“Intentional Distractions” and “Organizational Clutter”:
Using Cognitive Ethnography to Explore the Information Workspace of an Information Professional with Dyslexia and ADHD

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Peter Coppin is a PhD student in the Faculty of Information at the University of Toronto where he is researching the cognitive affordances of graphic illustration relative to text (“visual thinking” versus “language thinking”). The exploratory investigation in dyslexia described below is part of his effort to better understand the perceptual-cognitive-social-material processes involved in reading, “language thinking,” and “visual thinking.”

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Abstract:
Dyslexia is one of the least understood so-called “learning disabilities” (LD), characterizing problems with text, organization, working memory, attention, and mental sequencing. Surprisingly, other research shows that dyslexia and LD may include strengths. For example, astronomers identified with dyslexia were able to spot patterns in imagery that were less visible to their non-dyslexic counterparts.

The purpose of this investigation was to describe the information practices and spaces used by an information professional identified as dyslexic, focusing on their successful strategies within an office workspace context.

The participant 1) made extensive use of non-traditional workspaces that contained or had access to specific kinds of “noise” that served as “intentional distractions” to increase
focus, 2) made extensive use of ad hoc organizational “clutter” on horizontal surfaces, and 3) extended ad hoc organization into their computer workspace by relying more on search queries rather than hierarchical file systems.

**Introduction**

**Research Problem**

Dyslexia is often referred to as one of the least understood so-called “learning disabilities” (LD) because its causes are not well understood and symptoms are inconsistent across cases (Lyon, 1996). The label traditionally characterizes people with abilities/intelligence that exceed their reading ability. Other characteristics of dyslexia are disorganization, low working memory, attention problems (i.e., attention deficit hyperactivity disorder (ADHD)), and poor mental sequencing abilities (Stein, 2001; Swanson, Harris, & Graham, 2003). The majority of research in LD and dyslexia focuses on developing techniques to enable people identified with dyslexia to become better at mentally processing text (West, 2008).

However, other research shows that dyslexia and LD could be viewed as a “non-standard” set of strengths and complementary weaknesses that are useful (or not) relative to a task. For example, Grosser and Spafford (1990) measured above-average light sensitivity in the peripheral vision of people with dyslexia. This increased sensitivity in peripheral vision is believed to increase one’s ability to compare patterns across a wide field of view (FOV). Indeed, astronomers who were identified as dyslexic were able to spot patterns in imagery that were invisible (or less visible) to their non-dyslexic colleagues. Increased visual-spatial ability was attributed to their (empirically validated) above-average peripheral sensitivity (Schneps, Rose, & Fischer, 2007). There also appears to be a correlation between dyslexia and creativity which has not yet been fully explained (Everatt, Steffert, & Smythe, 1999), and many successful scientists, artists, business leaders, and politicians are reportedly dyslexic (West, 1999, 1997).

Unfortunately, the majority of dyslexia research uses approaches designed for understanding and correcting reading difficulties rather than discovering the possible strengths of dyslexics (Stein, 2001; West, 2008). Additionally, a search through the literature reveals that the research is conducted in more controlled laboratory or classroom situations that may not include factors that successful dyslexics use to accommodate their weaknesses and leverage their strengths in more realistic (“real world”) situations. As a result, many strengths and effective accommodation strategies used by dyslexics may remain undetected.

**Research Purpose**

In response to the lack of focus on dyslexics in “real world” situations that might reveal their successful accommodation strategies and strengths, the purpose of this exploratory investigation was to tentatively describe the information practices and spaces used by an information professional who is identified as
dyslexic (and who also turned out to have ADHD). Special attention was paid to accommodation strategies used to survive (and possibly thrive) in a world that is oriented for populations with lexical strengths. Furthermore, special attention was directed to detect accommodation strategies that address attention, organization, and memory deficits.

Guiding Research Questions
To respond to the proposed research purpose, some preliminary questions follow that served as loose guides during the investigation:

- How does the dyslexic information professional organize his/her workspace?
- What strategies enable the professional to access information expressed through lexical formats?
- What strategies enable the professional to cope with attention problems, disorganization, and low working memory?

To support these questions, a greater understanding of linkages between dyslexic strengths and weaknesses (described in the next section) may enable a greater understanding dyslexic information practices.

Understanding Dyslexic Strengths and Weaknesses
Less recent theories of dyslexia relate reading difficulties to “phonological processing deficits” (trouble with processing auditory information) (Stanovich, 1988). However, more recent neurophysiological observations may explain the counterintuitive coupling of certain weaknesses and strengths in dyslexics (i.e. below average reading ability, but above average visual-spatial and creative abilities).

For example, a theorized cause for dyslexia is that right hemisphere neurological machinery (often associated with “visual thinking” and holistic cognitive processes) emerges to dominate left hemispherical neurological processes (often associated with “language thinking,” sequential processing, and categorization), whereas in the majority of the (lexical) population, left hemispherical neurological machinery dominates the right hemisphere (Boliek & Obrzut, 1995; Stein, 2001; Zadina & Corey, 2006). Such a theory may explain why dyslexics exhibit below-average levels of lexical, organization, memory, and attention abilities, but above average visual-spatial and creative abilities.

But why would these hemispherical differences develop? Stein (2001), building on work by Livinestone et al. (1991) described a more recent “magnocellular theory of developmental dyslexia” proposing that (magnocellular) neural pathways between the eyes and visual cortex, dedicated for detecting visual motion, become damaged during infancy because of an auto-immune problem that has been observed in many dyslexics. As a compensatory measure, other “parvocellular” neural pathways, geared for finer-grained details and colour, develop differently for those effected, resulting in hemispherical differences between dyslexics and non-dyslexics. Stein et al. (2001) use this explanation to describe findings that are consistent with previously described dyslexic strengths and weaknesses. It is suggested here that these neurological characteristics may be
reflected in the way that individuals construct their information spaces.

Information workspaces

Office workspace research

Though no research focused on dyslexics in their “natural” office workspaces was found, several academic and non-academic communities explore the relationships between people and their workspaces. These include parts of information science (IS) (a short overview and list of references of workspace-related research is reviewed by Hartel (2008)), computer supported collaborative work (CSCW) (an overview by Harper (2000) described ethnographic field work programs in CSCW), human-computer interaction (HCI), and cognitive science (CS). Though each of these domain areas offer perspectives that could be extended for the present investigation, a branch of HCI that is explored from the perspective of cognitive science is particularly relevant because it uses a metatheory/paradigm called distributed cognition that extends cognitive science (the metatheory used for the majority of LD research) out of the laboratory and into “real world” situations such as control rooms, cockpits, and offices.

Distributed Cognition and Cognitive Ethnography

A seminal work that introduced distributed cognition was Cognition in the Wild (Hutchins & Lintern, 1995) that focused on how information spaces supported the distribution of cognitive tasks/functions between people, tools, and information artifacts during ship navigation. Hutchins then extended this approach to focus on the aircraft industry through studies of airline cockpits (Hutchins & Klausen, 1996) and to explore the role of physical pointing in relation to pictorial information artifacts within medical problem solving situations (Alac & Hutchins, 2004). Kirsh (2001) extended distributed cognition to office workspaces.

Kirsh’s (2001) study of offices

Kirsh’s (2001) study of offices included three basic abstractions relevant to the present investigation (paraphrased below):

Entry points: An entry point is a structure or cue that represents an invitation to enter an information space or office task. Kirsh draws parallel examples from newspapers where he describes how a newspaper column’s pictures and headings invite the viewer into an experience. Similarly, an open email application, a paper sitting on top of an input tray, or even papers scattered throughout a desk or other workspace serve a similar purpose.

Action landscapes: An action landscape is part mental construct and part physical, a space users interactively construct out of the resources they find when trying to accomplish a task. Building on the idea of a “task environment” introduced by Newell and Simon (1972), an action landscape is the intersection of user task and world. An activity landscape is the construct resulting from users...
projecting structure into the world, creating structures by their actions, and evaluating outcomes. Kirsh describes these phenomena as extremely difficult to define.

Coordinating mechanisms: A coordinating mechanism is an artifact, such as a schedule or clock, or an environmental structure such as the layout of papers to be signed, that helps a user manage the complexity of his/her task. Other examples include post-it notes or fasteners.

Regarding entry points, Kirsh also contrasted organization styles using the phrases “neats” and “scruffies” (i.e., people with orderly desks versus people with messy desks), noting that one’s working style may align with different kinds of work. For example, Kirsh suggested that “neats” typically engage in routine tasks, while “scruffies” typically engage in less routine tasks. Kirsh proposed that, for example, a “scruffy” might discover a new approach by constructing meaning or discovering solutions through unplanned interactions with combinations of objects.

One way that Kirsh’s extension of distributed cognition into offices could engage with the LD literature is by observing the interaction between entry points, action landscape, and coordinating mechanisms in relation to memory, organization, attention, and reading deficits.

Research Design

This investigation blended the techniques and metatheories of cognitive ethnography (Hutchins & Lintern, 1995) by building on the tradition described above, ethnography (Bernard et al., 1986; Emerson, 2002), and visual anthropology (J. Collier & M. Collier, 1986). Findings were explored in relation to literature from the LD field (laboratory experiments).

The fieldwork setting and access plan
To find an information professional with the dyslexic “cognitive phenotype”, a contact who participated in Toronto area university life was recruited for the study and interviewed after full disclosure (and obtaining signatures) in alignment with appropriate University of Toronto ethical research practices.

Data
Data gathering consisted of photographs of information spaces, audio recordings, jottings, and diagrams.

General approach to analysis
The next phase focused on coding data, both by grouping items (photographs, jottings, diagrams) on a wall collage (to seek patterns), and through software packages such as Microsoft Excel and Nvivo to explore patterns in transcriptions from audio.

1 The word “cognitive phenotype” appears to be common vernacular used in LD research (often in opposition to the word “disability”) to refer to different “thinking styles” (i.e. visual-spatial versus language oriented). However, no definition for “cognitive phenotype” was found. The word seems to be most commonly used in the autism branch of LD research (e.g., Happé, Frith, & Briskman, 2001).
The approach used was iterative, adding early versions of models to the wall collage to find deeper patterns. As patterns emerged, additional investigations of the literature to explain findings followed.

**What is meant by “information” (informational focus)**

“Information” in this setting refers to *information spaces* (e.g., work areas, surfaces (both real and virtual)). These spaces include *information tools* (e.g., computers, mobile devices, pens/pencils), and *information artifacts* (e.g., piles of paper, post-it notes, computer documents/files) that are located in those spaces. The main concern of this investigation addresses a combination of how information is organized, accessed, sought, and used. Additionally, understanding that the information experience of the dyslexic information professional transected several devices and spaces because their cognitive characteristics transcend those devices and spaces.

**Focusing the investigation (“cutting points”)**

A theme used to focus the investigation since it transcended several devices and spaces, was to focus on accommodation strategies that the dyslexic uses to cope with their situation. For example, the dyslexic professional used the background noise of a familiar TV show because it enabled him to more effectively focus attention on tasks. This use of the television was included in the study because it enables the dyslexic to cope with an attention problem. However, the use of the television for entertainment purposes would not be part of the study.

**Description of information spaces**

The observation was of the workspace used by a medically diagnosed dyslexic-ADHD information professional who we will refer to as James (a pseudonym). James described that he was diagnosed with dyslexia-ADHD prior to re-entering school to complete his unfinished undergraduate degree in visual design. James sought this diagnosis after his dyslexia-ADHD forced him to drop out of school due to an inability to complete lexically oriented homework assignments.

James is in his mid 40s, is married, and has at least one son (high school age). James currently splits his time between teaching as an adjunct instructor at an art academy and working as a graduate student at another university. Previously in his career, James owned and ran a small visual design firm.

The interview began in a workspace that James uses often. These were several interconnected rooms centered in the house commonly identified as a living room/TV room (Figure 1a (middle)).

**Physical layout of the working environment**

It is the workspace’s physical properties and its location that immediately distinguish it from other office workspaces. Specifically, the workspace is located in leisure areas in the home (the porch, living/TV room, and dining room). The workspace sprawls between a porch and two interconnected rooms. Figure 2a (center) shows the main area encountered, which will be referred to as “the hub” (the living room). To the left in the diagram is the “preferred workspace” (the porch). Notably, adjacent to
the preferred workspace is a residential street with a moderate amount of street noise and activity. Also notable in this area is a printer that is positioned outside, on the porch.

To the right in Figure 1a is what will be called “the spillover area” (the dining room). This appeared to be where items for semi-frequent use were placed upon horizontal surfaces (tables, chairs, couches, countertops). This included ungraded homework assignments from his students and other stray papers spread along the couch. Also notable in this area is a countertop with standard equipment that one would ordinarily find in an office.

\[\text{a. Photographs of the workspace (left, center, and right photographs correspond to the left, center, and right regions below).}\]

\[\text{b. A preliminary model of workspace usage.}\]

\[\text{Figure 1: The workspace}\]

Space and form
The interconnectedness of the rooms, with each room containing a variety of horizontal surfaces (e.g., couches, chairs, floor surfaces, and dining room tables), facilitates the impromptu spreading-display of multiple and varied items over a broad horizontal area that is easy for James to access. An example from the field study nicely captures how James capitalizes on the role of horizontal surfaces and the objects that were visible upon them. For example, within the spillover area, a central round table contained a binder with pictures of each of the students he taught and descriptions of those students. James described how this binder compensated for his bad memory. On another part of the same table, homework assignments from the students were scattered about. One could surmise that he would read the name in the homework assignment and relate it to the name in the binder of the person in the picture.

Sound
Unlike a typical office (such as his unused one upstairs\(^2\)), nothing stops James from sitting on the porch or turning on the TV. An example from the field study nicely captures how James capitalizes on sound features within the workspace.

His laptop, positioned near the porch, in front of an intentional distracter (i.e., the TV running a familiar show), communicates the role this area plays in James’s work habits. For example, James precisely described the role that background noise plays in combating his

\[\text{2 James showed an unused upstairs office designated for his use.}\]
ADHD, when he described how listening to a television show (one that he was so familiar with that he knew it by heart), enabled him to deeply focus.

All of this — the porch, living room, dining room, kitchen, computer, and intentional distractions — enable a workflow for this information professional with low working memory and attention problems. Here, the external world can act as a memory technology (cf. Ballard, Hayhoe, Pook, & Rao, 1995) to accommodate working memory deficits through the externalization and “spreading” of artifacts that cannot readily be assessed in James’s working memory. Furthermore, spreading artifacts throughout the area may enable James to keep attention focused on relevant tasks. Higher priority items were in his immediate working environment (i.e., “the hub”), whereas external memory objects that were required semi-frequently were in the spillover area. Also, environmental factors can be adjusted to accommodate attention deficits through what will be referred to as “intentional distractions” (elaborated upon in Section V).

**Emergent Themes From Transcripts**

*James’ difficulties keeping track of paper documents*

James reported how he frequently loses paper documents. He described his relationship with paper through a colourful story from early in his marriage. His wife had given him the task of delivering a bill to the post office for payment. Moments after leaving the house and on his way to the post office, he had already lost the document. James explained that from then on, his wife handled most household activities relating to paper documents. As James said: “I’ve never even filled out a tax form.”

An example from James’ past demonstrates how his relationship with paper documents affected his life in other ways. For example, even though James is an accomplished artist-designer with an above average level of visual-spatial talent (as evidenced from both this training at a prestigious art school and his creations that were positioned in other parts of the house), he was forced to drop out of art-design school in the 1980s. He said that even though he was successful in his studio art classes, his dyslexia and attention problems prevented him from completing his liberal arts classes (liberal arts classes, according to James, required more interaction with text documents than his studio art classes). However, once the personal computer became ubiquitous (and he owned one), he was able to return to school and finish his degree and later complete a master’s degree at another prestigious university.

Thus, it appears that affordances offered through the emergence of computer technology enabled James to interact with documents in ways that caused fewer difficulties to emerge as a result of his dyslexic symptoms and attention problems. For James, the computer is an assistive technology that enables him to interact with documents in ways that rely less on his reading, memory, organization, and mental sequencing problems.

*The role of the personal computer in James’ information life*
The affordances offered by computer technology

James relies heavily on the affordances offered by the automated features of computers in order to search for and retrieve documents. As James said: “The center of my organizational life is my computer.” For example, the computer automatically places computer documents in “piles” as shown in Figure 2.

However, James minimally uses spatial placements of documents on the screen for organizational purposes (in contrast to his practices in the material world). Instead he uses the “Spotlight” search feature on the Macintosh laptop. As James said during the interview: “My favourite tool is Spotlight on the Mac (Macintosh).”

Searching through documents using Spotlight

James uses Spotlight to look for words on and in documents rather than relying on his memory to recall and retrieve the location of documents. However, converting documents to fit the affordances of Spotlight is no trivial task.

Converting documents

To make documents searchable by Spotlight, James first uses optical character recognition (OCR) to convert the document into a text format that is readable by Spotlight and then into a format accessible to software called Kurzweil 3000, that can “read” the documents to James, while also highlighting text in the document and presenting the text through a larger window as shown in Figure 2.

Figure 2: Using Kurzweil 3000.

Using this process, James can search in a document or for a document itself. To enable later searching for a document, he manually assigns names to folders and documents.

Using naming conventions to enable searching via Spotlight

Using a naming convention, James lets articles “pile up” in the upper right corner of his computer desktop. James uses Spotlight to locate the documents within the large “pile” on his desktop.

Though James has a less formal filing system, he has a more formal naming system that enables him to later retrieve documents through Spotlight once they have been through the conversion process.

James described how, by default, the automated features of the computer naturally place the most recent items on top of the large desktop pile. This feature orients items in a row. Thus, for James, all documents wind up in one “place.” However, finding documents in that pile requires the described additional techniques that James has developed to utilize the affordances of Spotlight.

Printing
Though James describes difficulties keeping track of paper documents, they do seem to play an important role in his information experience. Of note were four printers found in his home, so it appeared that James did print out documents for certain stages of his work. As he said during the interview: “Sometimes documents need ‘physicalness’... they need a place.”

The role of intentional distractions
Previously, intentional distractions were noted. How is an intentional distraction different from a distraction? James’ own explanation exposes this distinction when he described how he used a recording of a familiar television show to focus his attention, and that an unfamiliar TV show was an actual distraction.

Results and discussion

Understanding Organizational Problems
James commented on and/or demonstrated difficulty with (traditional) organization. In his physical work environment, he scattered objects on numerous horizontal surfaces that were spaced throughout a series of interconnected rooms. For important documents that did not relate to his direct professional or school work, it appeared that James relied on his wife, who may have relied on a more traditional filing system. James’ practices can be understood in relation to Kirsh’s (2001) previously described entry points, action landscapes, and coordinating mechanisms.

Ad Hoc Organization
Kirsh (2001) describes how ad hoc organization systems used by “scruffies” are entry points to tasks and objects that do not fit conveniently into a single category (i.e., a category in an office filing system), and often span several categories (i.e., piles).

James could be viewed as an extreme sort of “scruffy”. His extensive use of horizontal surfaces for temporary document storage could be viewed as an ad hoc organization system with entry points to tasks (as “clutter”) in order to support an action landscape at the convergence of his cognitive profile and the availability of horizontal surfaces in his information space. For example, it is hard for James to remember where items are filed (likely due to working memory problems that relate to mental categorization), but it may be easier for him to remember where items are placed in a spatial location, or to find an item again using his (perhaps) above-average visual-spatial perceptual abilities (Schneps et al., 2007).

James’ action landscape may rely less on entry points as files where items can be stored in (or as) categories and recalled at a later time. Instead, James’s action landscape appears to use horizontal physical surfaces as entry points to “externalized memory” (cf. Ballard et al., 1995) where categories emerge through the reality that an object cannot be in more than one place at a time. Rather than accessing these items through memory, he may access them using his visual perceptual system (Schneps et al., 2007).

Summary of possible finding: James may use horizontal surfaces as entry points to “externalized memory” to compensate for his working memory deficits.
Using Space as an Organizational Accommodation Strategy

James’ strategy of using spatial relationships as an organizational strategy can be explored within the context of findings regarding the relationship between space and memory. Ballard (1995) proposed that memory has a spatial dimension. Shimojima and Katagiri (2008) extended Ballard’s theories to demonstrate a relationship between logical reasoning (a form of “language thinking” (Ware, 2008) related to the left-hemisphere neurological machinery used for mental categories) and spatial dimensions (associated with right-hemisphere “visual thinking”) by tracking eye movements during reasoning tasks. Shimojima and Katagiri called these memory structures “non-physical drawings.” To extrapolate from these findings, it could be said that people reason and remember using “non-physical drawings” as a means to categorize remembered information. Language could be a way to guide attention through the “non-physical drawings” (Coppin & Hockema, 2009). In this way, James’ use of horizontal surfaces in his home could be like using a “physical drawing” of arranged physical objects instead of (or as a) categorization system that may leverage right hemisphere oriented “visual thinking” to compensate for weaknesses in left hemisphere oriented “language thinking” categorization processes.

Summary of possible finding: James may use horizontal surfaces as visual-spatial organization systems that replace (or compensate for) below-average categorization ability.

Differences on the Computer

James did not use the horizontal-surface organizational technique (that he used in the physical world) in the virtual computer world. One explanation for this difference could be that his material workspace consisted of several interconnected rooms that afforded interconnected horizontal surfaces, whereas the desktop is a single “room.” The visual-spatial affordances of the desktop metaphor may lack an ability to “spread” items horizontally.

Summary of possible findings: Metaphors used for James’ computer OS might not support (possible) spatially oriented organization strategies that align with his horizontal organization strategy. James may use Spotlight to compensate for this.

Addressing Memory Failures through Printer Access?

Using “clutter” as an ad hoc entry point to an action landscape may occasionally fail due to the previously described memory deficits, or because other objects may occlude objects in piles. This may explain why so many printers were found throughout his house and workspace. Instead of finding the paper documents each time that he loses them, James may search for the electronic version of a document in Spotlight and print it from one of his many printers located throughout his house. In this way, James’ personal computer and Spotlight may serve as an entry point to his material action landscape (office space) via searching for and then printing documents.

In this way, James’ use of Spotlight rather than computer file systems for organization could be
a version of this ad hoc “scruffy” behaviour extended into the virtual world that lacks the same kinds of affordances (i.e., visual-spatial characteristics) found in James’ material world. 

**Summary of possible finding: James may use Spotlight as an entry point to physical documents.**

**Furniture as Reminder System?**

James’ choice (or necessity) of placing objects on horizontal surfaces that also have another purpose (as furniture) may mean that external factors (using the furniture) may cause the horizontal space to be cleared occasionally. This may force James to revisit his ad hoc “files” with some regularity, thus bringing them to his attention.

**Summary of possible finding: Using horizontal surfaces with other uses (i.e., as furniture) may bring objects to James’ attention on a regular basis, perhaps compensating for a below-average memory.**

**Understanding Intentional Distractions**

Though terminology and theories introduced by Kirsh (2001) are useful for describing office space and organization, and have been augmented above in terms of perceptual cognitive diversity, this investigation revealed other aspects of an office environment not addressed by Kirsh. This is the role of the discovered “intentional distractions” that James used to increase attentional focus during lexical tasks.

The first and most obvious example of an intentional distraction was using the pre-recorded familiar TV show as an accommodation aid in order to increase James’ focused attention during lexical tasks. Another intentional distraction may have been working on the porch (near street noise), or going to a café (contains a background “roar”). Working in the leisure area of his home, when a fully equipped office was also available upstairs, could also be interpreted as an intentional distraction.

**Neurological Basis for Intentional Distractions**

To better understand the seemingly contradictory phenomenon of intentional distractions, we can turn to the ADHD literature. Söderlund, Sikström, and Smart (2007) reported that noise exerted a positive effect on cognitive performance for an ADHD group and deteriorated performance for a control group, indicating that ADHD subjects need more noise than controls for optimal cognitive performance.

Thus, participants with low dopamine levels (ADHD) require more noise for “optimal cognitive performance” compared to controls.
James may be using intentional distractions to increase focused attention in order to complete tasks at socially acceptable levels.

**Summary of possible finding:** It appears that (specific kinds of) noise enhances categorical distinctions in an action landscape for James, potentially making entry points more distinct.

## Conclusion

Some have said that a disability is a discrepancy between one's ability and one's environment (e.g., Treviranus, 2007). This investigation revealed how one person used their information space to reduce this discrepancy. Through observations of a dyslexic information professional’s workspace, this paper blended findings and theories from LD laboratory experiments with non-laboratory ethnographic observations to add a neurological dimension to understanding information spaces, extending prior work to include perceptual-cognitive diversity.

However, it is worth mentioning that this study has several limitations. Only one individual's information space was observed, making it difficult to discuss how findings relate to dyslexic information spaces in general. Also, the lack of a comparison with a non-dyslexic information professional makes it difficult to robustly link aspects of James’ information strategy to his cognitive phenotype (for example, many people who do not identify themselves as ADHD may also use intentional distractions). Making a version of this paper available to James and including his feedback may enable a clearer linkage.

Regardless of how well these findings may or may not be applicable to other cases, this investigation revealed that James’ disability was “reduced” when personal computers, especially laptops, became ubiquitous in his environment. Similar to the changes enabled by computer technology, James’ disability was also reduced through strategies he used in his home office environment. This seems to concretely suggest the interconnectedness of cognition, information spaces, and abilities. Though Hutchins and Lintern (1995) discuss this interconnectedness in relation to “average” human abilities, and the linkage between cognition and environment (i.e., situated cognition) has been part of past debates in the more theoretical aspects of cognitive science (Norman, 1993; Suchman, 1993; Vera & Simon, 1993), it does not appear that this point is being made in the LD literature surveyed for this investigation.

However, understanding human ability as a function of cognition and information spaces may have larger social implications. James’ experience may be a microcosm of societal changes that emerged over the past decade, with similarly drastic changes in information environments on a larger scale. Could this imply a change in what a “learning disability” is, and who is considered “disabled”, on a more societal and global scale? Is the notion of “standard ability”, as defined by laboratory-determined levels of working memory, organization, and lexical ability
relevant in a society with adaptable information environments?

Understanding human ability as an intersection of cognitive phenotypes and information spaces provides a path to design new kinds of information spaces that increase abilities for many people. Furthermore, this perspective enables a broader and possibly more inclusive understanding of human ability as a function of interactions within information spaces that individuals construct to experience the world.

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