

goes down instead of up, as humans become very uncomfortable relating to the automata. The uncanny valley stands as warning to animators and directors alike that trying to exactly re-create humans and their actions is dangerous ground with serious consequences for failure. Animation is far better suited to exaggerating or crystallizing human (and animal) behavior, so unless you have a real need to reproduce photo-real animation, it is better to stay away from it.

The Facial Action Coding System

In the mid-1970s, Paul Ekman and Wallace V. Friesen, in researching facial expressions and emotions, noted that most emotions are related to facial expressions in a universal way, rather than a cultural one. Perhaps more importantly, at least for animators, is that Ekman and his fellow researchers “decoded” all human expressions into a few dozen muscle contractions they termed action units, or AUs. The complete set of AUs, which can be used to build up any expression on the human face, is called the Facial Action Coding System (FACS), and over the past several years has become a popular way for animation houses to rig characters’ faces.

In essence, the AUs isolate sets of muscular contractions on the human face, which contains an impressive 52 (approximately) muscle groups. As each muscle group slides over the skull during contraction, it creates a distinct look on the face, which we have become extremely adept at “reading” or understanding. From birth we stare at other human faces, and by a mere few years of age can tell when someone is lying, or disinterested, or happy-but-trying-to-hide-it, or a thousand other things that can play across one’s face. Our ability to recognize incredibly subtle differences in facial muscle contractions (and eye direction) is an amazing feat, but one that should scare the facial animator to death: we as animators have to take an inanimate object and reconstruct these subtle musculoskeletal interactions in such a way that an audience will believe they are seeing a real person with emotions and objectives behind the set of pixels rendered onscreen. Fortunately the FACS gives us everything we need to re-create these subtle motions; unfortunately it takes a skilled and experienced hand with them to get just the right effect. The best way to gain this experience is to observe faces doing specific things, which is where this book comes in. Over the next chapters we will have many occasions to re-create specific emotions based on pictorial reference.



The Maya rigs we have built for this book include a complete set of AU blend shapes for each character (except for a few involving head turns, which are easy enough to animate using the neck controls). These will allow us to precisely control facial “muscles” on the characters for lessons involving facial animation. While the faces are somewhat complex to manipulate due to the large number of blend shapes involved, we expect you will find that the level of control achievable with this setup is worth the learning curve. In addition, you will be working on a system similar to what large animation houses

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are currently using for their in-house facial animation systems, allowing you to achieve results similar to the best work being done today (assuming time and talent of course!). Figure 2.8 shows a complete set of AUs set together as a grid. The file `FACSActionUnits.jpg` on the accompanying DVD presents this image in substantially larger format so you can see the AUs more clearly.



Figure 2.8
A complete set
of facial action
units (AUs)

We only touch the surface of this very deep research topic—as it pertains to animation specifically—on these pages. For further information concerning FACS, see www.face-and-emotion.com or search for Facial Action Coding System on the Web.