Part I

Introduction

1.1 Processes of perception

In terms of neuroaesthetics, in particular, in relation to the visual arts, I will define visual perception in its simplest form as the detection of such features as line, colour, movement, luminance or texture in the visual field. The neurons responsible for the functioning of such perceptions are called feature detectors and these can work in large clusters in order to gain an overall sensory impression of an object in front of us, binding features together for object and scene identification, the mechanisms of which I examine later in relation to art. According to Marr (1982), low-level perception processes fine-grained local features before the intermediate level of perceptual binding into a percept (the thing identified); high-level perception produces categorical representations (but with the support of nonperceptual systems). According to Jackendoff (1987), consciousness arises on this intermediate level. Prinz (2009, p. 435) adds to this, that attention needs to be exercised here in order for conscious experience to arise. The process is complicated further by the fact that I am only dealing with the modality of sight, when perceptions will often depend on what the combined senses are telling it (we can imagine seeing, smelling, tasting and touching an apple). Yet it is also possible to have different perceptions about the same sensation, as we do when looking at pictures such as the rabbit/duck conundrum, where it is possible to switch perceptions from the same sensory signal.

The early stages of perception will proceed most often unconsciously, frequently called *bottom-up* processes, 'lower' perceptual processes that it

is believed drive the goals of the organism in particular events or situations. However, if something is flagged as important, which can happen when certain memory areas are triggered, further processing of the visual field will be needed. Here, the prefrontal cortex will direct the sensory and motor systems to pay more attention to salient aspects of the environment. The prefrontal cortex, the role in relational knowledge of which I will return to often in this book, is an important executive frontal part of the brain that is largest in humans and is associated with the monitoring of internal states and for keeping long-term plans and objectives in mind, in connection with a hormone-based reward system. These kinds of processes are generally referred to as *top-down*, which may also include later analytical procedures that manipulate sensory information and perceptions. However, there is also nonconscious sampling of the environment complicating the simplistic stimulus–response model, suggesting that sometimes a response can turn into a stimulus, and that we are often sensitised to where or when stimuli will occur in the environment; we have expectations and nonconscious subliminal processes that prime us for a 'discovery' that we experience as a stimulus.[1]

Cognition can involve the interaction between bottom-up and top-down processes. This happens when the processing of stimuli cooperates with short-term memory that maintains information (representations) to be used later. For example, we may be making a salad. We have just sliced a tomato and we have put it aside while attending to the other ingredients in the recipe. Even though the tomato is no longer in our view and we are busy with something else, we have a representation of it in our minds so that we can return to it later. However, while it is not being viewed, we might think more purposefully about the taste of red tomatoes and what might complement it in a salad, and this will require other kinds of representation of stored knowledge in longer-term memory. Our knowledge of factual details will aid interpretation of an ongoing situation, which we must keep attending to lest we cut our fingers. At the same time, we can access episodic memories and semantic memory as a way to add value and further meaning to the ongoing situation or the object under examination. Memories of sensory episodes can trigger the emotions associated with the memory, and even give rise to self-reflection. Meanwhile, various glands and hormones in the bloodstream could be

[1] Indeed, some theorists believe that 'rather than a stimulus *causing* a response, it is the response which must occur *first* and then *act* on the incoming afferent signals to *produce* a stimulus' (Ellis, 1999, p. 267). The superior colliculus is an area in the brain responsible for changing the direction of saccades. Low-level conscious peripheral vision is strongly attracted to novel objects or movements appearing in the periphery of the visual field. Higher-level conscious awareness makes the discovery 'official'.

sending signals to the brain about the body's state, feeling tired, hungry or thirsty, for example. In sum, cognition and perception require a broad interconnectivity of brain areas *and* the contingencies and rich details of our bodies dynamically engaging with the world that will help us to 'personalise' or conceptualise the significance of perceptual experience. The relevance of this (admittedly extremely simplified) description of conscious attention is complicated when we are attending to another situation in the environment, a work of art: an oil painting on canvas, for example, which might depict a chef making a salad. The artwork may not only stimulate a rehearsal of this familiar activity in our minds, but we may also question the artwork's ability to do this, a kind of metacognitive activity involving the self-monitoring of cognitive states and judgements about how the artwork's perceptible ingredients are able to anticipate or challenge expectations and lead to complex conclusions. This self-monitoring induced by the artwork is a process I shall return to in later pages. As Martin O'Shea neatly observes, 'when we say the brain does *x* or *y*, the word "brain" is a shorthand for all of the interdependent interactive processes of a complex dynamical system consisting of the brain, the body and the outside world' (2005, p. 3).

Certain artworks puzzle, as is the case with Op Art, in order to make us conscious of our perceptions by exploiting effects, problems and paradoxes in the visual field. It is important to note that we do not need the object in front of us to stimulate our perceptual processes; we can imagine or recall such objects. Meanwhile, 'mirror neurons' (Rizzolati and Craighero, 2004) are neurons in our sensorimotor systems that we use when we watch people move (or imagine them moving), and these fire up in order to help us follow the movements and intentions of others, using the same sensorimotor areas of the brain that we would use when performing the actions themselves although, of course, not executing them. This 'offline' perceptual processing can occur watching a film, daydreaming or remembering objects or actions.

Perceptions are commonly understood as representations of line, colour, luminance and movement, with distinctions being made for sound, touch, taste and smell in the other senses. Traditional neuroscience identifies each of these senses or functions with particular brain areas. Perceptions and concepts are generally treated for the purposes of analysis as separate mental and physical operations even though, phenomenally, they appear to occur at the same time. There are many experiences of contemporary art where perceptions and concepts cooperate in interesting ways, and much of this book will analyse how this works. Traditional ways of making distinctions between or 'states' out of human thought denoted by the use of such terms as perceptions, percepts and concepts

are most often arranged in various hierarchical models, with the sensations of objects then perceptions of their qualities placed at the bottom, and with percepts, the simplest form of identification, next. Then there are more complex concrete concepts that may be compounds (combine-harvester), followed by abstract concepts (equipment) at the top. The latter may utilise or abstract information from these lower levels. In sentences and in viewing art, we are quite adept at combining these different kinds of mental operations rapidly. Of course, this is a very simplified schema and is hotly debated, as is the amount of 'consciousness' to be apportioned to each of these states, and there is controversy over their underlying neural correlates and mechanisms. Perhaps more surprising is any rigorous application of these distinctions in contemporary art history, which is content to use 'concept' interchangeably with 'thought', 'idea', 'notion' and even 'the gaze' or 'the eye'.

1.2 Concepts

Because there are many different kinds of concepts and various ways of defining them, I shall restrict my introductory definition here to a broad consensus of views, although I shall provide further elaboration in later chapters as to how we combine concepts in larger systems of knowledge. A concept is a mental representation of a particular entity or category of entities that may be concrete or abstract. A standard psychological dictionary definition states that a concept is: 'acquired or learnt, usually from exposure to examples of items that belong to the concept category and items that do not belong to it. In general, it involves learning to distinguish and recognize the relevant attributes according to which items are classified and the rules governing the combination of relevant attributes, which may be disjunctive, as in the concept of a coin, which may be circular, polygonal, or annular' (Colman, 2009).[1]

An important distinction that continually arises in the psychological literature divides abstract from concrete concepts: 'Concrete concept nouns, such as *chair* and *book*, differ from abstract concept nouns, such as *freedom* and *language*. While the former refer to entities that are perceivable and spatially constrained, the latter refer to entities characterized by properties that are neither perceivable nor spatially constrained' (Setti and Caramelli, 2005, p. 1997).

In terms of art, this seems crucial, particularly because many artworks encourage us to shift from the processing of perceptible features as an end in itself, to using those perceptible features as symbols or tokens of abstract concepts, such as FREEDOM.[2] Arthur C. Danto suggests that much of art is conceptual, as it invites an 'enthymematic' phenomenon, whereby the viewer is responsible for supplying the 'missing' conceptual

[1] 'concept formation'.
[2] In many research studies in cognitive psychology, concrete and abstract concepts used as explicit examples are put into capital letters. I follow that convention throughout this book.

link, which the work itself suggests (Danto, 1981, p. 170). In a bold statement, Danto also writes: 'Whatever art is, it is no longer something primarily to be looked at' (Danto, 1997, p. 16). Directing his attention to Warhol's *Brillo Boxes*, 1964, a collection of wooden boxes printed to appear exactly like their commercial counterparts, Danto argued that to make a distinction between the ordinary and art required the relevant theory and cultural understanding, thereby emphasising not the physical appearance of artworks but the conceptual context. Carroll (2006, pp. 77–79) further suggests that the direct perception of an artwork is not necessary for aesthetic experience and that Duchamp's *Fountain* (a urinal turned on its side, signed in 1917 and entered for an exhibition) does not need to be visually inspected – clearly, embodied movement around many art objects is not essential for all artworks. Duchamp himself insisted: 'What art is in reality is this missing link, not the links which exist. It's not what you see that is art, art is the gap' (Schwarz, 1969, p. xxxii). While the visible, perceptual details of art are processed by the eye and the visual cortex, other areas of the brain are busy 'filling in' these gaps with conceptual information.

Perhaps one of the most often quoted remarks in contemporary art is when Duchamp referred to the 'non-retinal beauty of grey matter' that 'put art at the service of the mind' (Schwarz, 1969, pp. 18–19). Although this has been pursued with much alacrity in conceptual art and in many contemporary artworks, this does not mean, of course, that visual experience is totally irrelevant now. In fact, many of Duchamp's readymades remain visually interesting and suggestive. However, the way in which Duchamp placed the emphasis on the conceptual rather than the perceptual aspects of experiencing art has had a profound effect on contemporary art. The artwork can be viewed as one of many 'situations' that require the use and combination of both concrete and abstract concepts. Let us take the situation of thinking about a horse.

Nonconsciously and extremely rapidly, the sensory perceptions of a horse's shape, colour, surface texture, the sound it makes, its movements would be processed by feature detectors in the different senses to form a percept that binds the features together. A percept might be 'animal with four legs'; identifying it as an adult horse would be a concrete concept that stimulates processes of semantic and episodic memory. We might put the horse into a superordinate category of friendly domestic animals along with dogs, or with mythical animals such as unicorns. An abstract concept might associate the horse with a symbol of strength, speed and nobility, and we might associate a white horse with Pegasus.

According to a study undertaken by Crutch and Warrington (2005), superordinate categories are collections of concrete concepts, whereas

abstract concepts can be organised into networks via association (not categorisation). The results suggest that there are at least two kinds of representation for concrete and abstract concepts, and that 'in the latter case, it is *unlikely* that this associative network is premised on perceptual or modal examples'. Furthermore, 'Experience of the perceptual features of objects via our five sensory channels appears to play a key role in the acquisition of concrete concepts ... Abstract concepts, however, may be acquired in the context of language without any direct perceptual input' (p. 623).

These are a few practical tasks where we might engage in combining such concepts:

1 In analyses of complex spatial events, such as puzzles, chess, the calculation of quantities and mathematical formulae using methodical procedures (rules) that have been learnt, applied to ad hoc situations using concrete exemplars.
2 Coordinating embodied action with reasoning: painting or drawing; re-enacting and retracing the steps of a thief; acting on the stage; playing the piano; looking for lost keys; coordinating embodied perceptual processes and conceptual analysis, for example when examining a modernist sculpture that requires us to walk around it, through it and under it.
3 Running through counterfactual or hypothetical scenarios and events (requiring a suspension of disbelief for the sake of a logical experiment). For example, art creates objects out of 'impossible events': see Meret Oppenheim's famous *Object (Le déjeuner en fourrure)*, 1936, often referred to as the Fur Cup, or Man Ray's *Gift*, 1921 (a clothes iron with a strip of nails on its smooth side sticking out like teeth). We can imagine impossible objects that do not resemble anything we have seen before. Yet, feeling that objects look familiar even though they are nonsensical is a bit like trying to scratch an itch without much success. We can imagine using these hybrid objects and they manage to put our habitual responses into conceptual focus. This may be accompanied by strong emotions, from pleasure to disgust, or we may conceptualise such emotions and how they seem to rise and fall in the encounter with the art object. Such hybrids of emotion and cognition are sometimes described as phenomenal concepts. When our 'normal' perceptual processes are at odds with our conceptual expectations in cases of art such as *Lunch in Fur*, it could be said, following Duchamp, that a kind of gap appears that is only really closed by the operations of relational knowledge drawing upon other artworks that employ similar strategies. A certain charm might be found in our *inability* to make sense of the *Lunch in Fur*. As with *Alice in Wonderland*, there is always a fleeting sensation that we have apprehended the conceptual logic of fantasy, yet we are often at a loss for words on how to report on it.

Figure 2. Meret Oppenheim, *Object (Le déjeuner en fourrure – Luncheon in Fur)*, 1936 (fur-covered cup, saucer and spoon; cup 10.9 cm diameter, saucer 23.7 cm diameter, spoon 20.2 cm long, overall height 7.3 cm). Digital image, The Museum of Modern Art (MoMA), New York and Scala, Florence. © DACS 2012.

4 Using and thinking about lexical concepts to do with comparison, contrast, quantity, size, characteristics, relying on context-sensitive information that might also require judgements about time: thinking about why this film seems longer that the other one you saw when, in fact, it is sixty minutes shorter in duration.
5 Performing a religious ritual that requires one to regulate one's movements and actions either with regard to objects or social situations (genuflecting, threading one's fingers together, adopting a particular gait at a funeral or wedding). The body is regulated by learnt traditions and social settings; it may be a subpersonal concept (one is going through the motions). These rituals, which are produced by traditions of conceptual thought, involve the regulation of the body in designated spaces (churches, hospitals, theatres, libraries, bars). They may also involve 'conceptual acts' of performing beliefs or social mores, and they may function as channels for emotion. Many performance artworks explore these kinds of 'conceptual acts' where the actual execution of kinaesthetic and embodied actions allow concepts to emerge which, in turn, affect such actions in a continuous feedback loop. This is less exploratory or ad hoc than 2.

In sum, concepts are used in specific situations for particular tasks and actions in the world, but they are also used and combined in order to communicate emotions, memories, imaginary scenarios, events or reasonable calculations for problem solving, education or pleasure. Artworks are special because they provide opportunities to exercise these different kinds of concepts imaginatively. In addition, artworks often provide unique circumstances in themselves and present us physically with social

and public situations and spaces that constrain or encourage combinations of these different kinds of concepts, which otherwise might not come together in any other circumstance.

The cognitive psychology of concepts provides further details. According to Wiemer-Hastings and Xu (2005), 'Abstract concepts are anchored in situations and regularly involve subjective experiences, such as cognitive processes and emotion. Unlike concrete concepts, abstract concepts have fewer intrinsic and proportionally [more] relational properties' (p. 731). Importantly also, they state that many characteristics of abstract concepts are just as abstract as the concepts themselves. 'Thus, it is difficult to imagine how abstract concepts may be formed from purely perceptual sources' (p. 732).

Abstract concepts are distinct from concrete concepts such as HAMMER or CHAIR because, while the latter depend on real life, concrete situational examples or associated concrete concepts (NAILS, SOFA) and body references (to grip, to sit on), abstract concepts, such as TRUTH, rely more heavily on different kinds of situational examples that 'focus more on social aspects of situations, such as people, communication, and social institutions. Abstract concepts also focus more on introspections, especially beliefs and contingency/complex relations' (Barsalou and Wiemer-Hastings, 2005, p. 152).

However, it is not always the case that concrete or perceptual situations are needed to grasp abstract concepts. For example, 'the concept *comparison* requires (among other abstract constraints) the presence of two entities to be compared. The constraint does not dictate these entities to be of any particular nature, thus they could be people, essays, houses, laws, feelings' (Wiemer-Hastings et al., 2001, p. 1111).

Thus, one does not need to access or even to dwell upon ESSAY, HOUSE or LAW by rehearsing perceptual or sensory operations to demonstrate them. We may effortlessly combine them in sentence construction, leaving out the details. It is important to remember that purely logical examples may be contrasted with different kinds of concepts, such as those involving emotions, that require both concrete and abstract components and situations to communicate them.[3] It is interesting that

[3] Setti and Caramelli (2005) suggest four main domains of abstract concepts: cognitive processes (thought, idea), states of the self (childhood, identity), nominal kinds (error, plan) and emotions (fear). Note: 'There is an abstract *thinking*, just as there is abstract *feeling*, *sensation* and *intuition*. Abstract thinking singles out the rational, logical qualities. . .Abstract feeling does the same with. . .its feeling-values. . .I put abstract feelings on the same level as abstract thoughts. . .Abstract sensation would be aesthetic as opposed to sensuous *sensation*' (Jung, 1921/1971, p. 678).

many contemporary artworks function as situations, helping to constrain or elaborate concrete *and* abstract concepts, as I intend to show in later chapters, particularly with the use of metaphor.[4]

Concepts are not merely mental entities that are held in the memory as fixed representations; they are continually combined with incoming perceptual signals that help to provide such concepts with unprecedented detail and individuality. Choosing what we feel to be the right concept to describe a situation, which is itself full of groups of perceptions, sensations and imponderables, can be crucially important if we are to avoid putting ourselves into danger, for example, or when categorising a situation as pleasurable, giving us a sense of agency. Such ad hoc conceptualisations and generalisations of the details and events of an ongoing situation can draw us nearer to others in reading stories and watching films or listening to reports. Thus, it is not just incidental that concepts are mediated and constrained by social situations and the situations we find ourselves in while contemplating artworks or reading novels, for the way in which concepts are related to each other by the situation or task at hand allows us to get more involved in that situation. Concepts used to interact meaningfully with an artwork or performance will depend partly on our knowledge base and partly on the artwork that can provide the 'cognitive glue' – the catalyst that brings these concepts together in unusual combinations.

The question is how to find the right balance between stable or fixed aspects of concepts where, in order for them to shared, they need a certain invariability and identity (Fodor, 1998), and innovative ad hoc applications of them in conjunction with situations that may destabilise them.[5] A pragmatic approach that emphasises conceptual use and identification constrained by ongoing tasks and background knowledge shows how concepts are given an immediate if not absolute or universal coherence (as one would expect in a classical theory of concepts). For

[4] In addition, Barsalou and Wiemer-Hastings write: 'To our knowledge, no neuroscience research has assessed the processing of abstract concepts in situations. It would be interesting to see if situational processing shifted brain activation outside word generation areas.' (Barsalou and Wiemer-Hastings, 2005, p. 132). Artworks can provide such situational processing.

[5] Goldstone and Rogosky develop a theory of *correspondence* between concepts that they believe is 'sufficient to determine matching, and hence shared, concepts across systems' rather than strict identity matching. 'The advantage of accounting for shared concepts in terms of correspondence rather than identity is that one avoids the uncomfortable conclusion that people with demonstrably different knowledge associated with something have the identical concept of that thing. Although the notion of correspondence is less restrictive than identity, it is more constrained than similarity.' (2002, pp. 317–318).