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Examination of relationships among serendipity, the environment, and individual differences

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ABSTRACT

Under what conditions is serendipity most likely to occur? How much is serendipity influenced by what a person brings to the process, and how much by the environment in which the person is immersed? This study assessed (a) selected human characteristics that may influence the ability to experience serendipity (openness to experience, extraversion, and locus of control) and (b) selected perceptions of the environment in which people are immersed, including the creative environment, and selected characteristics (trigger rich, highlights triggers, enables connections, and leads to the unexpected). Finally, the study examined the relationships among these internal people-based and external, environmental, variables. Professionals, academics, and students engaged in thesis work ($N = 289$) responded to a web-based questionnaire that integrated six scales to measure these variables. Results were analysed using principal components analysis, multivariate analysis of variance, and multiple regression. We found some types of digital environments, (e.g., websites, databases, search engines, intranets, social media sites) may be more conducive to serendipity than others, while environments that manifest selected characteristics (trigger-rich, enable connections, and lead to the unexpected) are perceived more likely to foster serendipity than others. However, the perceived level of creativity expected in work environments was not associated with serendipity. In addition, while extraverted people may be more likely to experience serendipity in general, those who are open to experience or have an external locus of control are no more likely to experience serendipity than their counterparts. Notable from our findings was a failure in identifying individual differences that may influence a person's likelihood to experience serendipity, in contrast with our success in identifying how the environment in which the user is immersed may create a fertile environment for serendipity to occur.

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1. Introduction

Serendipity is often associated with luck, accident, and chance. But it is more than that – it is an experience marked by an interruption or discontinuity triggered by ideas, information, or phenomena that stops us in our tracks and prompts us to make connections that may have personal, organizational, community, or global outcomes (McCay-Peet & Toms, *in press*). Despite serendipity's association with events outside our control, it is serendipity's positive impact that motivates people and organizations to find ways to nurture and facilitate it.

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In her Rice Centennial Lecture, Shirley Ann Jackson, President of New York's Rensselaer Polytechnic Institute, argued that funding basic research spurs serendipity and thus innovation "because without [serendipity], there is no vitality in the innovation ecosystem. Indeed, there is no innovation" (Jackson, 2012, n.p.). While Jackson suggested that basic research facilitates serendipity, companies such as Google design buildings and rearrange furniture to maximise the potential for serendipitous encounters among co-workers (Lindsay, 2013), and developers create mechanisms such as recommender systems to support serendipity for users in digital environments (Shani & Gunawardana, 2011). But despite a push to support serendipity and understand how it may be influenced (see for example, Makri, Blandford, Woods, Sharples, & Maxwell, 2014), we know very little about how the complex relationships among the traits and abilities of individuals and the environments in which they are immersed may lead to serendipity. Thus, we are blind to how we may facilitate serendipity through policy, education, or systems design.

The purpose of our research is to examine whether selected characteristics of people, i.e., individual differences, and selected characteristics of environments influence likelihood of serendipity to occur, and whether some combination of the two interact to lead to serendipity. Before we can examine these relationships, we first need to develop a way to measure perception of serendipity and a way to assess whether an environment in which the user is immersed has the potential to facilitate serendipity. A perception of serendipity scale and a serendipitous digital environment scale were first developed so that relationships among serendipity, the environment, and the individual could be explored. Measuring an abstract, subjective construct such as serendipity is a difficult task. People have different notions of what serendipity means and what experiences they would describe as serendipitous (McCay-Peet & Toms, in press). However, the lack of tools to measure serendipity hampers the ability to improve research policy, educational strategies, and digital environments. Without tools to measure serendipity, for example, we are unable to verify whether changes to the interface or algorithms of a digital environment supports or hinders serendipity.

2. Prior research

We define serendipity as an unexpected experience prompted by an individual's valuable interaction with ideas, information, objects, or phenomena. In a study of how twelve scholars and working professionals experienced serendipity, a serendipitous experience was identified as a process consisting of five main elements: trigger, connection, follow-up, valuable outcome, and unexpected thread. Driving this process are the internal and external factors that are hypothesised to influence both the process and perception of serendipity (McCay-Peet & Toms, in press). Erdelez's (2005) model of an information encountering (IE) episode, often cited in the serendipity literature, is "an instance of accidental discovery of information during an active search for some other information" (p. 180) that illustrates the *beginning* of a potentially serendipitous experience, encompassing aspects of the trigger, connection, and follow-up.

Our definition of serendipity and its complementary model (McCay-Peet & Toms, in press) share many of the features of previous definitions and discussions of serendipity in its emphasis on the *unexpected* and *positive* aspects of the phenomenon as well as the *interaction* that takes place between the individual and the environment that drives the experience. Merton, for example, postulated chance favours "those at work in microenvironments that make for unanticipated sociocognitive interactions between those [with] prepared minds;" what he referred to as the "serendipitous sociocognitive microenvironment" (Merton & Barber, 2004, pp. 259–260). Serendipity has also been defined as "the interactive outcome of unique and contingent 'mixes' of insight coupled with chance" (1996, p. 434), suggesting internal and external factors are at play. The main elements of serendipity have similarly been described as "a mix of *unexpectedness* and *insight* [that lead] to a *valuable, unanticipated outcome*" (Makri & Blandford, 2012, p. 684). McBirnie and Urquhart (2011) noted that their "accepted understanding of the phenomenon requires the internal (e.g., the prepared mind) and the external (e.g., outside context and events) to come together in the right way, with neither on its own considered enough for the classification of an experience as serendipity" (np). Each of these definitions and extrapolations extend the more basic notion of serendipity as an aptitude or a happy accident, embedding within them how and why serendipity unfolds.

Interactions between individuals and their environments appear to be important for serendipity to occur but how can we deconstruct this? That is, what characteristics of the environment (external factors) and the individual (internal factors) may facilitate and influence serendipity?

2.1. Environment

This research focuses in particular on the more stable characteristics of the individual's environment rather than situational factors such as time pressures and information strategies, which are discussed elsewhere (e.g., Makri et al., 2014; McBirnie, 2008; Sun, Sharples, & Makri, 2011). We sought to understand what it is about digital environments that might facilitate serendipity, recognising that people do not interact with digital environments in a vacuum and experiences with their broader work environment may exert an influence on experiences of and perception of digital environments.

While we know of no research that has tested whether the type of environment, digital or physical, influences the likelihood of experiencing serendipity, research does suggest that some environments are more likely to support serendipity than others (e.g., Björneborn, 2008; Toms, 1997). Settings more conducive to serendipity include those designed to deliver information such as libraries, lecture rooms, as well as unfamiliar environments where new information can be found (Sun et al., 2011). Equally, some features and functions of digital environments may be more conducive to serendipity than others.

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