drug seeking, and drug use, which persists even in the face of severe adverse consequences.

Several models of addiction have been put forward, each attempting to explain and predict addictive behaviour. Benjamin Rush (1745–1813) was among the first to introduce the disease model of addiction, which defined addiction as a result of human weakness representing a defect of moral character. Individuals who endorse the moral model do not believe there is any biological or genetic basis for addiction and thus have little sympathy for people with severe addictions (Harding 1986; Peele 1987). The disease model, which is held by the American Medical Association and many addiction specialists around the world, views addiction as an illness that results from the impairment of neurochemical and/or biobehavioural processes (Jellinek 1960, Room 1983).

Behavioural models, including classical and operant conditioning models, are based on the premise that addiction is a consequence of learning, such that problematic habits and maladaptive behaviour patterns are initiated and maintained by past and present *rewards* (reinforcement), environmental access, family history, peer influences, and individual beliefs and expectations. The disease and behavioural models of addiction agree that a large component of addiction can be explained by neurochemistry and neuroadaptation following repeated exposure to drugs and/or alcohol (Robinson and Berridge 1993). All known drugs of abuse have the common effect of elevating the level of dopamine in the nucleus accumbens. Dopamine is a neurotransmitter that is part of the reward system, and continued use of drugs and alcohol will eventually result in the reward system reducing the amount of endogenous dopamine by causing a decrease in the number of dopamine receptors (Kalivas and Volkow 2005). Craving and withdrawal, two indicators of addiction, are directly related to reduction in dopamine receptors in the brain (Lowman et al. 2000).

Regardless of how addiction is defined or the aetiology of addiction explained, the fact that addictive behaviour often results in large costs to the individual and society is indisputable. For individuals the costs can be financial (medical and legal costs), physical (health and disease), and emotional (including the toll of addiction on family and friends). For society, costs are often attributed to medical and social welfare costs, the cost of drug-related law enforcement activity, and lost productivity due to drug use. For example, in the United States it is estimated that the annual costs of drug abuse and dependence (including costs to society and treatment costs) amount to more than $50 billion dollars. Unfortunately only a small percentage of this amount is spent on treatment, even though with every dollar spent on addiction treatment there is a $4–7 reduction in the cost due to drug-related crimes (National Institute of Drug Abuse 2006).

To understand the treatment of addiction it is important to recognize addiction as a chronic, persistent condition that is complex but treatable (McLellan et al. 2000). Within many treatment settings the ultimate goal of addiction treatment is to enable an individual to achieve abstinence from drugs and/or alcohol. More immediate goals of treatment are to reduce the addictive behaviour, improve functioning, and minimize the physical and social consequences of addiction (harm reduction). Individuals who receive treatment for an addiction may experience relapses even after long periods of abstinence (Moos and Moos 2006). In fact, relapse to drug abuse occurs at rates similar to that for other chronic medical illnesses such as diabetes, hypertension, and asthma. As such, addiction may require repeated treatments tailored to individual needs and relapse risk factors (Witkiewitz and Marlatt 2004).

G. ALAN MARLATT AND KATIE WITKIEWITZ

**Admiration and Awe**

Admiration and awe are often on few lists of *basic emotions*, yet there can be little doubt that people sometimes feel a strong emotional response to extraordinarily talented, powerful, or famous people. An essay on Noam Chomsky (1928–) described the ‘nearly theological reverence’ that his students had for him: ‘It verged on worship’, Robin Lakoff, a member of this group, later wrote. ‘To be in Chomsky’s good graces meant that you were worthy of him, you partook in some small way in the godhead’ (L. MacFarquhar in *The New Yorker*, 31 March 2003).

In their cognitive theory of emotions, Ortony *et al.* (1988) grouped admiration and awe together with esteem and respect and called them ‘appreciation emotions’—triggered by positive appraisals (see Appraisal Theories) of the actions of an agent. Many social animals have emotions related to fear and submission, but none seem to have positive emotional responses to excellence. Why would humans have evolved such feelings? There is almost no empirical research on admiration or awe, so we are forced to confine ourselves to theoretical speculations.

**Admiration**

The word admiration comes from the Latin *admirare*, to wonder at, and the Oxford English Dictionary (OED) defines it as ‘agreeable surprise; wonder mingled with reverence, esteem, approbation’. Perhaps the best way to understand the origins and functions of admiration is to view it as an emotion that facilitates learning (Hennrich and Gil-White 2001). As humans were becoming cultural creatures who did most of their learning by copying others, it became adaptive to find the best role models to copy. Individuals who excel in any culturally valued skill therefore draw attention and followers. The
followers, in turn, are motivated to build a relationship with the prestigious person to maximize their ability to learn further, and to share in his or her prestige. Admiration speeds cultural learning, and celebrity is what happens when a person is admired by many people. Admiration sometimes leads to inspiration, a highly positive state experienced as a transcending of one’s old self and old limitations coupled with a motivation to emulate the admired person or otherwise to express what has been learned or discovered (Thrash and Elliot 2004).

Awe

The word awe comes from Old Norse agi, which referred to fear, dread, and terror, particularly with respect to God (see religion and emotion—psychological perspectives). The OED shows how awe became a more positive emotion over time: ‘From its use in reference to the Divine Being this passes gradually into: Dread mingled with veneration, reverential or respectful fear; the attitude of a mind subdued to profound reverence in the presence of supreme authority, moral greatness or sublimity, or mysterious sacredness’. In its modern usage the word awe has lost most of its connection to fear, and is often used to mean little more than admiration (for people) or appreciation (for natural or human-made beauty). Keltner and Haidt (2003) reviewed the literature in anthropology, sociology, and psychology to propose that awe should be understood as a family of emotional states that result when two appraisals are made: vastness, and the need for accommodation. Awe happens when we encounter something vast (usually physically vast, but sometimes small things reveal vast power, genius, or complexity) that cannot be comprehended using existing mental structures. There are at least five additional appraisals that create the variety of awe experiences and give them their particular flavour: perceptions of threat (as when in the presence of a dominant or powerful person), beauty (as in awe at nature), extraordinary ability (as with admiration), virtue (as with moral elevation), and the supernatural (as in older meanings of awe towards a divine being). Awe stops us dead in our tracks, and sometimes, when intense enough, acts like a reset button on the self. People sometimes emerge from awe experiences with new selves, values, and allegiances. For this reason awe is among the emotions most often implicated in spiritual transformations and religious conversion experiences.

JONATHAN HAIDT AND PATRICK SEDER


adolescence (emotional development)

Adolescence is a time of change in the social and biological systems that underlie and support emotional processes. The transition through adolescence is accompanied by physical, psychological, and social transformations (see childhood (emotional development)) that elicit novel experiences of emotional arousal. Although psychologists no longer view adolescence as a time of ‘storm and stress’, transitions in multiple life domains do tax emotional resources and challenge coping abilities.

Social and pubertal changes at adolescence

Within the social realm, adolescents must renegotiate relationships with family (see family (role of emotion in)), friends, and members of the opposite sex (see social relationships). As children enter the teenage years, they begin to spend less time with their families. The peer context becomes increasingly important, and experiences within this context have strong emotional content such as jealousy, competition, commitment, excitement, loneliness, loyalty, or betrayal (Larson and Asmussen 1991). Adolescents begin to turn more to their peers to discuss their emotions, although parental support remains critical in helping adolescents manage their emotions (see regulation of emotion) and solve problems. The popular media also appear to play a role in adolescent emotionality, with the choices of music, television, and internet fare influencing (and influenced by) adolescents’ emotions.

The onset of puberty in early adolescence also introduces the adolescent to new and intense emotional experiences. Although hormonal changes have rarely been directly linked to adolescent emotionality, hormone-induced physical maturation leads to changes in appearance that, in turn, lead to changes in treatment by others such as parents and opposite-sex peers. Socially mediated effects of hormonal changes and associated changes in physical appearance place the adolescent in new situations and social contexts. Experiences in new, quasi-adult roles (e.g. employee, romantic partner) are potentially both emotionally exhilarating as well as overwhelming, posing new challenges for the adolescent’s capabilities of emotion regulation.

Adolescent brain maturation

These changes lead to a period of heightened emotional intensity coupled with increased need for self-competence in regulatory demands due to decreased adult supervision. Unfortunately, the ‘adolescent brain’ is not fully prepared to handle these challenges. Regions of the prefrontal cortex that play a critical role in emotion regulation mature slowly, continuing to show functional changes into late adolescence and early adulthood (Spear 2000). Furthermore, pubertal maturation has been occurring at much earlier ages in industrialized societies, particularly among girls. Thus, the adolescent may find himself or herself in affectively challenging