

# A whole new mind in human-computer interaction

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## Abstract

In the provocative bestselling book *A whole new mind*, author Daniel Pink (2006) uses the two hemispheres of the human brain as a metaphor for a shift that he believes is occurring in Western society. Pink argues that society is moving from an Information Age, characterised predominantly by logical, linear, L-Directed (left-brain) Thinking, to a Conceptual Age that will prize inventive, empathic, R-Directed (right-brain) Thinking. According to Pink, professional success and personal fulfilment in this new Conceptual Age will increasingly depend on six essential aptitudes: design, story, symphony, empathy, play and meaning. This paper lends qualified support to the spirit of Pink's argument by considering how the cross-disciplinary field of human-computer interaction is currently being reshaped by these six aptitudes.

*Key words:* human-computer interaction, interaction design, experience design, design, story, symphony, empathy, play, meaning, left-brain, right-brain

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## Introduction

In the 1960s neuroscientist Roger Sperry and his colleagues at the California Institute of Technology conducted the now-famous “split-brain” experiments, which demonstrated that the left and right hemispheres of the human brain specialise in different tasks (Sperry, 1968). Sperry's Nobel Prize-winning research and other studies that have been conducted since then revealed that the left side of the brain processes information in a sequential manner, while the right side interprets things simultaneously and holistically (Corballis, 2003; Gazzaniga, & LeDoux, 1978; Holtzman, & Gazzaniga, 1982; Levy, & Trevarthen, 1976; Luck, Hillyard, Mangun, & Gazzaniga, 1989; Zaidel, & Peters, 1981). The left hemisphere takes care of language functions such as grammar and vocabulary, while the right hemisphere contributes emotional context to language. The left side of the brain specialises in logical, analytic tasks, while the right side handles the processing of audio-visual stimuli, spatial manipulation, facial perception, and artistic ability.

In the provocative bestselling book *A whole new mind*, author Daniel Pink (2006) uses the two hemispheres of the human brain as a metaphor for a shift that he believes is occurring in Western society. Pink argues that society is moving from

an Information Age, characterised predominantly by logical, linear, L-Directed Thinking, to a Conceptual Age that will prize inventive, empathic, R-Directed Thinking. Pink (2006, p. 26) uses the term *L-Directed Thinking* to mean “a form of thinking and an attitude to life that is characteristic of the left hemisphere of the brain—sequential, literal, functional, textual, and analytic”. Similarly, he uses the term *R-Directed Thinking* to mean “a form of thinking and an attitude to life that is characteristic of the right hemisphere of the brain—simultaneous, metaphorical, aesthetic, contextual, and synthetic”. Pink generally avoids using the more convenient terms *left-brain thinking* and *right-brain thinking*, finding these terms limiting because “very few things human beings do are governed exclusively by one hemisphere or the other” (Pink, 2006, p. 26). His use of the terms L-Directed and R-Directed Thinking reminds readers that he is instead using lateralized brain functions as a metaphor for two different styles of thinking or attitudes to life that he perceives to be operating in modern Western society.

In this current time period, which Pink (2006, p. 27) and others refer to as the Information Age, “our broader culture tends to prize L-Directed Thinking more highly than its counterpart, taking this approach more seriously and viewing the alternative as useful but secondary”. But changes are afoot. Pink (2006) posits that three primary socio-economic forces are moving society into a new Conceptual Age with an increased emphasis on R-Directed Thinking. These forces are abundance, Asia and automation. As material abundance has raised the standard of living in the Western world, it has simultaneously created demand for R-Directed sensibilities. It is no longer enough for businesses to create products and services that are reasonably priced and functional; they must also be beautiful, meaningful and unique (Pink, 2006, p. 33; Postrel, 2003). At the same time, as millions of L-Directed white collar jobs are outsourced from advanced Western nations to countries where they can be performed at significantly lower costs, many knowledge workers are developing new R-Directed abilities that cannot be so easily outsourced (McCarthy, 2002; Moore, & McCarthy, 2007; Pink, 2006, p. 39). Jobs are also being impacted by automation. As computers replace or reshape many L-Directed jobs that depend heavily on rule-based logic, calculation and sequential thinking, knowledge workers are acquiring R-Directed skills that computers can’t perform better, faster or cheaper (Pink, 2006, p. 47). Pink does not argue that R-Directed Thinking is superior to L-Directed Thinking or that it will become dominant in the future. In his view, L-Directed Thinking will continue to be indispensable, but no longer sufficient. This is where the title of his book comes from: “In the Conceptual Age, what we need instead is a *whole* new mind” (Pink, 2006, p. 51).

As R-Directed Thinking is raised to a level of social and economic parity with L-Directed Thinking, Pink (2006, pp. 65-7) suggests that professional success and personal fulfilment will increasingly depend on six essential “senses” or aptitudes: design, story, symphony, empathy, play, and meaning. This paper lends qualified support to the spirit of Pink’s argument by considering how the field of human-computer interaction (HCI) is currently being reshaped by these six aptitudes. Why only qualified support? Since its release in 2005, Pink’s book has received praise from scholars around the globe in fields as diverse as the arts, business, design, education and medicine (Brown, 2008; Gipson, 2009; Groves, 2009; McDaniel, 2008; Timmerman, 2010). But it has also received criticism on grounds such as “ignorance of history, unnecessary polarisation and lack of devil’s advocacy” (Berkun, 2007). Rather than dissect or debate the details of Pink’s argument, this article will focus on the six senses themselves, and the growing recognition of their importance within the field of HCI.

Human-computer interaction (HCI), also known as computer-human interaction (CHI), is the study of interaction between people (users) and computers. It is a field of research and practice that emerged as a speciality area of computer science in the early 1980s. For some readers, it may seem anomalous to be discussing HCI in a special issue of a journal dedicated to creative arts education, but HCI courses are taught in many digital media programs at universities throughout Australia and around the world. Although HCI curricula was once the domain of information technology departments, today it is just as applicable to academics and students in creative arts departments working on activities such as the design of web sites, computer games and applications for mobile devices.

## Design

Not just function but also DESIGN. It is no longer sufficient to create a product, a service, an experience, or a lifestyle that's merely functional. Today it's economically crucial and personally rewarding to create something that is also beautiful, whimsical, or emotionally engaging (Pink, 2006, p. 65).

The original focus of HCI was on usability—the ease with which a person can use a computer system to achieve a particular goal (Nielsen, 1993). Today usability continues to be a prime concern, but the focus of the discipline has broadened to encompass other aspects of the user experience such as emotion and aesthetics (Wright & McCarthy, 2008). Don Norman (2004, p.8), a pioneer in the field of HCI, describes his personal journey toward R-Directed Thinking this way:

In the 1980s, in writing *The Design of Everyday Things*, I didn't take emotions into account. I addressed utility and usability, function and form, all in a logical, dispassionate way—even though I am infuriated by poorly designed objects. But now I've changed.

Norman (2004, p. 8) continues by describing how his change of attitude was influenced by “new scientific advances in our understanding of the brain”, new awareness of the importance of emotion in everyday life, and new appreciation for “aesthetics, attractiveness and beauty” in design. Norman's comments are indicative of the broad changes that have occurred within HCI in recent years. Sharp, Rogers and Preece (2007, p. 27) describe a sea change in which many people working within the field have earnestly begun to take on board aspects of the user experience that have traditionally been overlooked. HCI has outgrown its original boundaries to become something much more than a speciality of computer science.

Carroll (2009) describes HCI today as a “community of communities” incorporating many areas of design. He notes that although HCI has always been referred to as a design science, it was originally quite separate from graphic design and related fields. However, as user interface technologies advanced, “designers were welcomed into the HCI community just in time to help remake it as a design discipline” (Carroll, 2009). A key driver of this change was the emergence of the Web—a medium that has come to be primarily “a vehicle for human communication and interaction” rather than a conglomeration of “mere interfaces for tools” (Lenker, 2002, p. 4). The multi-faceted design requirements of the Web prompted the development of new design principles and practices that addressed both functional and aesthetic concerns (Mullet, & Sano, 1995).

In the course of this transformation, HCI has spawned several new design communities such as interaction design and experience design. Interaction design is

concerned with “designing interactive products to support the way people communicate and interact” in their everyday lives (Sharp, et al., 2007), while experience design focuses on creating superior experiences for people within a particular context (Shedroff, 2001). Given this new emphasis on R-Directed concerns, it seems likely that other “design proto-disciplines will emerge from HCI during the next decade” (Carroll, 2009).

## Story

Not just argument but also STORY. When our lives are brimming with information and data, it’s not enough to marshal an effective argument. Someone somewhere will inevitably track down a counterpoint to rebut your point. The essence of persuasion, communication and self-understanding has become the ability to fashion a compelling narrative (Pink, 2006, pp. 65-6).

Stories in the form of scenarios and their associated personas have become important tools in the field of HCI. Scenarios are stories about people and their activities that are used by HCI professionals for understanding, envisioning, designing and evaluating interactive systems (Carroll, 2000). For example, the following scenario by IDEO Europe was developed as part of an illustrated series to help envision how people might use an online system for exchanging digital photos. These scenarios were developed years before photo-sharing sites like Flickr and social networking sites like Facebook became part of the Internet mainstream.

Sue, Hannah, Janet, and Sandy became firm friends when they met at their children’s toddler group some years ago. Now they’re back at work, the kids are growing up and there never seems to be time for the chat with and about one another they once enjoyed. But then they subscribe to a “ChatPix” group. Whenever they take pictures they have the option of sending them to the group and they’ve found this is just the thing to keep up-to-date with one another’s lives. Sometimes they use “ChatPix” to send something about a special event (Sandy’s 29th birthday party—yet again). At other times it’s just a reminder that they’re still there and keeping in touch. They like the option for adding 5 seconds of recorded sound—just enough to say how they’re feeling. The pictures turn up on their WebTV at home or on the computers at work. Last week Hannah sent a family photo from the Caribbean. Janet and Sue were on the phone to one another immediately to discuss how she looked in her swimsuit and speculate how they’d ever managed to afford the trip. The message said “Let’s meet up when I’m back, I’ll show you all my pictures.” Sue and Janet weren’t quite sure they felt up to that (Long, 1999, p. 46).

Benyon (2010, pp. 64-8) identifies different types of scenarios that are currently employed by HCI practitioners and researchers: user stories, conceptual scenarios, concrete scenarios and use cases. User stories are the experiences of real people, which might be obtained through ethnographic studies, interviews or other means. Conceptual scenarios are abstractions of user stories that strip away certain details. Concrete scenarios are elaborated from conceptual scenarios by adding specific design decisions and technologies. Use cases describe the interactions between users and devices at a technical level. Different types of scenarios are employed at different stages of the design process. They are useful for understanding current practices, establishing requirements, brain-storming, expressing conceptual designs, testing design ideas, and communicating ideas to others across professional boundaries (Bødker, 2000).

Closely related to scenarios are personas—rich descriptions of typical users of a system that is under development. Personas are not real people, but characters based on the profiles of people who have been involved in the data-gathering process. Personas are described with precise, credible details that help designers think of them as potential users for whom they are designing an interactive system. For example, a persona may have a name, an age, a gender, a photograph, personality attributes, a back-story, a job description, a set of goals and other personal details. The development of a product will usually require a small set of personas to represent different user groups (Sharp, et al., 2007, pp. 481-85).

Scenarios and personas are practical tools that help designers connect to prospective users and their environments rather than simply design systems that they themselves would like to use. Pruitt and Grudin (2003) discuss how software development teams at Microsoft have employed scenarios and personas during the development of products such as the MSN Explorer web browser and the Windows operating system. The sets of personas they have developed for their projects typically consist of between 3 and 6 characters such as fictional business owner and family man Alan Waters. The personas are more than mere discussion tools, as in “Would Alan use this software feature?” Instead they “provide a conduit for conveying a broad range of qualitative and quantitative data, and focus attention on aspects of design and use that other methods do not” (Pruitt, & Grudin, 2003, p. 1). Personas help a product development team identify and understand its target audience, as well as aid in design and development decisions. Pruitt and Grudin (2003, p. 11) observe that at first encounter, scenarios and personas may seem “too arty for a science and engineering-based enterprise”, but they have proven to be effective tools for engaging team members and for improving design outcomes. Scenarios and personas go beyond mere collections of facts or demographic data to exploit the power of story. Norman (1993, p. 129) concisely explains this power as follows:

Stories are marvelous means of summarizing experiences, of capturing an event and the surrounding context that seems essential. Stories are important cognitive events, for they encapsulate, into one compact package, information, knowledge, context, and emotion.

## Symphony

Not just focus but also SYMPHONY. Much of the Industrial and Information Ages required focus and specialization. But as white-collar work gets routed to Asia and reduced to software, there’s a new premium on the opposite aptitude: putting the pieces together, or what I call Symphony. What’s in greatest demand today isn’t analysis but synthesis—seeing the big picture, crossing boundaries, and being able to combine disparate pieces into an arresting new whole (Pink, 2006, p. 66).

Symphony or synthesis is an essential skill for HCI researchers and practitioners because much of the work in this field is conducted by multidisciplinary teams (Moore & Lottridge, 2010). Today’s interface design problems are often cross-disciplinary, requiring the cooperative efforts of people from many different domains (Burns, & Vicente, 1995). A design team may draw on the skill sets of engineers, designers, programmers, psychologists, anthropologists, sociologists, artists and others, depending on the nature of a project (Sharp, et al., 2007, p. 11).

People from different disciplines often have different values and priorities. What one person considers important, others may not even notice. Some may think their

skills, tools and knowledge are more valuable than the contributions of others (Blevis, & Stolterman, 2009). People from different disciplines often have different thinking styles. The manner in which a programmer approaches the problem of designing an interface may be very different from that of a graphic designer (Kim, 1990). People from different disciplines often use different language. For instance, a computer scientist's understanding of the term *representation* may be very different from that of a graphic designer or a psychologist (Sharp, et al., 2007, p. 11). Similarly, individuals from different disciplines often have different design goals. Within a team environment, individual design goals must typically be negotiated or compromised in order to meet other design goals (Blevis, & Stolterman, 2009).

In view of these and other differences, it is not surprising that collaboration between members of a multidisciplinary design team is often fraught with misunderstandings (Blevis, & Stolterman, 2009; Burns, & Vicente, 1995). Boff (1987) characterises this situation as a "Tower of Babel" phenomenon, where different disciplines approach the same project from different perspectives. One of the keys to avoiding confusion, misunderstanding and communication breakdowns in a team is symphony, or the ability to cross disciplinary boundaries, to see relationships between seemingly unrelated fields, and to integrate those pieces into a bigger picture. As the field of HCI continues to work toward the goal of designing for the full range of human experiences, it seems likely that this attribute will become even more important in the design process (Harper, Rodden, Rogers, & Sellen, 2008; Sellen, Rogers, Harper, & Rodden, 2009).

## Empathy

Not just logic but also EMPATHY. The capacity for logical thought is one of the things that makes us human. But in a world of ubiquitous information and advanced analytic tools, logic alone won't do. What will distinguish those who thrive will be their ability to understand what makes their fellow woman or man tick, to forge relationships, and to care for others (Pink, 2006, p. 66).

Empathy is a key ingredient in User-Centred Design (UCD), an approach to the design of interactive systems that has had a significant impact on the HCI industry by improving product usefulness and usability (Mao, Vredenburg, Smith, & Carey, 2001). Mao et al. (2005) define UCD as "a multidisciplinary design approach based on the active involvement of users to improve the understanding of user and task requirements, and the iteration of design and evaluation". UCD places users at the centre of design decisions (Williams, 2009). Prior to the emergence of UCD, designers of interactive systems often took a system-centred approach to their work, wrongly assuming that users would attempt to solve problems in the same manner that they did. However, the advent of the Web as a medium for communication and electronic commerce greatly bolstered the adoption of UCD methods and outcomes. In a highly competitive environment where "users can take their business elsewhere with just one mouse click", designers have strong motivation for being more empathetic toward users (Mao, et al., 2005).

Hudson (2009) reports that UCD is surprisingly difficult for designers who have no HCI or usability experience, the biggest issue being a lack of appreciation for how users think and work, or in other words, a lack of empathy. In a recent large-scale study of 441 men and women working in the field of information technology, Hudson (2009) found that male technologists had markedly lower empathising scores than female technologists, meaning that they had "significant difficulty in

recognizing and addressing the issues of ‘real’ users”. He concluded that organisations need to acknowledge that empathising skills are just as important as systemising skills in building successful interactive systems.

## Play

Not just seriousness but also PLAY. Ample evidence points to the enormous health and professional benefits of laughter, lightheartedness, games, and humor. There is a time to be serious, of course. But too much sobriety can be bad for your career and worse for your general well-being. In the Conceptual Age, in work and in life, we all need to play (Pink, 2006, p. 66).

In the late 1980s when the field of HCI was dominated by concerns about usability, Carroll and Thomas (1988) lamented the paucity of research into play and fun:

... we continue to see, without humor, the prospect of a decade of research analysis of usability possibly failing to provide the leverage it could on designing systems people will really want to use by ignoring what could be a very potent determinant of subjective judgments of usability—fun.

More recently, Carroll (2004) reported that he no longer worries about this. While usability continues to be a touchstone concept of HCI, the focus of the discipline has broadened to encompass other aspects of the user experience such as play, enjoyment and affect. “Practitioners and researchers are now as likely to be concerned with how enjoyable a new technology is as how usable and useful it might be”, report Blythe, Hassenzahl and Wright (2004).

The concept of play or fun is clearly an important “candidate software requirement” for computer games and other products that are part of the entertainment industry (Monk, Hassenzahl, Blythe, & Reed, 2002). However, as more researchers have begun to focus on this topic, it has become evident that play is applicable to other interactive systems too. Jordan (2000), for example, advocates taking holistic “pleasure-based approaches” to HCI to ensure user satisfaction with an interactive system. He proposes a framework for understanding user experiences that models four conceptually distinct types of pleasure: physical, social, psychological and ideological. Play, then, is an important consideration for designers of interactive systems as they are increasingly expected to provide users with great experiences, not just great usability.

## Meaning

Not just accumulation but also MEANING. We live in a world of breathtaking material plenty. That has freed hundreds of millions of people from day-to-day struggles and liberated us to pursue more significant desires: purpose, transcendence, and spiritual fulfillment (Pink, 2006, pp. 66-7).

In March 2007 academic and industrial researchers from around the globe participated in a two-day workshop organised by Microsoft entitled HCI 2020. This event provided an opportunity for researchers from diverse fields to discuss and debate issues of central importance to the future of HCI. Workshop participants included academics from the fields of computing, design, management science, sociology and psychology, as well as representatives from software companies, hardware manufacturers and content providers. In spite of their diverse backgrounds, the workshop participants were virtually unanimous in their view that

HCI needs a new agenda that places human values at its core. The forum report declared that the key issues for HCI in the 21st century have evolved beyond the mechanics of the interface. The wider set of issues that are now at play include “how human desires, interests and aspirations can be realised and supported through technology”, not just at the level of the individual, “but also at the social, cultural and ethical level” (Harper, et al., 2008, p. 55).

As the remit of HCI broadens in this way, greater sensitivity to human values and meaning will be required from researchers and practitioners within the field. HCI will “need to form new partnerships with other disciplines” that are better equipped to address societal, moral and ethical concerns, particularly within the arts and humanities (Harper, et al., 2008, p. 53). People working within the field of HCI will need to become increasingly sympathetic to the tools and techniques of other disciplines, as already discussed in this paper. Outdated notions of the “user”, the “computer” and “interaction” will need to be re-examined and redefined to allow HCI to become part of a wider interdisciplinary exchange (Sellen, et al., 2009, pp. 65-6).

Implicit within this change is an acknowledgement that technology is not at the forefront of people’s daily concerns. What does concern them is how technology can support the things that matter to them—being part of a family, connecting with friends, educating their children, caring for each other when they are unwell, growing older comfortably, and so on (Harper, et al., 2008, p. 35). This notion of being human in our relationship with technology resonates strongly with Pink’s views about the growing importance of meaning and other whole-minded aptitudes.

## Conclusion

It is clear from this discussion that Pink’s six Conceptual Age senses are growing in importance within the ever-changing field of HCI. The aptitudes of design, story, symphony, empathy, play, and meaning are contributing to a transformation in the way we define our relationship with technology. Is there any evidence that these six aptitudes are influencing or reshaping other fields of endeavour? Do these aptitudes provide a potentially useful foundation or framework for creative arts educators? These questions invite further debate and discussion. They are particularly interesting at the present time when Australian universities are focusing so much attention on institutional strategies and policies for embedding graduate attributes into curriculum and assessment (Barrie, et al., 2009). If Pink’s six essential aptitudes prove to be important across a range of subjects taught under the banner of creative arts education, then perhaps his ideas deserve closer examination.

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