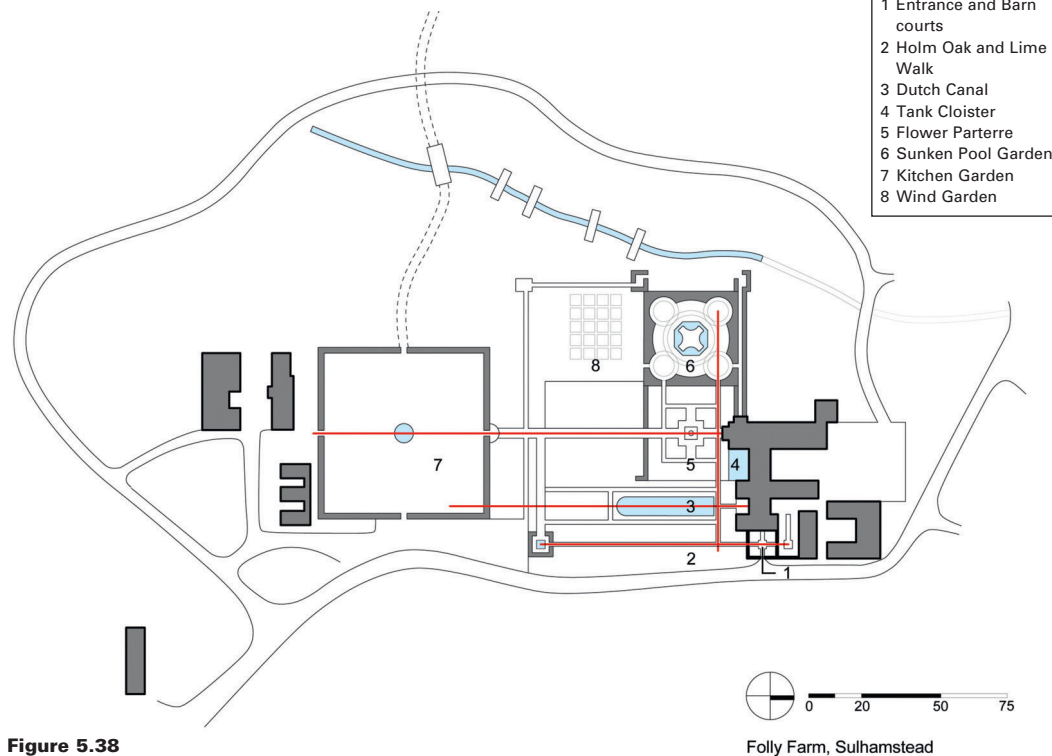


Figure 5.38
Folly Farm. Diagrammatic plan of garden showing key vistas and ordering lines.

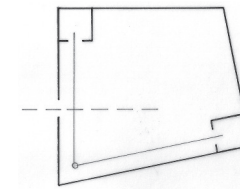


Figure 5.39
Route and focus.

Sissinghurst

By the beginning of the twentieth century much domestic architecture in England had become stifled by rules and codes of behaviour demanding that each room should have a particular function. It indicated a way of life bound by the empty formality and routine of the established patriarchal family. Even modestly sized houses had a proliferation of rooms that were organised by gender, class and function.¹⁷ The conversion of Sissinghurst Castle and its grounds was conceived to challenge these rigid ideas. It was bought by Vita Sackville-West and her husband Harold Nicolson in 1930 when it was no more than a series of ruined buildings. It became a project that gradually brought the site to life over the next five years, and is now one of the most influential gardens of the twentieth century. Sissinghurst questions how we use domestic private space, showing that rooms can be reinvented as the setting for experimentation and self-expression. It challenges conventions of class, social hierarchy, gender and sexuality.¹⁸

The entire plot at Sissinghurst was conceived as a series of rooms with designated activities. Vita had her writing room in the tower, the sitting room and library were combined within the Big Room in the North Wing. Breakfast would take place in the South Cottage where Harold had his workroom and where he and Vita had their bedrooms. Eating took place outdoors whenever possible. Dinner would be amid the scent of the roses in the White Garden at the end of the day and through the dusk when the white flowers were at their best, their whiteness standing out against the fading light.¹⁹ The pattern of the day necessitated walking outside to get from one activity to another through an orderly layout of outdoor rooms, each with their own distinct character.²⁰ It was achieved through both the structuring of the spaces and the planting, to elicit moods through colour, texture, scent and seasonal variation, all appealing directly to the emotions. This was a radical step in garden design. Although it was a private garden, the Nicolson opened it to the public in the late 1930s, a garden art gallery, and it has been visited ever since.

The footprint of the old sixteenth-century Tudor manor house has been used for locations for walls and hedges that now make up the site and divide it into separate areas. A disproportionately tall tower, all that is left of the manor house, which now stands apart from any other buildings, dominates the entire site. The long ascent up the tower is rewarded by a view of the entire garden, clearly showing its sculptural shaping (Figure 5.40). Not only is it a landmark, its central archway is the threshold to most of the garden. Once through, if you walk halfway across the Tower Lawn you are confronted with a choice. Small openings in the surrounding walls and hedges allow glimpses and arouse anticipation of three very contrasting journeys.



Figure 14.5 Collezione Interior
Source: Tomio Ohashi

But the entrance is bisected by a 15-degree angle wall that slowly assumes added significance in subsequent visits, because it has been deliberately positioned to cast a sequence of cruciform shadows on the back wall. These slowly reveal themselves, as worshippers leave, as the reverberating penumbra of the cross of light in the front of the church, in an extremely subtle, and phenomenally sensitive manipulation of spectral contrast.

This was not Ando's first use of the cross as the centerpiece of a design, since it was the focal point of his Church on the Water in Hokkaido a year earlier, and also appears, upside down, in a secular context in his Collezione building in the Omotesando district of Tokyo in 1989 (Figure 14.5). This seven-story high-end commercial enterprise has a cylindrical drum at the entrance that guides visitors down into its four below grade floors, and Ando has used light wells and planting here to soften that marginally apprehensive experience (Figure 14.6).



Figure 14.6 Collezione Exterior
Source: Tomio Ohashi

Awaji Yumebutai

The earth needed to build an artificial surface in Osaka Bay for Kansai Airport was taken from Awaji Island and, at the urging of Tadao Ando, Hyogo Prefecture decided to establish an "Awaji Island International Park City" in 1999, to remedy the destruction of the natural landscape that this had caused. The timing of their decision also coincided with the need to create a memorial for the thousands of people who had died in the Kobe earthquake in 1995, and the idea of natural rebirth seemed an appropriate way to do that. The project includes the Awaji Yumebutai International Conference Center in the Westin Awaji Island hotel, the Hyakudanen or "hundred stepped gardens," and a terraced garden, with a hundred square planters containing flowers from all regions of Japan, which cascade down the slope that was decimated by excavation, with stairways in the middle and on both sides and corridors



Figure 14.7
Awaji Yumebutai
International Conference
Center
Source: James Steele



Figure 14.8 Awaji Yumebutai International Conference Center
Source: James Steele

between them (Figure 14.7). This method, of using raised planting beds, is part of the gardening history of this region, and is reconstituted, at a larger scale, by Ando here as a testament to local tradition. In addition to this centerpiece, Ando has also included an Observation terrace, as well as individual evocatively named pavilions such as the Shell Garden, the Seaside Corridor, the Mountain-side Corridor, the Oval Forum, the Circular Forum, and the Promenade Garden as well as an Open-Air Theater and the exciting "Awaji Yumebutai Plants Museum of Miracle Planet" which is also a machine-in-the-garden feat of high-tech bravado, in the midst of this verdant paradise (Figure 14.8).

This combination of gardens, folies and a conservatory, create an ecologically sensitive contribution to the public as well as the perfect architect's playground, just like Bernard Tschumi's Parc La Villette, where forms are often explored without concern for function.

A modern version of Philosopher's Walk

Two years after completing Awaji Yumebutai, Ando designed a small open-air museum called the Garden of Fine Arts in Kyoto within a rectangular site located near Shimogamo Hangicho, next to a Botanical

context—Simister had been employed by Irvine New Town Corporation before becoming a prominent designer of inner-city housing. The three three-storey pitched-roof buildings with overhanging eaves are lined up at the block perimeter with only a small setback; each of the three identical façades is symmetrically designed around a central axis accentuated by a gable. The houses are built from facing blockwork reminiscent of New Town architecture, with black tile band features and a façade design recalling historical Glasgow tenements.

THE NEW GORBALS (1992–2000)

PERHAPS THE MOST symbolic inner-city redevelopment in Glasgow was the **Crown Street Regeneration Project** (1992–2000, master plan by Piers Gough of CZWG, buildings by Page & Park, Elder & Cannon, Hypostyle and others). It is often referred to as **New Gorbals**, although technically the New Gorbals also include the adjacent regeneration projects to the east, which are also situated in the Gorbals neighbourhood and were carried out in the 2000s (Figure 6.29).

The 18-hectare project development flanks both sides of Crown Street and is bordered by Ballater Street to the north, Caledonia Road to the south, Laurieston Road to the west and Camden Terrace/Pine Place/Commercial Street to the east. Since Crown Street is the southern prolongation of High Street, the medieval city's north-south axis, the development is situated in close proximity to the city centre across the River Clyde.

Strongly influenced by the West Berlin IBA, Crown Street was the city's first attempt to reinstate a traditional block plan on a previously cleared area, and at the same time promote a positive conception of Glasgow's industrial past that with the decline of the 1960s had irretrievably passed into history.⁶⁴ It was also the

complete reversal of the ill-fated Gorbals renewal that thirty years before had wiped out the historic tenements and replaced them with tower blocks that soon were just as badly reputed. The modernist renewal and its showpiece, the **Queen Elizabeth Towers** (1960–64, Basil Spence, demolished 1993), as a resident put it, merely “upgraded” the old Gorbals from “sump of human degradation” to “deprived area status.”⁶⁵ In contrast, the second renewal was seen as a major success and celebrated internationally. It is therefore an example for the symbolism of new tenement construction whose significance from the very beginning extended beyond the local context.

Although only some of the designs can be considered neo-historical the architects widely adapted Glasgow's historic tenement type. Old tenement references can for example be found on **111–43 Old Rutherglen Road** (1994–2000, Holmes/Miller), where brick colour and semi-circular bay windows refer to similar designs from early-1900s red sandstone tenements (Figure 6.30). The same applies to the buildings on **2–4 Kidston Place/11–23 Kidston Terrace** (c. 2000, Hypostyle) (Figure 6.31). References to Glasgow's industrial era can also be read from some of the artworks applied onto the buildings, such as an iron welder on a Crown Street façade and a bas-relief with chimneys and ship parts on the building **16–18 Naburn Gate** (c. 2000, Cooper/Cromar) (Figure 6.32).

There are also numerous historical references that cannot be attributed to a particular city or period. Neoclassical ingredients abound, including columns, pediments, and arches. The commercial centre on Crown Street and Errol Gardens is framed by an arcaded pavement. The gate to **Benny Lynch Court** (1994–2000, Cooper/Cromar) on 147–67 Old Rutherglen Road, which is named for the old Gorbals' most famous boxer, can by now be read as a generic allusion to a peacefully

64. “New Tenements and the Image of the Past—the Crown Street Development in Glasgow's New Gorbals” *Architectural Research Quarterly* 17 n. 2 (June 2013).

65. Anonymous resident of the old Gorbals, quoted in Murray Ritchie, “Why Gorbals is on Edge of Extinction” *Glasgow Herald*, 20 November 1982, 1.



FIGURE 6.29 Crown Street Regeneration Project or New Gorbals (1992–2000, master plan by Piers Gough/CZWG, buildings by Page & Park, Elder & Cannon, Hypostyle and others) (courtesy CZWG/© Guthrie Photography)

FIGURE 5.12 ANOVA source table test of $H_0: \beta_0 = \mu_Y = 75$ in simple regression context

Source	SS	df	MS	F	p	PRE
Reduction (using $b_0 = 72.806$)	240.682	1	240.682	24.07	< .001	.334
Error (using $b_0 = 72.806$)	480.003	48	10.000			
Total error (using $b_0 = 75$)	720.685	49	14.708			

FIGURE 5.13 ANOVA source table test of $H_0: \beta_0 = \mu_Y = 75$ in single-parameter model (from Chapter 4)

Source	SS	df	MS	F	p	PRE
Reduction (using $b_0 = 72.806$)	240.682	1	240.682	8.71	< .01	.151
Error (using $b_0 = 72.806$)	1355.046	49	27.654			
Total error (using $b_0 = 75$)	1595.728	50	31.915			

(college graduation rates), on the basis of which conditional predictions are made in the simple regression model. That is, earlier, we reported that the SSR attributable to a Model A that made conditional predictions of internet access, using college graduation rates as a predictor, compared to a Model C that predicted the mean value of Y_i , was 875.025. This is exactly the difference between each Model A used in these two tests. Model A for the Chapter 4 single-parameter version of the test makes unconditional predictions of Y_i ; Model A for the simple regression version of the test makes predictions of Y_i conditional on (centered) X_i . Making these conditional predictions means that Model A in the simple regression context has one fewer degrees of freedom for error ($n - PA = 48$) than Model A in the Chapter 4 version of the test (where $n - PA = 49$). But the loss in degrees of freedom has been more than compensated for by the substantial difference between the sums of squared errors of the two Model As. As a result, the test in the context of the conditional simple regression model has substantially more statistical power than the same test conducted in the context of the single-parameter model of Chapter 4.

In Chapter 4 we mentioned that the test we reported is known as the single-sample t -test. The advantage of our model comparison approach is that we have been able to generalize this test to cases where conditional predictions are made by the models that are compared. In the jargon traditionally used in the statistical inference literature, we have just conducted a single-sample t -test while controlling for a “covariate.”

A further advantage of our approach is that it permits us to conduct inferential tests about predicted values other than the mean. Suppose, for instance, that we had some reason to want to ask about internet usage rates in states where the college graduation rate was 70%. Rather than centering the predictor around its mean value, one could deviate the predictor from the value of 70. Then one could estimate a Model A in which the predictor variable was this deviated variable:

MODEL A: $Y_i = \beta_0 + \beta_1(X_i - 70) + \varepsilon_i$

In a deep sense we would be dealing with the same conditional model; we have simply moved the zero point on the x-axis to what was the value of 70. Accordingly, the slope

remains the same, while the estimated intercept in the model would be the predicted value of Y_i when X_i equals 70. This model might then be compared to a Model C that uses the same deviated predictor but fixes the intercept at some a priori value of interest.²

Confidence interval for the intercept

The confidence interval for the intercept represents the range of values for the intercept that would not be rejected by an inferential statistical test. In simple regression models, with a single predictor variable, the confidence interval for the intercept is:

$$b_0 \pm \sqrt{\frac{F_{\text{crit}; 1, n-2; \alpha} \text{MSE}(\sum X_i^2)}{n \sum (X_i - \bar{X})^2}}$$

This is the confidence interval for the intercept regardless of whether the predictor has been deviated from some value or not. If it has been deviated, then of course the X_i terms in the confidence intervals are the new values following deviation.

When using a centered predictor, deviated from its mean value, then \bar{X} for the centered predictor equals zero, and the above formula for the confidence interval reduces to:

$$b_0 \pm \sqrt{\frac{F_{\text{crit}; 1, n-2; \alpha} \text{MSE}}{n}}$$

which is the formula that we gave in Chapter 4 for the confidence interval for β_0 in the single-parameter model (except there the critical F value had 1 and $n - 1$ degrees of freedom). Of course, with a predictor variable in the model that is a useful predictor of Y_i , the MSE in the numerator of this confidence interval should be considerably smaller than the MSE in the numerator of the interval used in Chapter 4, without a predictor. This difference reflects the increase in power when conducting inferential tests about the mean in the context of a useful predictor compared to the same test in the single-parameter context of Chapter 4.

To illustrate, with the centered predictor from the simple regression model used in this chapter, the confidence interval for β_0 (equivalently for μ_Y) equals:

$$72.806 \pm \sqrt{\frac{4.04(10.000)}{50}}$$

$$71.907 \leq \beta_0 \leq 73.705$$

On the other hand, in the context of the single-parameter model of Chapter 4, the same confidence interval equals:

$$72.806 \pm \sqrt{\frac{4.03(27.654)}{50}}$$

$$71.313 \leq \beta_0 \leq 74.299$$

Clearly, the confidence interval for the mean of Y_i is smaller in the context of the simple regression model, reflecting the substantial increase in power resulting from the inclusion of the predictor variable (with its associated reduction in errors of prediction).



2.5.1 House features an elongated plan with occupied basement under the central portion. JON JENSEN PHOTOGRAPHY



2.5.2 Additional retaining walls at the rear to control the hillside. JON JENSEN PHOTOGRAPHY

FINELINE HOUSE

The Fineline House, located in Ashland, Oregon, is a LEED-H Platinum-certified home with exceptional green design and construction features. It is four to five times more efficient than a typical residence of comparable size and configuration. It features state-of-the-art lighting and heating systems and a built-in energy-monitoring system, claiming considerable energy savings and exceptional indoor air quality.

An elongated profile that hugs the site contours, and large expanses of glass facing the view of valley and mountains to the north made the pursuit of passive house certification a challenge. However, the passive house design-build principles were deemed highly relevant nevertheless. PHPP modeling and the key PH building envelope strategies were applied to the final design. Structural insulated panels, thick underslab insulation triple-glazed Unilux windows, and a Zehnder heat recovery ventilator round out a high-performance building.

PROJECT INFORMATION

Project title: Fineline House

Location: Ashland, Oregon

Size: 4,390 ft.² (407m²)

Completion: 2014

Recognition: Passive House planned, LEED-H Platinum, FSC-Chain-of-Custody certificate

Type: Single-family house

Architect: Jan Fillinger

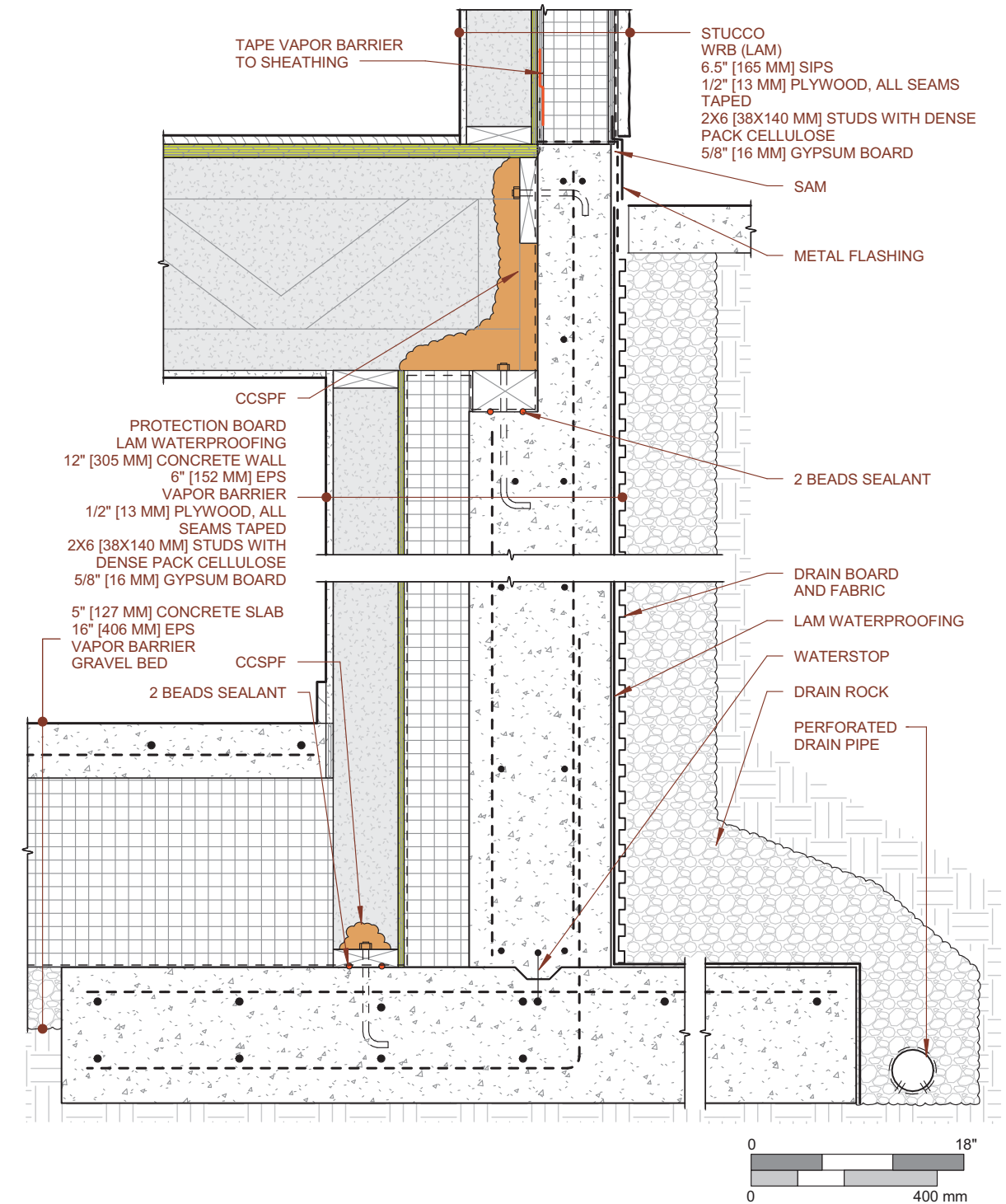
Builder: Green Hammer

CPHC: Alex Boetzel

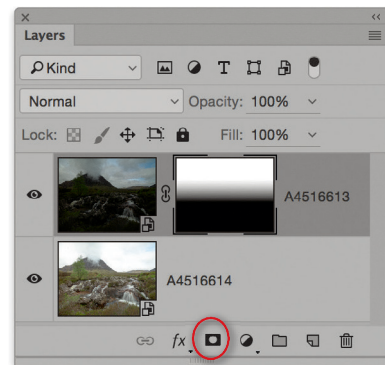
HDD: 4,323 base 65°F (2,402 base 18.3°C)

CDD: 790 base 65°F (439 base 18.3°C)

Annual precipitation: 20 in. (510 mm)



2.5.3 Retaining wall constructed directly against a steep hill. Basement insulation on the interior.



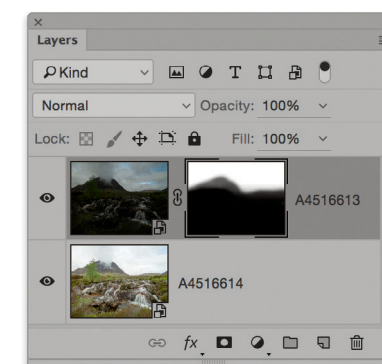
4 With the darker Smart Object layer selected I clicked on the Add Layer Mask at the bottom of the Layers panel (circled) to add an empty new layer mask. I then selected the Gradient tool and added a white to black gradient. This faded the visibility of the top layer.



5 I then selected the bottom layer, double-clicked the thumbnail to open it in Camera Raw and made some further tweaks to the Tone Curve panel to adjust the tonal contrast. Once I was done I clicked OK to close the Camera Raw dialog.



6 Whenever you update the Camera Raw settings it usually takes a few seconds after closing the Camera Raw dialog to see the changes updated in the Photoshop document window. To produce the final image shown here, I did a couple more things. I reopened the dark Smart Object layer and adjusted the white balance to make the image slightly cooler. I then selected the Brush tool and painted with white and black on the associated layer mask to fine-tune the mask border edge. In some instances you might find it desirable to apply a mask that precisely follows the outline of the horizon. However, a lot of the time a soft edge mask will work fine. The effect I was trying to achieve here was somewhat similar to placing a graduated filter in front of the lens, except when you do this in Photoshop you have the means to edit the mask edge as much or as often as you like.

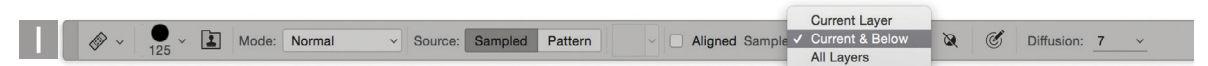


Healing Brush

The Healing Brush can be used in more or less the same way as the Clone Stamp tool to retouch small blemishes, although it is important to stress here that the Healing Brush is more than just a magic Clone Stamp and has its own unique characteristics. These differences need to be taken into account so that you can learn when it is best to use the Healing Brush and when it is more appropriate to use the Clone Stamp.

To use the Healing Brush, you again need to establish a sample point by **alt**-clicking on the portion of the image you wish to sample from. You then release the **alt** key and move the cursor over to the point where you want to clone to and click or drag with the mouse to carry out the Healing Brush retouching. If you are using a pressure sensitive tablet such as a Wacom™ tablet, the default brush dynamics will be size sensitive, so you can use light pressure to paint with a small brush, and heavier pressure to apply a full-sized brush. The Healing Brush works by sampling the texture from the source point and blends the sampled texture with the color and luminosity of the pixels that surround the destination point. The Healing Brush reads the pixels within a feathered radius that is up to 10% outside the perimeter of the Healing Brush cursor area. By doing so, the Healing Brush is able to calculate a smooth transition of color and luminosity within the area that is being painted (always referencing the pixels outside the perimeter of the Healing Brush cursor area). It is for these reasons that there is no need to use a soft-edged brush and you will always obtain more controlled results through using the Healing Brush with a 100% hard edge.

Once you understand the fundamental principles that lie behind the workings of the Healing Brush, you will come to understand why the Healing Brush may sometimes fail to work as expected. You see, if the Healing Brush is applied too close to an edge where there is a sudden shift in tonal lightness, it will attempt to create a blend with the pixels immediately outside the Healing Brush area. So when you retouch with the Healing Brush you need to be mindful of this intentional behavior. However, there are things you can do to address this. For example, you can create a selection that defines the area you are about to retouch. This will constrain the Healing Brush work so that it is carried out inside the selection area only. My advice is to always constrain the selection slightly to prevent the Healing Brush reading past the selection edge. Therefore, use **Select** ⇨ **Modify** ⇨ **Contract** and shrink by at least 1 pixel in order to prevent edge contamination.



1 I selected the Healing Brush from the Tools panel and selected a hard-edged brush from the Options bar. The brush blending mode was set to Normal, the Sample source was set to 'Current & Below' and the Aligned box left unchecked.



2 I added a new empty layer and **alt**-clicked to define the source point, which in this example was an area just to the right of the trash bin. I then released the **alt** key, moved the cursor over to where the bin was and clicked to remove it using the Healing Brush. Here is an example where having the Clone Source Show Overlay visible (see page 448) ensured the bricks were carefully aligned.



3 This shows the final image with the trash bin removed from the scene.

7.40 In practice, s.73 must be considered together with Rule B33 of the Rules of Practice of the Association of Average Adjusters. Rule B33 provides as follows:

If the ship or cargo be insured for more than its contributory value, the underwriter pays what is assessed on the contributory value. But where insured for less than the contributory value, the underwriter pays on the insured value; and when there has been a particular average for damage which forms a deduction from the contributory value of the ship that must be deducted from the insured value to find upon what the underwriter contributes.

This rule does not apply to foreign adjustments, when the basis of contribution is something other than the net value of the thing insured.

That in practice, in applying the above rule for the purpose of ascertaining the liability of underwriters for contribution to general average and salvage charges, deduction shall be made from the insured value of all losses and charges for which underwriters are liable and which have been deducted in arriving at the contributory value.

In adjusting the liability of underwriters on freight for general average contribution and salvage charges, effect shall be given to section 73 of the Marine Insurance Act 1906, by comparing the gross and not the net amount of freight at risk with the insured value in the case of a valued policy or the insurable value in the case of an unvalued policy.

7.41 The effect of these provisions is as follows. First, the relevant values must be determined. Where no value is agreed for the purposes of insurance, the *insured value* of the subject-matter of the insurance will be its “true” value in the form of its *insurable value* determined in accordance with the general law on marine insurance⁸⁶ (which may, though will not necessarily, be identical with its contributory value).⁸⁷ However, it is more common for insurance to be effected under valued policies, i.e. with the insured value being the *agreed value* fixed in the insurance contract. The valuation in a valued policy generally fixes the upper limit of the insurer’s liability. It must further be noted that, however the insured value is determined, the amount agreed to be insured may be less than the insured value: i.e. the insurer may only accept the risk for part of the insured value, so the subject-matter will be under-insured.

7.42 The *contributory value* of the subject-matter of the insurance is in principle its value for the purposes of the average adjustment. However, the statute uses the expression “full contributory value”, thereby raising the question of the significance of the adjective “full”.⁸⁸ *Arnould*⁸⁹ argues that it means the gross sound value at the port of destination, without deduction for damage, deterioration or expenses, since: the adjective would otherwise be superfluous and misleading; “full contributory value” cannot mean less than “contributory value”, which is used later in s.73 to mean gross value; and it fulfils the object of providing the assured with a full, though no more than a full, indemnity.⁹⁰

⁸⁶ See in particular MIA 1906, s.16 (“insurable value”).

⁸⁷ Thus, under MIA 1906, s.16(1), the insurable value of a ship is basically its value at the commencement of the risk, whereas its contributory value for the purposes of general average adjustment will be its value at the end of the voyage: see *ante*, §§ 6.44–6.46.

⁸⁸ Close to the passing of the codifying MIA 1906, in *Steamship Balmoral Co Ltd v. Marten* [1902] AC 511, 522, Lord Lindley intimated that the word was superfluous: “If the word ‘fully’ is introduced, it must be qualified so as to show its true meaning, i.e. fully for a ship of the value mentioned in the policy”.

⁸⁹ *Arnould*, § 26.101.

⁹⁰ *Arnould*, § 26.101 states: “the object of section 73(1) . . . is to ensure that the assured shall receive a full, but no more than a full, indemnity; in other words, that underwriters’ liability shall in no case exceed the agreed or insurable value, as the case may be, of the subject-matter insured. If the provisions as to

In practice, “contributory value” is used to mean the *net* value on which an interest contributes and “full contributory value” is taken to mean the gross sound value of the interest before deductions for damage or charges for which insurers are liable.

7.43 Where the assured’s liability for a general average contribution is equal to or exceeds the amount insured, the insurer must in principle pay the full amount. But, where the amount insured is less than the contributory value, the insurer is only bound to indemnify the assured for a proportion of his liability. In that case, the relevant proportion is the proportion that the amount insured bears to the contributory value. Thus, if the contributory value is £100,000 and the insured value under a valued policy is £90,000, the insurer will be liable for 90 per cent of the assured’s contribution to general average.⁹¹ Similarly, if on the same facts the policy further provides that the insurer is liable for only 80 per cent of the assured’s loss (i.e. the subject-matter is partly insured), the insurer will only be liable for 80 per cent of the 90 per cent contribution.

7.44 The final part of s.73(1) deals with particular average. It provides that in a case of under-insurance, if the underwriter is also liable for a particular average loss, and the contributory value of the assured’s interest is reduced by that particular average loss, then the amount of the particular average loss (or the proportion of the particular average loss for which the insurer is liable) must be deducted from the insured value, and the proportion between the resulting amount and the net contributory value is the proportion of the general average contribution for which the insurer is liable.

VIII ADJUSTMENT REGIME; PLACE OF ADJUSTMENT;
FOREIGN ADJUSTMENT

7.45 In principle, general average should be adjusted at the place of termination of the adventure.⁹² The parties to the adventure may agree to adjustment at a different place, and that agreement will normally be binding upon them. But obviously, if an insurer is not a party to such an agreement, it will not bind him.⁹³ However, it is of course open

under-insurance were not to be applied in cases where the insured value, though greater than the value on which the subject-matter in fact contributed, was less than its maximum potential contributory value, this object would not necessarily be achieved”.

⁹¹ *Steamship Balmoral Co Ltd v. Marten* [1902] AC 511; 1 Magens 245, Case XIX. In the *Balmoral* case [1902] AC 511, 514–515, Lord Macnaghten thought that a more logical rule would be the amount that would have been assessed against the ship if the agreed value had been employed in the adjustment as the contributory value; but he regarded the rule as too settled to decide otherwise. The stimulus for taking such an arguably simple and obvious point to the House of Lords may have been the existence of the contradictory US rule. It was held in the US that insurers on ship were liable in full for the ship’s contribution to general average, regardless of the insured value: see *International Navigation Co v. Atlantic Mutual Insurance Co* (1900) 100 Fed Rep 304, affd (1901) 108 Fed Rep 988; *International Navigation Co v. Sea Insurance Co* (1904) 129 Fed Rep 13; *Maldonado v. British & Foreign Marine Insurance Co* (1910) 182 Fed Rep 744. The English rule in the *Balmoral* case was followed, in a case of cargo insurance, in *Gulf Refining Co v. Atlantic Mutual Insurance Co* (1929) 279 US 708; 35 Ll L Rep 21. In practice, the English rule is commonly applied to ship insurances by contract. But see the Scandinavian systems for a contrary practice.

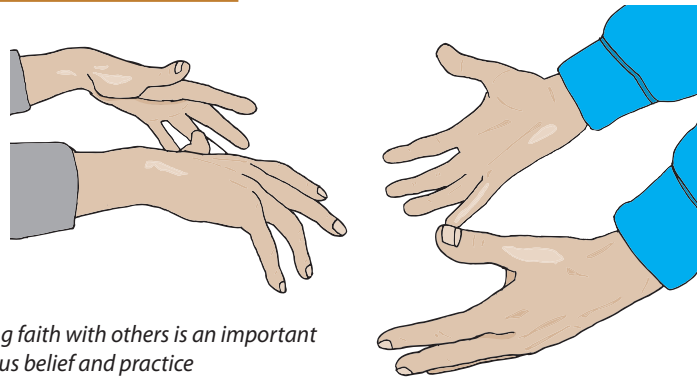
⁹² See §§ 6.4–6.19.

⁹³ *Cf* the discussion by *Arnould*, 16th edn (1981), § 1002, on whether an insurer is bound by an adjustment abroad on an estimate of damage sustained.

Topic 3

3.1 The work of religious charities and organisations

- Have you ever helped someone who was in need?
- What was it that you did?
- Why did you help them?



Sharing faith with others is an important religious belief and practice

The next two pages will help you to:

- examine the direction that religious faith can give to some people
- explain the types of work people and organisations do to support others.

Can a religion give a purpose in life?

It is faith that gives meaning and purpose to the lives of religious believers. The term **faith** means trust or confidence. For religious believers it means to have a trust or confidence in God. It is this that helps to create their **identity** and gives a sense of purpose to who they are.

A religious faith gives direction to people's lives. Many religious believers belong to a local community, regularly attending a place of worship, which is an expression of faith. Many religious believers also choose to spend some of their own personal time involved in charity work. Part of the expression of a religious faith is to want to help other people. Some people simply give money to street collections or donate money in collection envelopes. Some may buy charity Christmas cards or give up time to work in a local charity shop. Charity is about helping other people who are in need.

Activities

- 1 What do you know about religious charities? Make a list of ideas individually and then share your ideas with others. Try to think about what work charities do, what the aims of charities are and who charities try to help.
- 2 As a class, list all the charities you can think of. Try to categorise them into local charities and global charities. Try to identify which religions they are associated with.
- 3 Create a concept map using words and pictures to show the reasons why Christians, Jews and Hindus believe it is important to help others. Try to colour code ideas to identify which religion they belong to.
- 4 Do you think it is always possible for religious believers to help and support others? Explain at least three reasons for your answer.

How do religious charities or organisations help?

Consider the following examples.



Christian Aid

- Wants to create and establish a world free from poverty and injustice.
- Provides relief in times of disaster and helps people regardless of religion or nationality.
- Speaks out against injustice.
- Tries to deliver real, practical help where it is most needed.
- Campaigns for change.



Tzedek

- Is a Jewish overseas development and educational charity.
- Works with some of the poorest people in the world, regardless of their race or religion.
- Tries to help people in distress and in damaging political and economic conditions.
- Helps to fund small-scale, self-help sustainable projects, assisting people long term in looking after themselves and coping with the conditions they live in.



Hindu Aid

- Is an organisation that helps the work of Hindu organisations in the UK.
- Focuses particularly on projects, including education, removing poverty, providing relief after natural disasters and helping those needing water or medical care.
- Bases its ideas on the concepts of serving, sharing and caring, which are contained in their holy scriptures.

Research note

- Find out what other work charity organisations do? Research CAFOD, Tearfund and any others you know of.
- Famous names have often supported religious charities or organisations. Alan Sugar isn't religious, but supports Jewish Care, while Cliff Richard 'tithes' (meaning he gives a percentage of his annual income to charity). Dermot O'Leary has completed charity work for CAFOD. See what you can find out about other famous people who have supported religious charities and organisations.

Activities

- 5 Do you think short-term or long-term aid is more successful? Why?
- 6 Research one religious organisation and identify what work they do that comes under short-term aid and what work they do that comes under long-term aid. Create a poster or presentation showing this information.

For debate

'Does a charity need to be linked to a religion to be effective?' Think about your own views on this question. Try to make a table, showing the arguments 'For' and 'Against' this. What do you think religious believers would argue and why?

Why do people support others?

Being compassionate and caring about other people is an important aspect of being a religious believer. Christians follow the example of Jesus, who spent much time helping others. Jews have similar beliefs to Christians, claiming that God wants us to help each other, because we were all made in his image and are all worthy of care. Hindus believe every living thing is valuable and put this teaching into practice by supporting others.

How can a belief drive actions?

Religious beliefs drive the actions of individuals who try to make a difference in the world. Many organisations are involved with short-term and long-term aid to help those in need.

Short-term aid means responding to emergency requests as a result of famine, war and natural disasters. Usually this means food, water, shelter and medical assistance.

Long-term aid requires more structure, providing technology for clean drinking water, sanitation, sustainable farming methods, education and employment.

$$\begin{aligned}\lambda_p &= 0.38 \sqrt{\frac{E}{F_y}} \\ &= 0.38 \sqrt{\frac{29,000 \text{ k/in}^2}{50 \text{ k/in}^2}} \\ &= 9.15\end{aligned}\quad \begin{aligned}&= 0.38 \sqrt{\frac{200,000 \text{ N/mm}^2}{345 \text{ N/mm}^2}} \\ &= 9.15\end{aligned}$$

Because b/t is less than this value, we know our flange is compact and can take substantial yielding before locally buckling, and that we don't need to use different equations below.

Step 5: Check all Applicable Strength Limit States

We begin by checking yielding

$$\begin{aligned}M_p &= F_y Z_x = 50 \text{ k/in}^2 (110 \text{ in}^3) \frac{1 \text{ ft}}{12 \text{ in}} \\ &= 458 \text{ k} \cdot \text{ft}\end{aligned}$$

$$\begin{aligned}&= 345 \text{ N/mm}^2 (1,800 \times 10^3 \text{ mm}^3) \left(\frac{1 \text{ m}}{1000 \text{ mm}} \right) \left(\frac{1 \text{ kN}}{1000 \text{ N}} \right) \\ &= 621 \text{ kN} \cdot \text{m}\end{aligned}$$

This is larger than the demand, so we know we are heading in the right direction.

We next check lateral torsional buckling. The unbraced beam length is one third of the span, shown in Figure 4.14, as follows

$$L_b = 10.0 \text{ ft} \quad L_b = 3.0 \text{ m}$$

We will need L_r and L_p , using equations 4.4 and 4.5 and additional section properties from the *Steel Manual*. Alternatively, we can pull them from Table 4.1.

$$\begin{aligned}L_p &= 4.59 \text{ ft} & L_p &= 1.40 \text{ m} \\ L_r &= 13.6 \text{ ft} & L_r &= 4.15 \text{ m}\end{aligned}$$

Because L_b is between these, we know the beam will be in the inelastic lateral torsional buckling range. Pretty exciting!

Next, we determine the lateral torsional buckling factor C_b for each section. While we can conservatively take $C_b=1.0$, it may under predict the moment capacity. Let's see how much of a difference it makes. For Spans 1 and 3, and using the moments from step 2 (with units of k-ft and kN-m), we have:

$$\begin{aligned}C_b &= \frac{12.5 M_{\max}}{2.5 M_{\max} + 3 M_A + 4 M_B + 3 M_C} \\ &= \frac{12.5(282)}{2.5(282) + 3(92.8) + 4(171) + 3(234)} \\ &= 1.49\end{aligned}\quad \begin{aligned}&= \frac{12.5(374)}{2.5(374) + 3(122) + 4(225) + 3(309)} \\ &= 1.49\end{aligned}$$

And now for the middle span,

$$\begin{aligned}C_b &= \frac{12.5 M_{\max}}{2.5 M_{\max} + 3 M_A + 4 M_B + 3 M_C} \\ &= \frac{12.5(334)}{2.5(334) + 3(315) + 4(334) + 3(315)} \\ &= 1.03\end{aligned}\quad \begin{aligned}&= \frac{12.5(445)}{2.5(445) + 3(419) + 4(445) + 3(419)} \\ &= 1.03\end{aligned}$$

We see for the middle span, C_b is almost 1, so we don't get much of an advantage. Now we know.

Now to find the nominal bending capacity, considering LTB, we check section 2, where the demand is greatest and C_b is lowest.

$$M_n = C_b \left[M_p - (M_p - 0.7 F_y S_x) \left(\frac{L_b - L_p}{L_r - L_p} \right) \right] \leq M_p$$

$$\begin{aligned}M_n &= 1.03 \left[458 \text{ k} \cdot \text{ft} - \left(458 \text{ k} \cdot \text{ft} - 0.7 \left(\frac{50 \text{ k}}{\text{in}^2} \right) (94.5 \text{ in}^3) \left(\frac{1 \text{ ft}}{12 \text{ in}} \right) \right) \left(\frac{10.0 \text{ ft} - 4.59 \text{ ft}}{13.56 \text{ ft} - 4.59 \text{ ft}} \right) \right] \\ &= 359 \text{ k} \cdot \text{ft}\end{aligned}$$

$$\begin{aligned}M_n &= 1.03 \left[621 \text{ N} \cdot \text{m} - \left(621 \text{ kN} \cdot \text{m} - 0.7 \left(\frac{345 \text{ N}}{\text{mm}^2} \right) (1.55 \times 10^6 \text{ mm}^3) \left(\frac{1 \text{ kN} \cdot \text{m}}{1 \times 10^6 \text{ N} \cdot \text{mm}} \right) \right) \left(\frac{3.0 \text{ m} - 1.4 \text{ m}}{4.15 \text{ m} - 1.4 \text{ m}} \right) \right] \\ &= 492 \text{ N} \cdot \text{m}\end{aligned}$$

This is below the plastic moment capacity M_p . Multiplying by ϕ we get the capacity

$$\begin{aligned}\phi M_n &= 0.9(359 \text{ k} \cdot \text{ft}) \\ &= 323 \text{ k} \cdot \text{ft}\end{aligned}\quad \begin{aligned}\phi M_n &= 0.9(492 \text{ kN} \cdot \text{m}) \\ &= 443 \text{ kN} \cdot \text{m}\end{aligned}$$

Since the capacity is slightly less than the demand, our beam does not work. However, since they are so close, we can bump up a size in Table A1.1 to a W21 \times 73 (W530 \times 109), and know we are OK.

Table 2.4 Representative structural steel shape grades and their availability

Steel Type	ASTM Designation	Grade	Imperial Strength		Metric Strength		Shape Series										
			F _y (k/in ²)	F _u (k/in ²)	F _y (MN/m ²)	F _u (MN/m ²)	Wide Flange (W)	Standard (S)	Piles (HP)	Channels (C)	Miscellaneous Channels (MC)	Angle (L)	Rectangular HSS	Round HSS	Pipe		
Carbon	A36		36	58	250	400											
	A53	B	35	60	241	414											
	A500	B	42	58	290	400											
		B	46	58	317	400											
	A501	A	36	58	250	400											
	A529	50	50	65	345	448											
High-Strength Low-Alloy	A572	42	42	60	290	414											
		50	50	65	345	448											
	A618	I,&II	50	70	345	483											
		50	50	60	345	414											
	A992		50	65	345	448											

Corrosion Resistant	A242		42	63	290	434									
			50	70	345	483									
	A588		50	70	345	483									
	A847		50	70	345	483									

- indicates the preferred material for a given shape
- indicates potentially available material for a given shape, verify before specifying
- indicates unavailable material for a given shape

Notes

- 1) Common and representative materials are listed. See AISC Manual for additional materials.
- 2) HSS= Hollow Structural Shapes.
- 3) Non preferred material may not be available in all flange thicknesses.

Source: AISC Manual of Steel Construction, 14th Ed.



CHAPTER 3

Image Capture: Cameras, Lenses, and Scanners

THE ROLE OF A CAMERA

The camera is the key component of photographic vision. The role of the camera has been to make an “acceptable” and recognizable depiction of the visible world based on established visual conventions. The early camera, called the *camera obscura*, was an optical drawing device designed to imitate the visual models of perspective and scale that were formulated during the Renaissance.

Cameras and lenses leave their fingerprints all over the basic characteristics of the final photographic image, including field of view, contrast, sharpness, tonal range, and noise. Because the camera plays such a vital role in the formation of the final picture, photographers should select a camera that supports their specific visual goals. No single camera can be expected to produce acceptable results in every situation. The standard of what is acceptable depends on a variety of factors, including the purpose for which the picture is being made, the subject being photographed, the intended audience, and the

desires of the photographer. For this reason, photographers should learn about the differences among cameras—both their strengths and limitations—in order to make intelligent choices for achieving the anticipated outcome. When possible, experiment with different types of cameras. Street photographer Garry Winogrand observed: “A photograph can only look like how the camera saw what was photographed. Or, how the camera saw the piece of time and space is responsible for how the photograph looks. Therefore, a photograph can look any way. Or, there’s no way a photograph has to look (beyond being an illusion of a literal description).”¹

The camera’s design is a basic part of the photographer’s visual language. Although a camera may shape the construction of an image, it is the private individual response to a situation that gives an image its power. It is up to each photographer to understand and apply a camera’s capabilities, to learn its characteristics, and to know when to use different cameras to achieve the desired results.

FIGURE 3.0 In playing across the scanner glass all the disassembled components produced during a performance piece, Lee takes the seventeenth-century Dutch still-life genre into the digital age. Photographer Adam Harrison observes, “This brings Lee’s photographic practice full circle, using the form that he has found after eight years of conflict to represent the initial action that marked the beginning of his investigations in this area.”

Credit: © Evan Lee. *Every Part from a Contaflex Camera, Disassembled by the Artist During Winter, 1998*. 2006. 50 x 38 inches. Inkjet print. Courtesy of Monte Clark Gallery, Vancouver/Toronto.



CHAPTER 10—SEEING WITH A CAMERA



FIGURE 10.8 As part of his project *American Power*, which examines America's cultural investment in energy, Mitch Epstein made this picture about six weeks after Hurricane Katrina struck. This straight-on image is one of contradictions. The warm, soft light stands in stark juxtaposition to the detritus of tragedy flung on a bared tree like some kind of post-tempest Spanish moss.

Credit: © Mitch Epstein. *Biloxi, Mississippi*, 2005. Variable dimensions. Inkjet print. Courtesy of Black River Productions Ltd. and Sikkema Jenkins & Co., New York, NY.

obtain dynamic graphic effects. Get in close and dispense with the nonessential elements. Consider using a neutral or a black background to make the color pop out even more.

HARMONIC COLOR

Harmonic colors are closely grouped together on the color wheel. Any single quarter section of the color wheel is considered to exhibit color harmony. The most basic harmonic compositions contain only two colors, which are desaturated and flat in appearance. The lack of complementary colors makes seeing the subtle differences in these adjacent hues much more straight-

forward. Constancy and evenness in light and tone can assist in bringing forward harmonic color relationships. Deeply saturated colors that may be technically close to each other on the color wheel can still produce much contrast and interfere with the harmony. Therefore, start by setting the camera's saturation mode to normal or reduced levels and avoid using the enhanced color mode. Also, try reducing the camera's contrast mode.

EFFECTIVE HARMONY

Color harmony can easily be spotted in nature, but it is a highly subjective matter whose effectiveness depends on the colors, the situation, and the intended effect. The

CHAPTER 10—SEEING WITH A CAMERA



FIGURE 10.9 Brian Ulrich utilizes an 8 x 10-inch view camera to explore the implications of commercialism within the hulking architecture of abandoned big-box stores and malls, emptied and laid barren in the wake of the recent economic downturn. Ulrich takes the harsh conditions of the spaces he chooses in stride, stating, "One room in the mall was on fire when we arrived. We used the green mucky water in the photograph to put it out so I could photograph! I only fell once while precariously balancing the camera on various found wood to get the proper vantage point for the picture."

Credit: © Brian Ulrich. *Belz Factory Outlet Mall 1*, from the series *Dark Stores, Ghost Boxes and Dead Malls*, 2009. Variable dimensions. Inkjet print.

tangible, visual effect is dependent on the actual colors themselves. Passive colors tend to be peaceful and harmonize more easily than the warm, active hues. For example, blue and violet are adjacent to each other on the color wheel and are harmonious in a restrained and subdued manner. On the opposite side of the color wheel are orange and yellow. These two colors harmonize in a much more animated and vibrant fashion.

In an urban, human-made environment, discordant, jarring, and unharmonious colors are encountered everywhere, as people randomly place contrasting colors next to each other. Look for and incorporate neutral areas, which offer balance within the scene, and de-emphasize differences among diverse colors.

Exercising care in the quality of light, the angle of view, and in determining an appropriate proportional mixture of these discordant colors can bring a sense of symmetry and vitality to a flat or inactive compositional arrangement. Both contrasting and harmonic colors can be linked together by working with basic design elements, such as repeating patterns and shapes.

Pay close attention when framing the picture space, taking care to notice exactly what is in all corners of the frame. Eliminate any hue that can interfere with the fragile interplay of the closely related colors. Use your monitor to review each exposure. The utilization of soft, unsaturated color in diffused light is an established method of crafting harmonious color relationships.



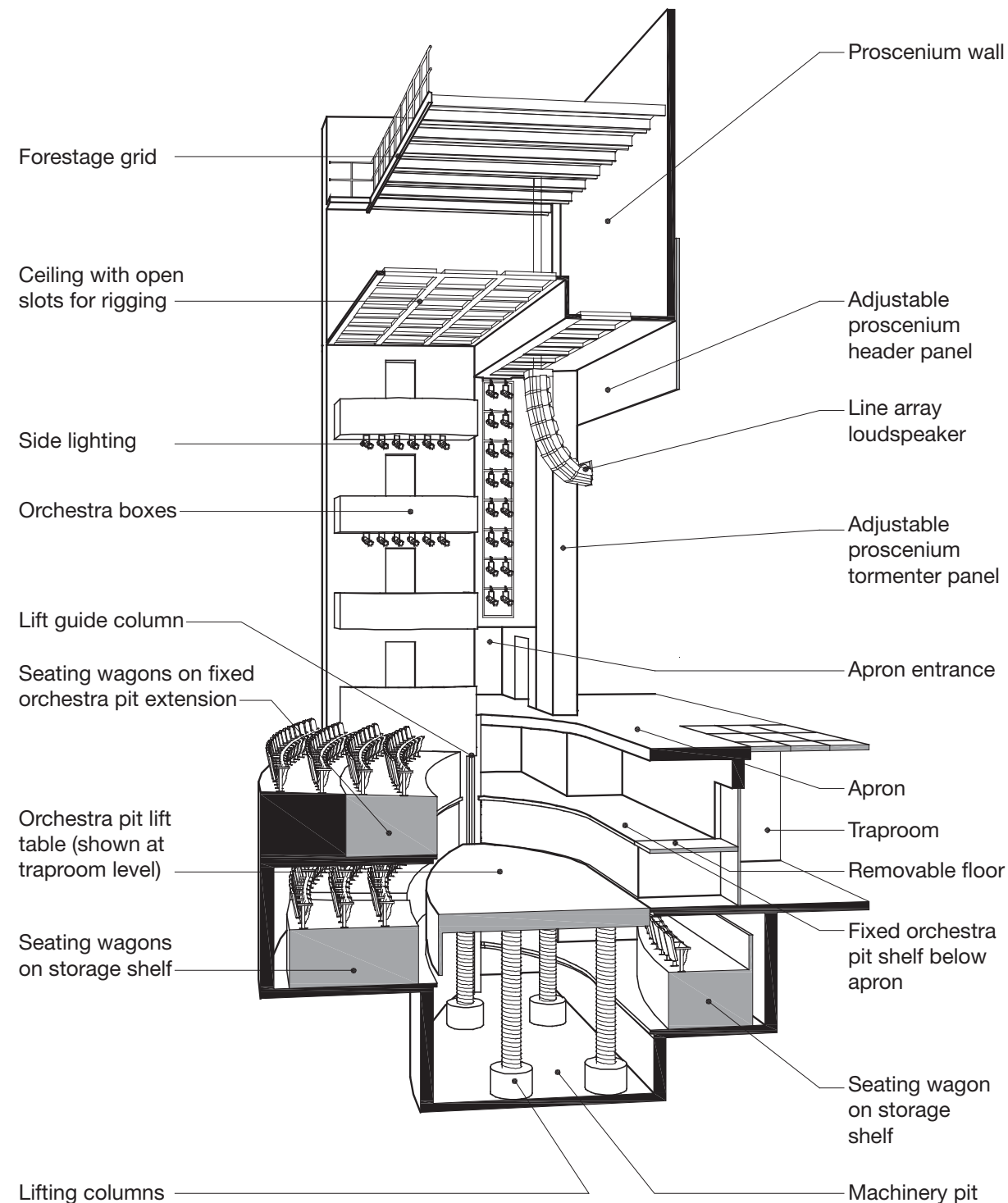


Figure 10.1 Forestage Zone

Source: Author

Apron Entrances

The apron may have entrances on each side from vestibules on the auditorium side of the proscenium wall. (If these aren't provided, the performers enter the apron from the center split in the house curtain.) The area above these entrances is often used for stage lighting, video monitors for the performers onstage, and other production equipment. If the side loudspeaker clusters aren't "flown," then the entrances themselves may be filled with loudspeakers stacked at each side of the apron.

Adjustable Proscenium Opening

If the proscenium width is to be adjustable, this may be accomplished with framed, architecturally finished panels on the apron side of the proscenium wall. These "tormenter" panels are hung on barn door tracks and may also have a guide track in the apron floor. A matching header panel may be used to adjust the height of the opening. All panels are kept to a minimum thickness so as not to increase the distance between the first row and the stage. If the production calls for it, the stage opening may be further reduced by a scenic portal or draperies on the stage side of the proscenium wall.

Apron Edge

The front of the apron is defined by the orchestra pit opening, or by the stage riser if there is no orchestra pit. At one time, built-in footlights were a common feature of the apron edge, but electric footlights were actually a holdover from the pre-electric age and are rarely used today. (The British term *floats* refers both to footlights and to the apron edge where footlights were once common. It derives from the use of floating candles as light sources.)

Cable Trough

The footlights are gone, but a continuous trough with removable covers is often built into the apron edge. The trough is used to access power and control outlets below the apron edge and to route temporary cabling across the front of the apron.

Front Fill Loudspeakers

The audio designer may specify small loudspeakers built into the apron edge, spaced every four to eight feet or so. These loudspeakers cover the first few rows of seats, an area that the primary speakers overhead may not reach. The front fill speakers also provide localization—that is, they enhance the perception that the sound is coming from the apparent visual source on stage and not from speakers overhead.

CASE STUDIES



- Maximize energy savings through building form and passive solar elements while minimizing the cost of active systems.
- Design a high-performance, energy-efficient building to last more than 100 years.
- Integrate engineering and sustainable features with the architectural design.
- Use materials that age gracefully and endure heavy use: architectural concrete, stone, precast concrete, metals, and timber.
- In addition, design a high-quality contemporary building that responds to Yale's architectural tradition and will inspire its occupants.
- Provide a simple building organization and flexible arrangement of spaces suitable for reconfiguration.
- Knit together the Science Hill community by use of courtyards on the north and south sides of the building. The south courtyard doubles as a green roof over the service node.
- Create a centerpiece for the Yale School of Forestry and Environmental Studies, consolidating its faculty and activities and demonstrating the mission of the school.¹⁶¹

The process required compromises from all parties. For example, Hopkins Architects proposed structural stonewalls for the building façades. "It took several rounds of discussion to conclude that, in fact, uninsulated stone walls would be detrimental to the building's energy performance and comfort," explained Stoller.¹⁶²

In addition to the sustainability agenda, one of the overarching project goals was to use strategies that could be replicated on Yale's campus. "We wanted Kroon Hall to be a simple, elegant architectural solution that was pushed hard with good climate-responsive design, so that the systems had less work to do," said Stoller.¹⁶³

The team chose a series of high-performance systems and design strategies that work together. The building uses underfloor air distribution and an air-handling system that recovers heat from exhaust air in the winter, along with ground-source heat pumps. High-efficiency air-handling units and a 100-kW PV array help to lower energy use.¹⁶⁴

"There was nothing invented for the project per se," said Stoller. "The photovoltaic array is inconspicuous but a fundamental part of the look and feel of the building. It doesn't look like a PV array that was just bolted on. It was very carefully considered, proportioned, and aligned. Part of the iterative design process was in understanding the panel dimensions and clearances, and all of the building proportions took that into account."¹⁶⁵

Kroon Hall's sustainable solutions include:¹⁶⁶

- a 218-ft (66-m) long south wall that maximizes solar heat gain in winter and provides natural lighting year-round
- a 100-kW rooftop PV array that provides about 18 percent of the building's electricity
- four solar panels with evacuated tubes filled with glycol on the south-facing wall, which provide the building with hot water

USA

7.26 *Left:* The 100-kW PV system on the roof of Kroon Hall is one of the building's distinguishing features. Photo: Michael Marsland. Courtesy of Yale University.

- a geothermal energy system that pulls 55°F (13°C) water from four 1,320-ft-deep (400-m-deep) wells in the adjacent Sachem's Wood
- a narrow floor plan (57 ft; 17 m wide) that allows for the penetration of natural light into interior spaces
- interior lighting that responds to occupancy levels and outdoor light
- manually operable windows that encourage natural ventilation
- green construction materials that include "thermally massive" concrete and low-e glass and insulation, water-free urinals, and low-impact paint
- Red Oak paneling that was harvested from Yale-Myers Forest and certified by the Forest Stewardship Council
- Briar Hill sandstone used in the façade was quarried within 500 miles of campus
- a rainwater harvesting system and the Mars cleansing pond.

Stephen Kellert, Professor Emeritus at the Yale School of Forestry and Environmental Studies, was instrumental in pushing the sustainability agenda for the new building. "I think sustainability needs to have embedded within it an understanding of not just energy efficiency, but the need for affirming a positive beneficial relationship with nature within the built environment."¹⁶⁷

He emphasized: "The majority of our time is spent in the built environment, so connecting to nature and achieving sustainability inside needs to be as much of an objective as it is for the outside landscape. I think connecting to nature is important not just for academic buildings but also for office buildings, manufacturing facilities, and schools."¹⁶⁸

Kellert cited the third floor as an example of the use of biophilia design principles in Kroon Hall. "It has a great cathedral-like space, an incredible experiential connection to the outside, and it has all of these biophilic elements, from fractal geometry and natural materials to great light and space."¹⁶⁹

As a result, the third-floor space is much more heavily used than originally predicted. Students occupy the area twenty-four hours a day. "The space is so attractive that people are using it more than what was modeled and, therefore, it uses more energy than originally anticipated, but that's a good thing in a way," said Kellert. "You want your building to be loved and used. But it has had the effect of driving up the energy costs."¹⁷⁰

TABLE 7.14
Energy and water use, 2011

	Annual use	Intensity
Electricity	514,973 kWh	83 kWh/sq m
PV production	95,624 kWh	15.4 kWh
Total energy use	610,597 kWh	98.4 kWh/sq m
Water use	180,268 g	3.2 g/sq ft 130 l/sq m

Another lesson learned, according to Stoller, Brewster, and Kellert, came from managing the building's operations after completion. The high-performance systems in Kroon are uncommon on campus and require sophisticated management. "There's always a shakedown period for a new facility, but I think it took longer than usual because there was a steep learning curve for a building this sophisticated," said Brewster.¹⁷¹

Today the school continues to collect and analyze data on the building's performance, with the following results:

- Kroon is performing 50 percent better than the average US academic building, in terms of energy performance.
- Photovoltaic panels provide up to 18 percent of the building's electricity during the summer and an average of 16 percent year-round.
- LEED Platinum certification awarded in February 2010.

At a glance

Name: Kroon Hall, School of Forestry and Environmental Studies, Yale University
Location: New Haven, Connecticut
Size: 56,467 sq ft (6,206 sq m)
Completion/Occupancy: January 2009
Cost: US\$33.5 million
Distinction: LEED-NC Platinum
Program: Academic building with classrooms, offices, meeting rooms, lounges.

Project team

Owner: Yale University
Design Architect: Hopkins Architects
Executive Architect: Centerbrook Architects and Planners
Mechanical Engineer, Structural Engineer, Architectural Lighting and Acoustical Design: Arup
Civil Engineer: Nitsch Engineering
Environmental Consultant: Atelier Ten
General Contractor: Turner Construction Company

CASE STUDIES

TABLE 7.16

Annual energy use distribution by end use, Phase 1^a

	%	kBtu/sq ft
Data center	35	12.11
Space heating	24	8.58
Office plug loads	22	7.87
Lights	6	2.07
Ventilation fans	5	1.88
Domestic hot water	3	0.90
Space cooling	3	0.85
Pumps	1	0.48
Data center fans	1	0.20
Data center cooling	0	0.02
Exterior lights	0	0.12
Task lights	0	0.10
Total (kBtu/sq ft)	100	35.4
Total (kWh/sq m)		111

a "NREL's Research Support Facility: An Energy Performance Update," October 2011, www.nrel.gov/sustainable_nrel/pdfs/rsf_operations_10-2011.pdf, accessed October 8, 2011.

OPERATING DATA¹⁸⁶

Building gross floor area: 222,000 sq ft (20,632 sq m) for initial Phase 1; 360,000 sq ft (33,457 sq m) total.

Number of occupants: 1,325 (plus sixty visitors averaged daily)

Percentage of workspaces with daylight: 100

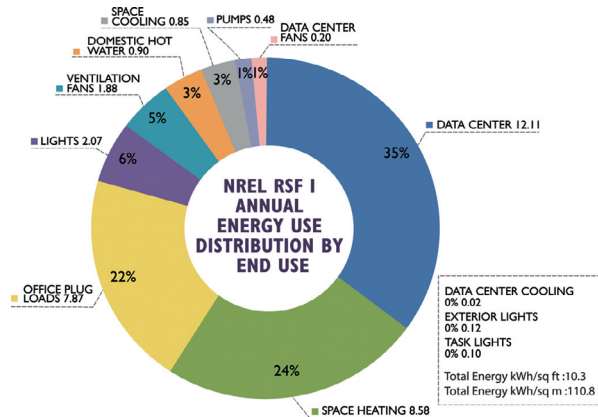
Percentage of the building that can be ventilated or cooled with operable windows: 67

Potable water used, indoors and outdoors: 791,202 gallons (2,995 kl) per year

Annual EUI: 35.4 kBtu/sq ft (112 kWh/sq m), including the site-wide data center

Total energy savings vs. standard building: 46 percent

Annual PV production: Approximately 32,800 kWh/month (2.73 million kWh/year)



7.31 NREL RSF annual energy use distribution by end use. Source: NREL's Research Support Facility: An Energy Performance Update, October 2011, www.nrel.gov/sustainable_nrel/pdfs/rsf_operations_10-2011.pdf, accessed October 8, 2011.

At a glance

Name: Research Support Facility, National Renewable Energy Laboratory

Location: Golden, Colorado

Completed: Phase 1, June 2010; Phase 2, December 2011

Cost: \$91.4 million construction cost (\$254/sq ft)

Distinction: LEED-NC Platinum

Program: Government research facility, offices

Project team

Owner: US Department of Energy National Renewable Energy Laboratory

Architect, Interior Designer, Landscape Architect: RNL

MEP Engineer, Sustainability Consultant: Stantec Consulting

General Contractor: Haselden Construction

USA

7.32 Below: The campus design at Ohlone College features low-water-using hardscape and landscape. Photo: © Robert Canfield Photography.

NEWARK CENTER FOR HEALTH SCIENCES AND TECHNOLOGY, Ohlone College, Newark, California

Initially the new campus building was going to be a copy of its original strip-mall location in nearby Fremont, California. But when a new college president, Douglas Treadway, took over, he insisted that the building prioritize sustainability principles throughout the design, construction, and operation phases. This would offer several advantages to the college: it would signal a commitment to sustainability, give a boost to a new environmental studies program, and reduce energy costs.

"A college's purpose isn't just to distribute content. Our purpose is to develop knowledge workers," said Treadway. "Once you look at it that way, then you shift the paradigm. You start asking, what kinds of environments are conducive to learning and discussion? Then you start thinking about the built environment."¹⁸⁸

Designed by architects Perkins+Will, the Newark Center for Health Sciences and Technology is a state-of-the-art research and teaching facility that houses laboratories, classrooms, offices, a library, and an exercise center. The Center serves 3,500 students in the academic areas of health sciences and technology. Built on a former brownfield site adjacent to San Francisco Bay, the 130,000-sq-ft (12,077-sq-m), two-story building was completed in January 2008 and received a LEED Platinum certification.

"Number one, the most important key to reaching Platinum certification was the partnership between the architect and the builder. We didn't start out with green [certification] as a goal," said Treadway. "However, [Perkins+Will] were very motivated to push everything and come back to us and offer suggestions. They would ask us, 'How about if you did this? Could you do this and would you see the value of it, not just for LEED but on the face of it?'"¹⁸⁹



7 pillars 21 commitments	21 quantifiable objectives for 2015
1. Ensure healthy interiors	85 per cent of hotels use eco-labelled products
2. Promote responsible eating	80 per cent of hotels promote balanced dishes
3. Prevent diseases	95 per cent of hotels organize disease prevention training for employees
4. Reduce our water use	15 per cent reduction in water use between 2011 and 2015 (owned/leased hotels)
5. Expand waste recycling	85 per cent of hotels recycle their waste
6. Protect biodiversity	60 per cent of hotels participate in the Plant for the Planet reforestation project
7. Reduce our energy use	10 per cent reduction in energy use between 2011 and 2015 (owned/leased hotels)
8. Reduce our CO ₂ emissions	10 per cent reduction in CO ₂ emissions between 2011 and 2015 (owned/leased hotels)
9. Increase the use of renewable energy	10 per cent of hotels use renewable energy
10. Encourage eco-design	40 per cent of hotels have at least three eco-designed room components
11. Promote sustainable building	21 new or renovated hotels are certified as sustainable buildings
12. Introduce sustainable offers and technologies	20 per cent of owned and leased hotels offer green meeting solutions
13. Protect children from abuse	70 per cent of hotels have committed to protecting children
14. Support responsible purchasing practices	70 per cent of hotels purchase and promote products originating in their host country
15. Protect ecosystems	100 per cent of hotels ban endangered seafood species from restaurant menus
16. Support employee growth and skills	75 per cent of hotel managers are promoted from internal mobility
17. Make diversity an asset	Women account for 35 per cent of hotel managers ¹
18. Improve quality of worklife	100 per cent of host countries organize an employee opinion survey every two years
19. Conduct our business openly and transparently	Accor is included in 6 internationally-recognised socially responsible investment indices or standards
20. Engage our franchised and managed hotels	40 per cent of all hotels are ISO14001 or EarthCheck-certified ²
21. Share our commitment with suppliers	100 per cent of purchasing contracts are in compliance with our Procurement Charter 21

FIGURE 6.1 PLANET 21: 7 pillars, 21 commitments and quantifiable objectives for 2015

Notes: 1 Outside Motel 6/Studio 6. 2 Excluding economy segment.

CHAPTER

7

Food security

CHAPTER OBJECTIVES

The objectives for this chapter are:

- To analyse the world food crisis
- To describe the challenges with conventional agriculture
- To discuss genetically modified food
- To analyse the links between food production and food scares
- To define the Western diet
- To describe the agricultural inputs to support the Western diet
- To discuss issues of animal welfare

Sustainable food and beverage management infers a holistic approach respecting the planet, **biodiversity** and all people in equal measure. The subject of sustainable food cannot be ignored by the **hospitality industry** although its meaning is complex. The provision of nutritious food that maintains a healthy and active life and respects the **environment** is known as **food security** and **sustainable** agriculture is at its heart. All too often, conventional agricultural systems are unsustainable due to extensive reliance on fossil fuels and negative **impacts** on biodiversity. Agriculture in developing countries is the largest employment sector, around 70 per cent of their population work on the land. Trade liberalization can arguably reduce a country's food security by reducing agricultural employment levels. In the West, we put pressure on the planet's finite resources in our food and **lifestyle** choices. Land that could be used for growing cereals for people is used to grow food for animals and for producing bio-fuels. Employment conditions for some workers producing cash crops like cocoa, bananas and coffee are sometimes precarious. The conditions that many farm animals are kept in defy the rules of humanity. The result of consuming cheap food and especially meat in these conditions is a population in the West suffering from ever increasing levels of obesity and food-associated health problems.





Listen to all or a portion of the following tracks, which serve as excellent examples of different meters. “Take Five,” for example, is in 5/4 meter. Compare “Take Five” with “Every Tub,” “Summertime,” “Pent Up House” written in the more common 4/4 meter, or “La Fiesta,” played in a fast 3/4 time. Also think about their differing tempos.

Symphony orchestras and bands have conductors to control the pace of the music—jazz ensembles have rhythm sections. There is flexibility in terms of tempo associated with a “classical” music ensemble performance. In larger ensembles such as symphony orchestras, the conductor controls the tempo. In smaller ensembles, the performers control the tempo and must work carefully together to adjust the tempo or risk a poor, disorganized performance. The rate of the steady pulse, or tempo, in a jazz or pop/rock group is consistent and generally maintained throughout the piece by the **rhythm section**, which is comprised of piano, bass, drums, and often guitar. Within this group of instruments, there is likely to exist a hierarchy of time-keeping responsibilities that may be somewhat dependent on the particular style of jazz. The other musicians in the ensemble must then strive to rhythmically coexist within this tempo. At times, performers in a jazz band may seem to rush or drag behind the rhythm section’s steady pulse, but it is frequently by choice, not by error. The dragging sensation is described as **laying back** and is often associated with the sound of a particular band and helps to define its style.

The subject of rhythm as it relates to jazz is a thorny one that has provoked debate for many years. Attempts to define the special rhythmic qualities of jazz have sometimes ended in poetic metaphors and metaphysical phrases in attempts to make feelings and individual interpretations tangible. The very existence of a group of instruments described as the “rhythm section” points to the importance of this basic musical element to the jazz style. What other music ensemble, other than in related popular music styles that share similar roots with jazz (rock, R & B, pop), includes a group of instruments known as the “rhythm section”? The emphasis on steady rhythm is a distinguishing feature of this music, and, aside from the spontaneously improvised aspect of jazz, its unique rhythmic features are among the most important characteristics establishing jazz as a truly original style.



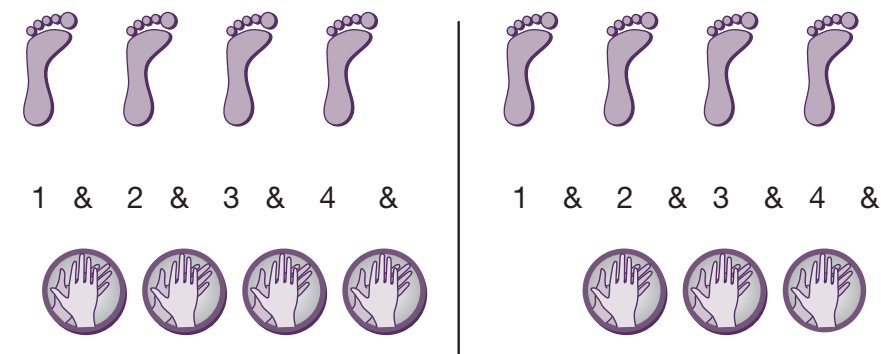
Listen to all or a portion of the following tracks from the online audio anthology, which serve as excellent examples of different tempos. Wynton Marsalis’ “Delfeayo’s Dilemma” presents the illusion of several different tempos. “Intuition” seems to have no set tempo, while “Poem for Brass” takes some time before a steady tempo is established. Compare these tracks with the slow, but steady, tempo of “Moon Dreams.”

Rhythmic Devices Important to Jazz

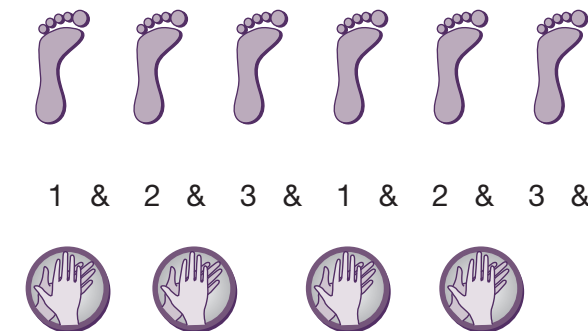
The rhythmic terms syncopation and swing are synonymous with jazz. **Syncopation** occurs when a rhythm appears on a weak, normally un-emphasized portion of a beat (when your foot moves up), interacting with a regularly occurring rhythm or major beat emphasis (when your foot pats down). The rhythm that is normally un-emphasized becomes accented and creates a syncopation or tension.

A **polyrhythm** results when two or more different rhythms are played simultaneously, layered one on top of the other. One fundamental rhythm usually serves as the foundation, and other layers are added. The examples that follow clarify these two important concepts.

Much has been said about the predominance of syncopation in jazz, its importance in contributing to the unique nature of jazz rhythms, and the relationship to African music. To quote Gunther Schuller, from his book *Early Jazz*:



EXAMPLE 2.2 Illustration of a simple syncopation in measure 1 that results from handclaps on off beats that create a tension between major beats represented by the foot tapping a steady pulse. By the second beat of the second measure, the handclaps are lined up precisely with the foot tapping on beats 2, 3, and 4, hence no syncopation and no tension



EXAMPLE 2.3 Using similar graphics, the following example illustrates a simple polyrhythm. In this case, the foot taps indicate a 3/4 meter and fundamental rhythm. The hand-clapping introduces a new rhythm in opposition to the foot tapping. If the foot tapping suddenly stops, the continuing handclaps give the illusion of 2/4 meter. The combined result when both are executed simultaneously is a polyrhythm

By transforming his natural gift for against-the-beat accentuation into syncopation, the Negro was able to accomplish three things: he reconfirmed the supremacy of rhythm in the hierarchy of musical elements; he found a way of retaining the “democratization” of rhythmic impulses [meaning that any portion of a beat could have equal emphasis]; and by combining these two features with his need to conceive all rhythms as rhythmicized melodies, he maintained a basic, internally self-propelling momentum in his music.²

Schuller is also defining to some degree what **swing** is. It is this form of propulsion or forward momentum that we feel when something “swings.”

Listen to the following track, which offers excellent examples of complex rhythms happening simultaneously and syncopations. The opening section of Keith Jarrett’s “The Windup” (0:00–0:39) juxtaposes a regular rhythm played by one hand with improvised, syncopated rhythms that work against the regular rhythm and are played by the other hand. Listen to the “Bamaaya,” the African music track in the online audio anthology, to hear complex polyrhythms played by the drummers.





FIGURE 1.1 A professional scenic shop such as Cobalt Studios will stock many brands and varieties of paint and dyes. A small theater or school shop can still do a lot with a more modest inventory.

expensive or toxic ingredients, but also for qualities such as lightfastness and durability. There are also colors commonly available to us that would have been impossible in the pre-industrialized world. The cyan, magenta, yellow, black printing systems found in your desktop inkjet printer or in the world's finest presses would be impossible without synthetic colors. What plants or stones could you grind up to make magenta? Pigments are differentiated from dyes by the fact that they are suspended rather than dissolved into a fluid like a dye.

Vehicle is the fluid that “carries” the pigment. The vehicle is pretty simple. Its main job is to allow the particulate pigment to take on a fluid form so it may be applied with a brush. In just about every paint you will use in a basic scene shop, the fluid or vehicle is going to be water. Latex acrylic, the

most common paint, is an emulsion of acrylic and vinyl suspended in water. The pigments and binders can fall out of suspension if left long enough, which is why you need that stir stick the paint store clerk always offers.

The vehicle does have a secondary job in paint—it goes away. The fluid evaporates out of the paint, leaving the dry pigment and binder stuck to the surface you were painting. The plastics in water-based latex paint are fairly water-resistant once dry. That way you can wipe down your walls or hose the cobwebs off your house without washing the paint away. Chemically, it's a bit more complicated than just evaporation, but that explanation will do for our needs.

The terms solvent and diluent are related. The solvent can also be the vehicle for the paint. Water is used to thin and

clean up water-based latex paints. Denatured alcohol dissolves shellac so it can be applied with a brush and is also the cleaning agent, whereas mineral spirits or turpentine are the solvents for oil paint. The amount of vehicle has an obvious impact on the viscosity or thickness of the paint. With water-based paints, it is easy to thin the paint by simply adding water. Almost any paint, from the cheapest house paint to the finest scenic paint, can, and in some cases must, be diluted with water.

Binder is the glue that sticks the pigment to your surface. Without binder, your paint would never dry. Anytime you touched the painted surface, pigment would come away on your fingers. Students sometimes discover this when they mistake tubes of colorant for paint and can't understand why it still hasn't dried days later. In some paints, most notably oil paint, the vehicle and binder are one and the same. Linseed oil suspends the pigment and also serves as a binder once dry. But in most cases, the binder you will be working with is some form of polymer. Different types of latex paint have different formulations of plastics, but they are all similar and usually play well together. The main difference will be in the amount of actual acrylic in the paint. High-quality artists' paints will be nearly 100 percent acrylic, while cheaper house paints will introduce less expensive vinyl, and even polyvinyl acetates (PVA)—a fancy way of saying glue.

Fillers are simply additives to give paint better coverage or volume. You can basically think of it as chalk, although the actual ingredients can be a wide range of materials, from lime to barite crystals. The filler in most paints you'll work with is there to allow pastel colors to opaquely cover your surface. Fillers will be added to “high-hide” paints for the same reason. The main difference in paint store “bases” such as pastel-base, mid-tone, and accent-base has to do with the amount of filler in the paint. This is important to understand when mixing your own paint. More on that in Chapter 4.

Additives can be found in many types of paint depending on the intended use of the paint. For example, many exterior paints contain UV-inhibitors to prevent fading, fungicides or insecticides, and additional resins to harden the surface once dry. All of these extras, useless and even harmful when used onstage, are why exterior paint costs significantly more than interior. It's not “better” paint; it's just designed to do different things.

Acrylic has a semigloss, plastic-looking finish, so matte or flat paints and varnishes have an additional “flattening” agent added to the paint. High-gloss paints will have extra resins added to create a mirror finish when dry. These additives are often a lot of what makes up the gooey stuff at the bottom of the can before you stir. These additives can solidify after a long

time and can no longer be mixed back into the paint's vehicle. So if you have had a can on the shelf for several years and you can't stir it back to a nice creamy consistency, you'd better dispose of it.

Additives may even include components to mask the paint's smell. Basically, what you have is a bucket of chemicals, some of which can smell a bit unpleasant, so paint manufacturers add agents to help make the consumers' experience opening their can of paint more enjoyable, even though these additives may do nothing for the paint's actual job. Rosco adds pine oil to the paint both as a mild preservative and for its fragrance. This is why pine-oil or pine-based disinfectants are the best choice for spritzing on top of the paint before packing a can away for a long time.

Be aware that although we talk about pigment, binder, vehicle, fillers, and additives as the “ingredients of paint,” there is a lot more in the can. Unless you are using products manufactured by a company specifically engaged in making 100 percent natural paint—and you're almost certainly not, as these paints, while wonderful, are expensive and usually only come in earth tones—then there is a lot more in the can than those five ingredients. They may be part of the proprietary formulas that make one paint perform better than their competitors. They may also be the ingredients that cause nasty surprises when you start mixing different products or adding things to the paint. Most companies have some kind of customer support where you can contact the manufacturer with questions about using their product. Always mix small batches and test on samples of the materials you will be painting on if you engage in any scene shop cookery.

TYPES OF PAINT

Artists have been trying to get colors to stick to various surfaces for thousands of years. There are countless varieties of paints in use today. There's high-tech powder coatings applied electrostatically and heat-cured to a perfect finish. Catalyst-hardened epoxy paint and two component urethanes are used on machine and automotive parts. There are paints formulated to resist graffiti, to repel barnacles, to conduct or insulate electricity, even super-slippery paints designed to prevent burglars from climbing walls. On the other end of the spectrum, natural clay-based paints are making a comeback for the eco-conscious market. Despite the dizzying array of paints in use today, only a handful are of practical use in the scene shop. The list below will introduce you to the paints you're most likely to encounter.



Introduction to *Richard III*

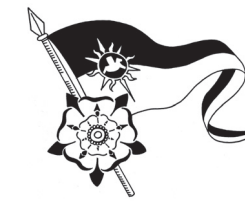
Shakespeare does not follow a strict historical record of the Wars of the Roses. He is unconcerned with dates and never mentions them. He alters the sequence of events and the timing between events to make the play vibrant and to bring what is portrayed here as Richard's catalogue of crimes to life. This is of course only one side of the story, and there are many who would defend *Richard III*. This play deals with the death of Richard's brother Edward IV, and the confusion and intrigue that followed, culminating in the crowning of Richard and his death in almost the last battle in the long-drawn-out Wars of the Roses. Shakespeare dramatises in this play the fall of the House of York and the establishment of the Lancastrian Tudor monarchs.

For each scene of the play *context* is provided, which is largely based on the Shakespearian version of events. This is intended as brief support for the Talking Points. Students will need a copy of the play text. The aim is primarily to engage students with the text and ensure that they understand the characters, action, narrative and language of the play. Out of this may come an interest in the history; a Thinking Together activity to do with matching Shakespeare's version of events to the historical record is provided after the scene-by-scene Talking Points.

A NOTE ABOUT NAMES IN THE PLAY

In the play *Richard III*, there is every chance for confusion about who is who. There are four Edwards, two Richards, two Margarets, two Henrys, two Elizabeths, and two men called Hastings. Stanley is also called Derby, and George is also called Clarence. People are called by their titles, Christian names or surnames so that Richard may be called The Duke of Gloucester or just Gloucester, until he is Richard III. The Queen's brother is called Anthony Woodville. He is Earl Rivers, so is referred to as Rivers, but sometimes Richard calls him Woodville. All this adds a layer of difficulty for the student. Shakespeare himself found it complicated; in Act 2 Scene 1 line 69, three lords are addressed – Lord Rivers, Lord Woodville, and Lord Scales – though actually all these titles belonged to one character, Queen Elizabeth's brother Anthony Woodville.

For clarity the characters are referred to in the Talking Points as follows:



- The main character is Richard.
- Edwards: the King as the play begins is Edward IV. His sons (Richard's nephews the 'Princes in the Tower') are Edward Prince of Wales (later Edward V) and Richard Duke of York. Crown Prince Edward who died at Tewkesbury in 1471 is referred to as Edward Tudor. The young son of George Duke of Clarence is Edward Plantagenet.
- Henry Earl of Richmond who arrives to give battle at Bosworth is Henry VII. The previous king, killed at Tewksbury, is Henry VI.
- King Edward IV's wife is Queen Elizabeth and their daughter is Princess Elizabeth.
- Stanley is referred to by many of the Players, though in the cast list he is called Derby. I have used both names e.g. Thomas Stanley (Earl of Derby).
- George Duke of Clarence is referred to as George or Clarence.

PREPARING FOR THE PLAY

Thinking Together activities

1 Mind map for *Richard III*

With a group, make a drawing, model or electronic image of each of the main characters in the play. Arrange them on a poster (or board or screen) linking them with lines annotated to show relationships at the start of the play. As the play proceeds, move, alter or add further description to the characters or the linking relationships, to show what is happening and why, and how this affects others. Add feelings, prophesies and predictions as well as actual events, plans and quotations.

Characters for your mind map

- King Edward IV.
- *Sons of King Edward IV*: Edward Prince of Wales and Richard Duke of York.
- *Brothers of King Edward*: George Duke of Clarence and Richard Duke of Gloucester.
- *Wife of King Edward*: Queen Elizabeth.

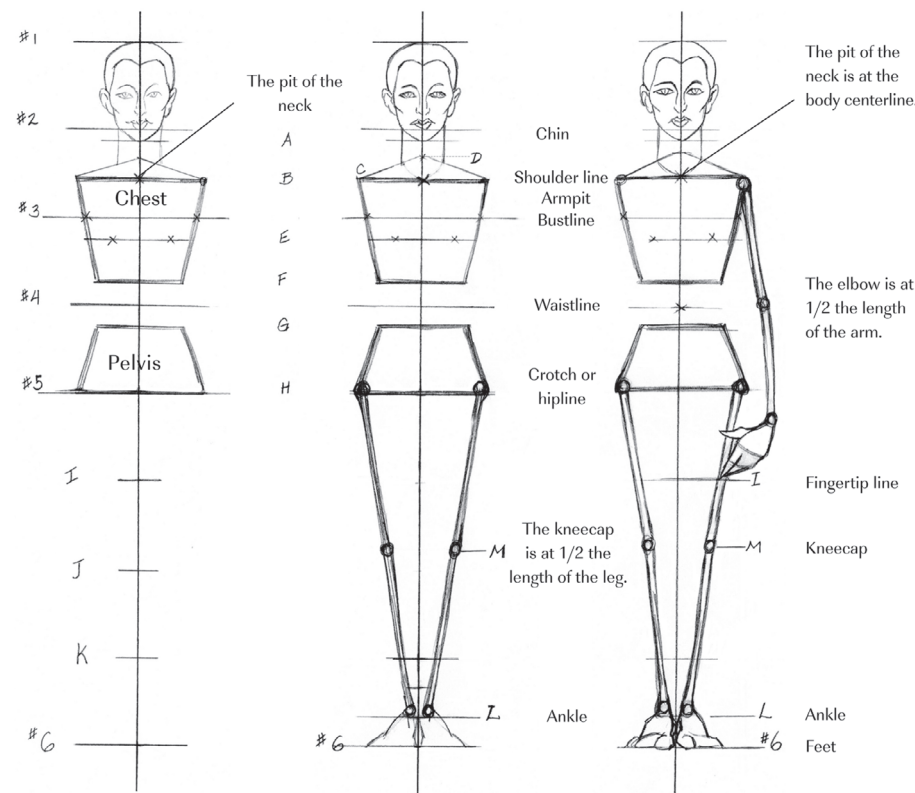
4 ✿ CHAPTER 1

(see letter H in Figure 1-1). The hipline's width will depend on whether you are drawing a female or male. The other two marks are not used.

10. Treat the chest/rib cage as a tapered box (refer to Figure 1-2). Connect the shoulder line with

the bottom of the rib cage to make a tapered-down box. The shoulder should be wider than the bottom of the rib cage. Keep both sides of the body symmetrical with the body centerline. The pit of the neck is at the middle of the shoulder line—it is the body centerline.

1-2 Proportion of the Body, Marks I through M



11. Treat the pelvis as a tapered-up box. Connect the top of the pelvis line with the bottom of the pelvis line (mark #5, also the hipline/crotch line) to draw a tapered-up box. The female hipline is wider than the male hipline.
12. The area from the crotch down will be for the legs and feet. The legs join the pelvis at the hipline. Before starting to draw the legs, divide the distance between mark #5 (crotch line) and mark #6 (the bottom of the feet) into four equal parts. Then mark them from the top down (see letters I, J, and K in Figure 1-2).
13. Divide the distance between K and mark #6 into three equal parts. The feet are drawn in the bottom third (see letter L in Figure 1-2).
14. Draw two lines from both corners of mark #5 (hipline/crotch) down to letter L to indicate the legs. Keep them symmetrical. Then divide these two lines in half; the middle marks on these two lines are the knee positions (see letter M in Figure 1-2). This method of drawing leg length avoids the leggy look of fashion-illustration figures. Our objective is to create a realistic look corresponding to the actors, rather than a fashion ideal.
15. The arms join to the chest at the shoulder line. In human anatomy theory, the upper arm from the shoulder to the elbow is longer than the distance from the elbow to the wrist. In my method, I treat them as two equal parts in length for an easy calculation ratio. When the arm is hanging down, the elbow usually lines up with the waistline. The measurement from the shoulder to the elbow should equal the measurement from the elbow to the wrist. From the elbow joint, measure down to indicate the placement of the wrist.

16. Add hands to the wrists. The fingertips usually stop at letter I (the fifth head in other books). Asian people often have shorter arms, African people usually have longer arms, and Caucasians often have arms that are longer than Asians' but shorter than Africans'. There are many variations and exceptions to any racial generality.

17. As shown in Figure 1-3, contour the body according to the basic bone/stick structure (see the section, "Contouring the Stick Figure"). Figures 1-4 and 1-5 show the contouring lines for the male and female body, respectively.

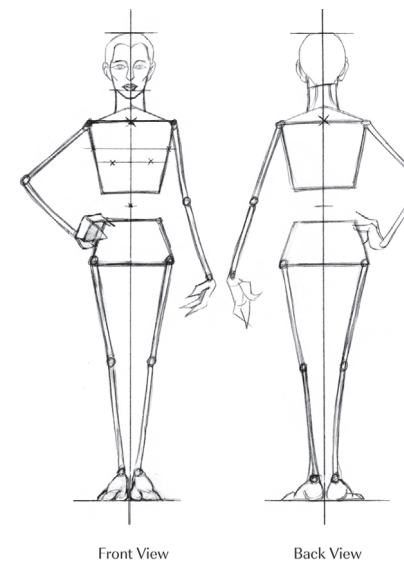
The proportions of the body, either seven or eight heads tall, work only for the body standing in a

straight position. When the body is bending or the head is facing up or down, you cannot apply the measurements to the body because of foreshortening.

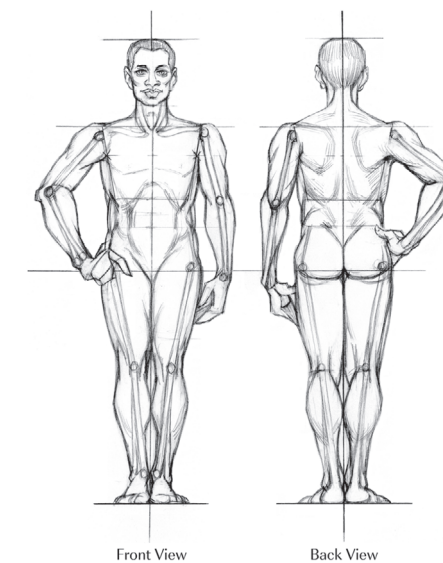
The body measurement methods used in this book are not the only methods you should follow, but I recommend you use my system as a guide or reference for drawing stage costumes.

Drawing the Figure ✿ 5

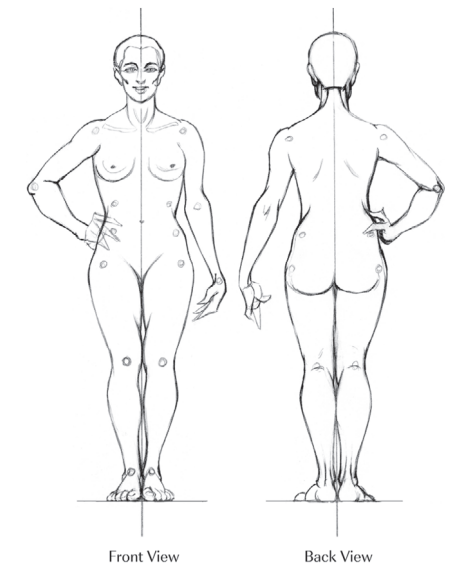
1-3 Proportions of the Body, Stick Structure, Front and Back Views



1-4 Contouring Lines for the Male Body, Front and Back Views



1-5 Contouring Lines for the Female Body, Front and Back Views





I'd like to take a short break from talking about shutter speed because you can talk and think all you want about technology and miss a photo opportunity, or worse, not have fun. In Chapter 12 I focus on composition. Here's a preview. If you look closely at the opening photograph in the Introduction (page 1), you'll see what looks like an angel formed by the flowing water. That section of the waterfall is pictured here, cropped from that image. The idea is to look for pictures within pictures when you are photographing and when you are processing your images.

3 ISO and Light



One way to think about the ISO setting is that it determines the light sensitivity of the camera's image sensor.

Traditionally, you would use a low ISO setting, such as ISO 100 or 200, in bright light and high ISO settings in low light situations. The lower the light, the higher the ISO you'd need to get a hand-held photograph. When you are using a tripod or a speedlite, ISO becomes much less of an issue.

I took this hand-held image at the Jökulsárlón Glacier Lagoon after sunset. One of my goals was to stop the movement of the geese in the foreground so I knew I had to boost my ISO to get a fast enough shutter speed to stop the action *and* maintain good depth-of-field so the entire scene was in focus. [Exposure information: Canon 24–105mm IS lens at 60mm, ISO 800, f/8, 1/250th of a second.]



I felt a little better on day two in Snow Hill Island. I organized my camera and cold weather gear and was ready to shoot.

Finally! The idea was to take the ship's helicopters over to the island to photograph the penguins.

However, things got worse. It started to snow. Heavily. After checking the weather radar, the expedition leader announced over the PA system that we were shipbound for the day. It was just too dangerous to fly, he said.



It was now our last day to photograph the penguins. The snow finally stopped, and several of us, feeling weak and exhausted, flew over to Snow Hill Island.

We were dropped, with our heavy backpacks and tripods, about two miles from the penguin colony, because the ship's naturalists, understandably, did not want the helicopters to frighten the penguins.

Slowly and carefully, toting our gear and dressed in cumbersome winter clothing, we made the hour-long trek to the colony. Oh yeah, we were also wearing life jackets, because we were walking on ice. That made for even more cumbersome walking and photographing.



Here's the first shot I took of the penguins. I know it's a compositional mess, but I'm sharing it with you to show how closely the penguins often huddle together.



With my original goal in mind, I started looking for the one shot I came all this way to make. I saw a possibility, the family you see in the center of the left photograph. I slowly and carefully made my approach, crawling on my belly in the snow with my Canon 1-D and 100-400 mm IS lens. I took twenty shots, most of which were outtakes, but then, for the first time on the trip, my luck changed. I got a digital file from which I made the opening image for this chapter.