

Steven Pace

Introduction

Can a person's tastes in art, music, literature, cinema, sport, humour or other fields be changed through online activity? This article explores that question by comparing recent research findings in the areas of neuroplasticity and flow. Neuroplasticity, also known as brain plasticity, is the idea that the human brain can change its structure and function through thought and activity, even into old age (Doidge). The second concept—flow—comes from the field of psychology, and refers to a deeply satisfying state of focused attention that people sometimes experience while engaging in an enjoyable activity such as browsing the Web (Csikszentmihalyi, *Flow*). Research into the experiences of web users, conducted from these two different perspectives, reveal interesting connections to the acquisition of taste and opportunities for further investigation.

Neuroplasticity

The term *neuroplasticity* comes from the words *neuron* and *plastic*. Neurons are the nerve cells in our brains and nervous systems. Plastic, in this context, means flexibility or malleability. Neuroplasticity has replaced the formerly-held belief that the brain is a physiologically static organ, hard-wired like a machine (Kolb, Gibb and Robinson). For much of the last century, scientists believed that adult brains, unlike those of children, could not produce new neurons or build new pathways or connections between neurons. According to this view, any brain function that was lost through damage was irretrievable. Today, research into neuroplasticity has proven that this is not the case. In the late 1960s and 1970s pioneering scientists such as Paul Bach-y-Rita demonstrated that brains change their structure with different activities they perform (Kerckel). When certain parts fail, other parts can sometimes take over. Subsequent research by many scientists has validated this once-controversial idea, leading to practical benefits such as the restoration of limb function in stroke victims, and improved cognition and perception in people with learning disabilities (Nowak et al.). Merzenich, for example, has demonstrated how a brain's processing areas, called brain maps, change in response to what people do over the course of their lives. Different brain maps exist for different activities and functions, including sensory perception, motor skills and higher mental activities. Brain maps are governed by competition for mental resources and the principle of "use it or lose it." If a person stops exercising particular mental skills, such as speaking Spanish or playing piano, then the brain map space for those skills is handed over to skills that they practise instead. Brain maps are also governed by a principle that is summarised by the expression, "neurons that fire together wire together" (Doidge 63). Neurons in brain maps develop stronger connections to each other when they are activated at the same moment in time. Consequently people are able to form new maps by developing new neural connections.

Acquiring Tastes

Doidge has illustrated the role that neuroplasticity plays in acquiring new tastes by explaining how habitual viewing of online pornography can shape sexual tastes (102). In the mid- to late-1990s, Doidge (a psychiatrist and psychoanalyst) treated several

men who had lost interest in their sexual partners as a consequence of their addiction to online pornography. Doidge explains their change of sexual taste in terms of neuroplasticity, noting that “pornography, delivered by high-speed Internet connections, satisfies every one of the prerequisites for neuroplastic change” (102). The sexual excitement of viewing pornography releases a chemical neurotransmitter named dopamine that activates the brain’s pleasure centres. Since “neurons that fire together wire together”, the repeated viewing of pornography effectively wires the pornographic images into the pleasure centres of the brain with the focused attention required for neuroplastic change. In other words, habitual viewers of pornography develop new brain maps based on the photos and videos they see. And since the brain operates on a “use it or lose it” principle, they long to keep those new maps activated. Consequently, pornography has an addictive power. Like all addicts, the men who Doidge treated developed a tolerance to the photos and videos they observed and sought out progressively higher levels of stimulation for satisfaction. Doidge explains the result:

The content of what they found exciting changed as the Web sites introduced themes and scripts that altered their brains without their awareness. Because plasticity is competitive, the brain maps for new, exciting images increased at the expense of what had previously attracted them—the reason, I believe, they began to find their girlfriends less of a turn-on. (109)

If the habitual viewing of online pornography can change sexual tastes, what other tastes can be changed through online activity? Art? Music? Literature? Cinema? Sport? Humour? One avenue for investigating this question is to consider existing research into the flow experiences of web users. The term *flow* refers to a deeply satisfying state of focused attention that was first identified by psychologist Mihaly Csikszentmihalyi (*Beyond Boredom*) in his studies of optimal experiences. According to Csikszentmihalyi, people in flow “are so involved in an activity that nothing else seems to matter; the experience itself is so enjoyable that people will do it even at great cost, for the sheer sake of doing it” (*Flow* 4). Flow experiences are characterised by some common elements, which include a balance between the challenges of an activity and the skills required to meet those challenges; clear goals and feedback; concentration on the task at hand; a sense of control; a merging of action and awareness; a loss of self-consciousness; a distorted sense of time; and the autotelic experience. The term *autotelic* refers to an activity that is done, not with the expectation of some future benefit, but simply because the doing itself is the reward. Whenever people reflect on their flow experiences, they mention some, and often all, of these characteristics. Support for Csikszentmihalyi’s characterisation of flow can be found in studies of many diverse activities, such as playing computer games (Chen) and participating in sport (Jackson), to mention just two examples. The activities that people engage in to experience flow vary enormously, but they describe how it feels in almost identical terms.

Pace has developed a grounded theory of the flow experiences of web users engaged in content-seeking activities including directed searching and exploratory browsing. The term *grounded* in this instance refers to the fact that the theory was developed using the Grounded Theory research method, and its explanations are grounded in the study’s data rather than deduced from research literature (Charmaz). A review of that theory reveals many similarities between the flow experiences of web users engaged in content-seeking activities and the experiences of habitual viewers of online pornography described by Doidge. The following sections will consider several of those similarities.

Focused Attention

Focused attention is essential for long-term neuroplastic change. Goleman notes that “when practice occurs while we are focusing elsewhere, the brain does not rewire the relevant circuitry for that particular routine” (164). In a series of brain mapping experiments with monkeys, Merzenich discovered that “lasting changes occurred *only* when his monkeys paid close attention” (Doidge 68). When the animals performed tasks without paying close attention, their brain maps changed, but the changes did not last. Focused attention also plays a central role in the flow experiences of web users. The higher-than-average challenges associated with flow activities require a complete focusing of attention on the task at hand, or as Csikszentmihalyi puts it, “a centering of attention on a limited stimulus field” (*Beyond Boredom* 40). An important by-product of this fact is that flow leaves no room in one’s consciousness for irrelevant thoughts, worries or distractions (Csikszentmihalyi, *Flow* 58). People who experience flow frequently report that, while it lasts, they are able to forget about the unpleasant aspects of life. Consider the following comment from a 42-year-old male’s recollection of experiencing flow while using the Web: “It’s a total concentration experience. You’re so interested in doing what it is you’re doing that nothing’s interrupting you.” In everyday life, one’s concentration is rarely so intense that all preoccupations disappear from consciousness, but that is precisely what happens in a flow experience. All of the troubling thoughts that normally occupy the mind are temporarily suspended while the pressing demands of the flow activity consume one’s attention. Let’s now consider a second similarity between the flow experiences of web users and the taste-changing experiences of habitual viewers of online pornography.

Enjoyment

The pleasure experienced by the pornography addicts treated by Doidge played an important role in the alteration of their brain maps and sexual tastes. Since “neurons that fire together wire together”, the repeated viewing of pornographic photos and videos wired those images into the pleasure centres of their brains with the focused attention required for neuroplastic change. Web users in flow also experience enjoyment, but possibly a different kind of enjoyment to the pleasure described by Doidge. Seligman and Csikszentmihalyi make the following distinction between pleasure and enjoyment:

Pleasure is the good feeling that comes from satisfying homeostatic needs such as hunger, sex, and bodily comfort. Enjoyment, on the other hand, refers to the good feelings people experience when they break through the limits of homeostasis—when they do something that stretches them beyond what they were—in an athletic event, an artistic performance, a good deed, a stimulating conversation. (12)

The enjoyment experienced by people in flow is sometimes described as “the autotelic experience.” According to Csikszentmihalyi, an autotelic experience is “a self-contained activity, one that is done not with the expectation of some future benefit, but simply because the doing itself is the reward” (*Flow* 67). Because autotelic experiences are so satisfying, they create a strong desire to repeat the activity that produced the experience. Consider the following comment from a web user about the reasons he enjoys online content-seeking activities that have led to flow:

It’s like going to somewhere new. You’re always learning something. You’re always finding something. And you don’t know what it is

you're going to find. There's so much out there that you'll go there one day and then you'll come back, and you'll actually end up on a different path and finding something different. So it's investigation of the unknown really.

This comment, like many web users' recollections of their flow experiences, points to a relationship between enjoyment and discovery. This connection is also evident in flow experiences that occur during other kinds of activities. For example, Csikszentmihalyi suggests that "the reason we enjoy a particular activity is not because such pleasure has been previously *programmed* in our nervous system, but because of something *discovered* as a result of interaction" (*The Evolving Self* 189). He illustrates this point with the example of a person who is at first indifferent to or bored by a particular activity, such as listening to classical music. When opportunities for action in the context of the activity become clearer, or when the individual's skills improve, the activity may start to be interesting and finally gratifying. For example, if a person begins to understand the design underlying a symphony he or she might begin to enjoy the act of listening. This example hints at how discovery, enjoyment and other rewards of flow may engender change in a person's taste. Let's now consider a third similarity between the two areas of research.

Compulsive Behaviour

One consequence of flow experiences being so enjoyable is that they create a strong desire to repeat whatever helped to make them happen. If a person experiences flow while browsing online for new music, for example, he or she will probably want to repeat that activity to enjoy the experience again. Consider the following comment from a 28-year-old female web user who recalled experiencing flow intermittently over a period of three days: "I did go to bed—really late. And then as soon as I got up in the morning I was zoom—straight back on there [...] I guess it's a bit like a gambling addiction." This study informant's use of the term *addiction* highlights another similarity between the flow experiences of web users and habitual viewing of online pornography. Flow experiences can, in a very small percentage of cases, encourage compulsive behaviour and possibly addiction. A study by Khang, Kim and Kim found that "experiences of the flow state significantly influenced media addiction" across three media forms: the Internet, mobile phones and video games (2423). Examples of problems associated with excessive Internet use include sleep deprivation, poor eating and exercise habits, conflict with family members, and neglect of academic, interpersonal, financial and, occupational responsibilities (Douglas et al). Some heavy Internet users report feelings of moodiness and anxiety while they are offline, along with an intense desire to log in. Doidge states that "the addictiveness of Internet pornography is not a metaphor" (106), but many researchers are reluctant to apply the term *addiction* to heavy Internet use. Internet addiction first came to the attention of the research community in the mid-1990s when Young conceptualised it as an impulse-control disorder and proposed a set of diagnostic criteria based on the diagnostic criteria for pathological gambling in the *Diagnostic and Statistical Manual of Mental Disorders*. However, after more than fifteen years of research on this subject, there is still no agreement on a definition or diagnostic criteria for Internet addiction. Some researchers argue that Internet addiction is not a true addiction and may be no more than a symptom of other existing disorders such as anxiety or depression (Weinstein and Lejoyeux). Regardless of this controversy, the potential for compulsive behaviour is another clear similarity between the flow experiences of web users and the neuroplastic change caused by habitual viewing of online pornography. One more similarity will be considered.

Sidetracks

In Pace's study of the flow experiences of web users, informants reported engaging in two general types of content-seeking behaviour: (1) a directed searching mode in which one is motivated to find a particular piece of content such as the answer to a question or a specific music video; and (2) an exploratory browsing mode that is characterised by diffuse motives such as passing time or seeking stimulation. Directed searching and exploratory browsing are not dichotomous forms of navigation behaviour. On the contrary, they are closely interrelated. Web users move back and forth between the two modes, often many times within the same session. Just as web users can change from one navigation mode to another, they can also get sidetracked from one topic to another. For instance, it is reportedly quite common for a web user engaged in a content-seeking activity to decide to pursue a different goal because his or her curiosity is aroused by interesting content or links that are not directly relevant to the task at hand. Consider the following comment from a 21-year-old female web user whose desire to find contact details for a local Tai Chi group disappeared when a link to the Sportsgirl web site attracted her attention:

I think I typed in "sports" [...] I was actually looking for a place to do Tai Chi and that sort of thing. So I was looking for a sport. And it ended up coming up with the Sportsgirl web site. And I ended up looking at clothes all afternoon. So that was kind of cool.

Sidetracks are a common feature of the flow experiences of web users. They are also a prominent feature of the description that Doidge provided of the pornography addicts' neuroplastic change (109). The content of what the men found exciting changed as the web sites they viewed introduced "themes and scripts" or sidetracks that altered their brain maps. "Without being fully aware of what they were looking for, they scanned hundreds of images and scenarios until they hit upon an image or sexual script that touched some buried theme that really excited them", Doidge notes (110).

Conclusion

Can a person's tastes in art, music, literature, cinema, sport, humour or some other field be changed through online activity, just as sexual tastes can? This article alone cannot conclusively answer that question, but significant similarities between the flow experiences of web users and the neuroplastic change experienced by habitual viewers of online pornography suggest that flow theory could be a fruitful line of investigation. Can the flow experiences of web users lead to changes in taste, just as the neuroplastic change caused by habitual viewing of online pornography can lead to changes in sexual taste? What is the relationship between flow and neuroplastic change? Is the Internet the most appropriate environment for exploring these questions about taste, or do offline flow activities provide insights that have been neglected? These are some of the unanswered questions arising from this discussion that require further investigation. Advances in the field of neuroplasticity have been described as some of "the most extraordinary discoveries of the twentieth century" (Doidge xv). These advances provide an opportunity to revisit related theories and to enhance our understanding of phenomena such as flow and taste.

References

Charmaz, Kathy. *Constructing Grounded Theory: A Practical Guide Through Qualitative Analysis*. Thousand Oaks, California: Sage Publications, 2006.

Chen, Jenova. "Flow in Games (and Everything Else)." *Communications of the ACM* 50.4 (2007): 31–34.

Csikszentmihalyi, Mihaly. *Beyond Boredom and Anxiety: The Experience of Play in Work and Games*. San Francisco: Jossey-Bass Publishers, 1975.

Csikszentmihalyi, Mihaly. *The Evolving Self: A Psychology for the Third Millennium*. New York: HarperPerennial, 1993.

Csikszentmihalyi, Mihaly. *Flow: The Psychology of Optimal Experience*. New York: HarperPerennial, 1990.

Doidge, Norman. *The Brain That Changes Itself: Stories of Personal Triumph from the Frontiers of Brain Science*. Melbourne: Scribe Publications, 2010.

Douglas, Alecia C., Juline E. Mills, Mamadou Niang, Svetlana Stepchenkova, Sookeun Byun, Celestino Ruffini, Seul Ki Lee, Jihad Loutfi, Jung-Kook Lee, Mikhail Atallah, and Marina Blanton. "Internet Addiction: Meta-Synthesis of Qualitative Research for the Decade 1996-2006." *Computers in Human Behavior* 24 (2008): 3027–3044.

Goleman, Daniel. *Focus: The Hidden Driver of Excellence*. New York: HarperCollins, 2013.

Jackson, Susan. "Toward a Conceptual Understanding of the Flow Experience in Elite Athletes." *Research Quarterly for Exercise and Sport* 67.1 (1996): 76–90.

Khang, Hyoungkoo, Jung Kyu Kim, and Yeojin Kim. "Self-Traits and Motivations as Antecedents of Digital Media Flow and Addiction: The Internet, Mobile Phones, and Video Games." *Computers in Human Behavior* 29 (2013): 2416–2424.

Kercel, Stephen W. "Editorial: The Wide-Ranging Impact of the Work of Paul Bach-y-Rita." *Journal of Integrative Neuroscience* 4.4 (2005): 403–406.

Kolb, Bryan, Robbin Gibb, and Terry E. Robinson. "Brain Plasticity and Behavior." *Current Directions in Psychological Science* 12.1 (2003): 1–5.

Merzenich, Michael. *Soft-Wired: How the New Science of Brain Plasticity Can Change Your Life*. San Francisco: Parnassus Publishing, 2013.

Nowak, Dennis A., Kathrin Bösl, Jitka Podubeckà, and James R. Carey. "Noninvasive Brain Stimulation and Motor Recovery After Stroke." *Restorative Neurology and Neuroscience* 28 (2010): 531–544.

Pace, Steven. "A Grounded Theory of the Flow Experiences of Web Users." *International Journal of Human-Computer Studies* 60.3 (2004): 327–363.

Seligman, Martin E. P., and Mihaly Csikszentmihalyi. "Positive Psychology: An Introduction." *American Psychologist* 55.1 (2000): 5–14.

Weinstein, Aviv, and Michel Lejoyeux. "Internet Addiction or Excessive Internet Use." *The American Journal of Drug and Alcohol Abuse* 36 (2010): 277–283.

Young, Kimberly S. *Caught in the Net: How to Recognize the Signs of Internet Addiction—And a Winning Strategy for Recovery*. New York: John Wiley & Sons, 1998.