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Flow in Web Design

Imagine that you're doing your favorite activity—let's say, sailing. You're skimming along the waves, when suddenly the breeze freshens. You hike out to compensate, leaning back into the wind to keep the boat upright. A wave splashes your face. You shake your head and trim the main sheet for more speed. You are entirely focused on the movements of your body, the water rushing past, and keeping the boat right side up.

You're really flying now, just on the edge of control. You're so fully immersed in this activity, there's no room left in your awareness for distractions. Otherwise, you might catch a wave and capsize. You're having so much fun that you want this moment to last forever. Mihaly Csikszentmihalyi calls these exceptional moments *flow experiences.*[1] Flow can occur in practically any activity, including browsing the web.

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1. Mihaly Csikszentmihalyi, *Finding Flow: The Psychology of Engagement with Everyday Life* (New York: Basic Books, 1997), 29.

This "optimal experience"[2] is "intrinsically enjoyable."[3] Time seems to stand still, and we lose our sense of self. We feel playful and are willing to try (and presumably buy) new things. Although flow can occur anywhere, certain activities like rock climbing, performing surgery, chess, and sailing lend themselves to this optimal state of focused attention. Responsive, well-designed web sites can also induce flow in their users.

On Flow and Mihaly Csikszentmihalyi

Mihaly Csikszentmihalyi, a professor and former chair of the Department of Psychology at the University of Chicago, pioneered the study of flow. He wrote that flow is the "holistic sensation that people feel when they act with total involvement."[4]

Csikszentmihalyi wanted to understand the experience of enjoyment. He asked, what motivates people to perform better? Extrinsic rewards like money and prestige are limited resources that ultimately are about comparisons between people. Status is a zero-sum game; so something else must motivate us humans. Intrinsic rewards, doing activities for the sheer joy of it, are the key to understanding flow.[5]

In order to understand intrinsic motivation, Csikszentmihalyi studied self-rewarding, or *autotelic*, activities. Csikszentmihalyi knew that if he could understand what made us tick, he could revolutionize how we work and play. He observed painters, rock climbers, dancers, musicians, and surgeons, taking surveys and later paging them at random intervals. His goal was to answer one of life's greatest questions: What makes life worth living?

The answer is that life is worth living when we can experience the joy of doing what we want to do, have autotelic experiences, or flow. Without flow "there would be little purpose in living."[6]

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2. Mihaly Csikszentmihalyi, *Optimal Experience* (New York: Cambridge University Press, 1988).

3. Gayle Privette and Charles M. Bundrick, "Measurement of Experience: Construct and Content Validity of the Experience Questionnaire," *Perceptual and Motor Skills* 65 (1987): 315–332.

4. Mihaly Csikszentmihalyi, *Beyond Boredom and Anxiety: Experiencing Flow in Work and Play* (1975; reprint, with a Preface by Mihaly Csikszentmihalyi, San Francisco: Jossey-Bass, 2000), 36.

5. Ibid., 4.

6. Mihaly Csikszentmihalyi, "Towards a Psychology of Optimal Experience," in *Annual Review of Personality and Social Psychology*, ed. L. Wheeler (Beverly Hills, CA: Sage, 1982), 3:13–36.

Flow is a positive, highly enjoyable state of consciousness that occurs when our perceived skills match the perceived challenges we are undertaking. When our goals are clear, our skills are up to the challenge, and feedback is immediate, we become involved in the activity.

We can become so involved that we lose our sense of self and time distorts. The experience becomes autotelic or intrinsically rewarding; we do it for its own sake. People who have experienced flow consistently report the same nine dimensions:[7]

- Clear goals
- Unambiguous and immediate feedback
- Skills that just match challenges
- Merging of action and awareness
- Centering of attention on a limited stimulus field
- A sense of potential control
- A loss of self-consciousness
- An altered sense of time
- An autotelic experience

Flow depends on how we *perceive* our skills and the challenges at hand. We may feel "anxious one moment, bored the next, and in a state of flow immediately afterward."[8]

As you can imagine, as our skill level improves, we must undertake more difficult challenges to achieve a flow state. Flow encourages us to improve ourselves and our web sites. People tend to repeat activities they enjoy, so flow is like a Darwinian force of nature, subtly changing society.[9] That's why people tend to return to web sites they enjoy.[10] Csikszentmihalyi wrote this about flow and cultural evolution:

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7. Csikszentmihalyi, *Beyond Boredom and Anxiety*.

8. Ibid., 50.

9. Paolo Inghilleri, *From Subjective Experience to Cultural Change* (New York: Cambridge University Press, 1999).

10. Donna L. Hoffman and Thomas. P. Novak, "Marketing in Hypermedia Computer-Mediated Environments: Conceptual Foundations," *Journal of Marketing* 60 (July 1996): 50–68.

> *"Flow is a sense that humans have developed in order to recognize patterns of action that are worth preserving and transmitting over time."*[11]

The best memes are passed down through generations.

Attention! Supply Is Limited

Our supply of attention (otherwise known as "*bandwidth*") is limited. Csikszentmihalyi estimated that we can process about 126 bits per second, which I'll update in light of recent findings. This is based on our ability to recognize seven chunks of information per unit of time, plus or minus two, and Orme's estimate of our "attentional unit" of $1/18$th of a second.[12] This gives humans 18×7 or 126 bits per second of processing power.

As you learned in Chapter 1, "Response Time: Eight Seconds, Plus or Minus Two," our span of immediate memory is more on the order of five,[13] or as low as three,[14] which means that our bandwidth is on the order of 90 to 126 bits per second. That gives humans a processing power of around 5,400 to 7,560 bits of information per minute.[15]

What can we accomplish with this limited attention capacity? Csikszentmihalyi estimated that listening to a conversation takes about 40 bits per second, or about one third to one half of our bandwidth. That's why it is so difficult to listen to multiple conversations, or to play engrossing games or sports while listening to a conversation. It's also one reason why designers are told to minimize distractions on the web.

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11. Csikszentmihalyi, *Optimal Experience*, 34.

12. John E. Orme, *Time, Experience, and Behavior* (London: Iliffe Books, 1969).

13. George Mandler, "Organization in Memory," in *The Psychology of Learning and Motivation*, ed. K. W. Spence and J. T. Spence (New York: Academic Press, 1967), 1:327–372.

14. Denny C. LeCompte, "Seven, Plus or Minus Two, Is Too Much to Bear: Three (or Fewer) Is the Real Magic Number," *Proceedings of the Human Factors and Ergonomics Society 43rd Annual Meeting* (1999): 289–292.

15. Csikszentmihalyi, *Optimal Experience,* 17–18.

What Causes Flow Online?

Speed and control play a big part in establishing flow in online interactions. In 1996, Hoffman and Novak extended Csikszentmihalyi's work to consumer navigation on the web. They proposed that users return to web sites that facilitate flow and suggest that online marketers offer these "flow opportunities."[16] It turns out that marketers are listening. Nearly 45 percent of the users that they surveyed experienced flow online. A subsequent study found that 47 percent of users had experienced flow on a specific web site.[17] Hoffman and Novak defined flow online as:

> *the state occurring during network navigation which is: (1) characterized by a seamless sequence of responses facilitated by machine interactivity, (2) intrinsically enjoyable, (3) accompanied by a loss of self-consciousness, and (4) self-reinforcing.*"[18]

The prerequisites for flow online are similar to those offline. On the web, flow "is determined by (1) high levels of skill and control; (2) high levels of challenge and arousal; and (3) focused attention; and (4) is enhanced by interactivity and telepresence."[19] Telepresence is a new dimension unique to online environments where users feel they are part of the action.[20]

Novak, Hoffman, and Yung tested and refined their conceptual model of flow to create a structural model that describes the factors that make for a compelling online experience. They found that flow is a multidimensional construct with nine variables, including interactive speed.

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16. Hoffman and Novak, "Marketing in Hypermedia Computer-Mediated Environments," 66.
17. Thomas P. Novak, Donna L. Hoffman, and Yiu-Fai Yung, "Measuring the Customer Experience in Online Environments: A Structural Modeling Approach," *Marketing Science* 19, no. 1 (2000): 22–42.
18. Hoffman and Novak, "Marketing in Hypermedia Computer-Mediated Environments," 57.
19. Novak, Hoffman, and Yung, "Measuring the Customer Experience," 24.
20. Jonathan Steuer, "Defining Virtual Reality: Dimensions Determining Telepresence," *Journal of Communication* 42, no. 4 (1992): 73–93.

Speed and Flow

Hoffman, Novak, and Yung found that the speed of interaction had a "direct positive influence on flow" on feelings of challenge and arousal (which directly influence flow), and on importance. Skill, control, and time distortion also had a direct influence on flow.[21]

The researchers then applied their model to consumer behavior on the web. They tested web applications (chat, newsgroups, and so on) and web shopping, asking subjects to specify which features were most important when shopping on the web.

They found that speed had the greatest effect on the amount of time spent online and on frequency of visits for web applications. For repeat visits, the most important factors were skill/control, length of time on the web, importance, and speed.

So to make your site compelling enough to return to, make sure that it offers a perceived level of control by matching challenges to user skills, important content, and fast response times.

Experiential versus Goal-Directed Flow

Confirming their previous work, the authors found two types of flow: experiential (associated with recreational surfing) and goal-directed (associated with research, shopping, etc.). The authors suggest that these two types of activities require different web site designs to facilitate flow.

Less-experienced users tend to see the web in a hedonic, playful way, while more experienced users tend to view the web in a utilitarian way, or a means to accomplish tasks. The authors found that telepresence/time distortion, exploratory behavior, focused attention, and challenge/arousal correlated with recreational web use, while skill/control, importance, and experience correlated with task-oriented activities, such as research, work, and shopping.

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21. Novak, Hoffman, and Yung, "Measuring the Customer Experience," 34.

There is some debate over which type of flow is more common on the web. A subsequent study found that flow is more likely to occur during task-oriented activities than during recreational activities.[22] Nantel, Sénécal, and Gharbi found that flow contributes to more hedonic online shopping experiences but not to utilitarian shopping.[23] They suggest that e-tailers offer both types of activities for a compelling shopping experience. Offer "flow opportunities" plus utilitarian features like one-click buying, intuitive searches, and customized pages.

In either case, to facilitate flow, as designers we must offer plenty of speed and "enough challenge to arouse the consumer, but not so much that she becomes frustrated navigating through the site and logs off."[24]

An Interview with Mihaly Csikszentmihalyi

To find out more about flow, speed, and web design, I talked to Dr. Mihaly Csikszentmihalyi, who popularized the notion of flow.

Andy King: You talk about immediate feedback being a prerequisite for the flow state. How does speed of interaction influence flow?

Mihaly Csikszentmihalyi: If you mean the speed at which the program loads, the screens change, the commands are carried out—then indeed speed should correlate with flow. If you are playing a fantasy game, for instance, and it takes time to move from one level to the next, then the interruption allows you to get distracted, to lose the concentration on the alternate reality. You have time to think: "Why am I wasting time on this? Shouldn't I be taking the dog for a walk, or studying?"—and the game is over, psychologically speaking.

King: Responsive feedback of an activity and feelings of control go hand in hand. Can you elaborate on that?

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22. Donna L. Hoffman, Thomas P. Novak, and Adam Duhachek, "The Influence of Goal-Directed and Experiential Activities on Online Flow Experiences," *Journal of Consumer Psychology* 13 (2002).
23. Jacques Nantel, Sylvain Sénécal, and Jamel Gharbi, "The Influence of the Flow on Hedonic and Utilitarian Shopping Values," *Advances in Consumer Research* 29 (2002).
24. Novak, Hoffman, and Yung, "Measuring the Customer Experience," 39.

Csikszentmihalyi: Actually it's not so much the "feeling" of control, as the fact that you can act without thinking, without interruption, and making your own choices (for example, BEING in control). If a computer program has a mind of its own, is not responsive to your commands, or is so slow as to appear to be a moron, then you are again brought back to "reality" and lose flow.

King: Has your definition of flow changed over the years?

Csikszentmihalyi: The only change has been that we found it takes above average challenges AND skills to get into flow. Also, there seem to be individual differences so that some people prefer to be in control (that is, high skill, moderate challenge) to being in flow.

King: You said that web sites should be like a gourmet meal to enable flow.[25] Can you elaborate?

Csikszentmihalyi: What I meant is that like in a good meal, you should have varieties of tastes and textures, metaphorically speaking.

King: What do you think the key attributes would be of web sites that enable flow?

Csikszentmihalyi: The key attribute is that it should be very user-friendly and transparent at first, but one should immediately be able to find complexity in it, so as to find quickly the right level of opportunities for "action" that match one's skills. These "challenges" include the visual aspects as well as the content.[26]

Shopping Site Design

Hoffman, Novak, and Yung performed an additional survey on web shopping using a list of features that shoppers found important on the Internet. They found customer support to be very important for a "smooth" shopping experience. Speed plays a role in a compelling shopping experience, contributing significantly to ease of contact and variety.[27]

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25. John Geirland, "Go With The Flow," *Wired* 4, no. 9 (1996): 160–161. Available from the Internet at
    `http://www.wired.com/wired/archive/4.09/czik.html`.

26. Mihaly Csikszentmihalyi, email to author, 30 August 2002.

27. Novak, Hoffman, and Yung, "Measuring the Customer Experience," 38.

Variety and quality of information are important to consumers. Shoppers don't want cutting-edge technology, however. It just gets in the way of consumer goals.

Flow Can Be Measured

The researchers found that "the degree to which the online experience is compelling can be defined, measured, and related well to important marketing variables."[28] Marketers can use their flow model to discover the secrets of online success.

The Benefits of Flow Online

People who experience flow tend to be more playful,[29] exploratory,[30] and willing to try new things. They tend to stay longer, and return to web sites that facilitate flow. Hoffman and Novak found the following benefits of flow online:[31]

- Increased learning
- Exploratory and positive behavior
- Positive subjective experience
- Perceived sense of control over their interaction

The bottom line is that people in flow are having fun, and truly enjoying themselves. Of course, you can have too much of a good thing. The authors warn that playful people in flow can take longer to complete tasks, although staying longer on your web site isn't necessarily a bad thing. People in flow can also become overinvolved in an activity.

Marketers know that engaged users tend to buy more products, so making your site flow can make a big difference to the bottom line. It is relatively easy to get users to come to your site, but getting them to stay is another matter.

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28. Ibid., 22.
29. Jane Webster, Linda Trevino, and Lisa Ryan, "The Dimensionality and Correlates of Flow in Human Computer Interactions," *Computers in Human Behavior* 9, no. 4 (1993): 411–426. Flow means fun and playfulness, which increases use.
30. Jawaid A. Ghani and Satish P. Deshpande, "Task Characteristics and the Experience of Optimal Flow in Human-Computer Interaction," *The Journal of Psychology* 128, no. 4 (1994): 381–391.
31. Hoffman and Novak, "Marketing in Hypermedia Computer-Mediated Environments."

Enabling Flow with Web Design

As you have seen, flow occurs under a limited set of circumstances. Users can experience flow only if their trips through cyberspace feel seamless, with fast response, immediate feedback, and few distractions. Users who experience flow feel their skills match available challenges. To enable flow, make sure your site has the following traits:

- **Speed**—Interactive speed is a significant factor in all models of user satisfaction. Make your pages load quickly and minimize the variability of delay. Be especially careful to avoid sluggish response after your pages have loaded.

- **Feedback**—Provide fast, unambiguous feedback for user input and the following elements:
  - Links (include hover, visited, and active styles)
  - Navigation widgets (menus, etc.)
  - Display performance variables (server load, cache state, page/file sizes, download progress bars)

- **Clear navigation**—Include signposts—such as site maps, breadcrumb trails, and "you are here" landmarks—to help visitors find their way so they can easily form a mental model of your site.

- **Match challenges to skills**—Offer an adaptable/adjustable interface that gives users control over their environment's complexity that is appropriate to their skill level. Stage their experience. Make it easy at first, but offer more complex challenges as users gain experience.

- **Simplicity**—Uncluttered layout and minimal features reduce the attention load.

- **Importance**—Make your offerings appear important and credible with professional design, impressive clients, and outside recognition.

- **Design for fun and utility**—Offer a rich yet responsive experience, plus tools to help users accomplish their goals quickly and easily.

- **Avoid cutting-edge technology**—Cutting-edge technology gets in the way of user goals. Research shows that users don't want it; they just want to get their information.

- **Minimize animation**—It distracts users, who often have limited attention.

Summary

No matter how you slice the performance pie, it is clear that to ensure that you have satisfied, repeat customers online, you have to design for speed, feedback, and flow. Offering a consistently fast-loading web site with unambiguous feedback can contribute to a compelling online experience.

Give your users a sense of perceived control by offering them challenges matched to their skills. Use a simple layout with minimal distractions, offer interesting well-chunked and delineated content, and make navigation and performance transparent. Happy users are loyal users who will keep coming back to purchase your products and use your services.

Online Resources

- `http://elab.vanderbilt.edu/`—Vanderbilt's eLab research center is devoted to studying the Internet, including flow.
- `http://www.hcibib.org/`—HCI Bibliography features a searchable database of human-computer interaction resources.
- `http://www.humanfactors.com/`—Human Factors International has an excellent free monthly newsletter on user interface design issues.