

LIBRARY AND INFORMATION SCIENCE

LOOKING FOR INFORMATION A SURVEY OF RESEARCH ON INFORMATION SEEKING, NEEDS, AND BEHAVIOR

THIRD EDITION

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Chapter 2

Common Examples of Information Behavior

Information-seeking must be one of our most fundamental methods for coping with our environment. The strategies we learn to use in gathering information may turn out to be far more important in the long run than specific pieces of knowledge we may pick up in our formal education and then soon forget as we go about wrestling with our day-to-day problems.

— Lewis Donohew, Leonard Tipton, and Roger Haney (1978, p. 31)

Blood donors often ask, “Will I faint?” Cancer patients ask, “Will I die?” citizens facing everyday situations ask, “How long will it take me to handle this?”

— Brenda Dervin (1992, p. 75)

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In this chapter we will make the case that searching for information is an important part of being human, and it is something that we do on a regular basis. Out of necessity we will encounter concepts and terminology that will be explained fully in later chapters of this book. Consider this chapter to be a preview of what is to come.

Every day of our lives we engage in some activity that might be called information seeking, though we may not think of it that way at the time. From the moment of our birth we are prompted by our environment and our motivations to seek out information that will help us meet our needs.

This chapter will consider six situations in which information seeking behaviors are in full swing. That is, these are scenarios that face millions of

people (at least in developed nations) each year, in which decisions and choices are made that require a great deal of data, information, and understanding. Each will underscore the complexity of information seeking and the strategies we use to make it simpler.

All of the stories here involve not only the search for information but the choice of which data to retain and consider. Five of the tales can be characterized as decision making as well, a narrower type of behavior that is studied in its own right and is not always considered in studies of information seeking.

Let's first consider a very familiar type of activity: shopping.

2.1. Six Information Seeking Scenarios

2.1.1. Buying Products

Few decisions are more common in developed societies than choosing to purchase a product. In our role as consumer we may buy thousands of items a year, mostly foodstuffs, but also intangibles like services and many hundreds of household items. Of the latter, only a few may be considered major purchase decisions: houses, cars, boats, furniture, and large appliances, among others.

From the consumer's perspective it is the expensive, infrequently purchased items that tend to garner the most thought. However, it is important to recognize that many small purchases over the course of a lifetime — such as toothpaste or soft drinks — also amount to large expenditures. The fact that even our most minor needs eventually amount to a great deal of money accounts for the attention paid to the purchase decision from two different perspectives: market research (intended to aid the producers of goods and services) and product evaluations (intended to aid the consumers of these).

On the production side, a great deal of thought goes into the design and especially the advertising of items for sale. Advertising is intended to present (and sometimes inundate) the consumer with reminders of the product's existence and with persuasive information about it. Hence, the marketing of products attempts to minimize the effort a consumer expends to search for information.

Indeed, from the marketer's perspective, the information that is put out in print, on radio and television, on the Internet, and on billboards would result ideally in an entirely knee-jerk reaction: the consumer sees the ads, then sees the product, and then buys the product. For those who make and sell products, it is better that the consumer does not engage in a lengthy search for information, but simply buys the item as quickly as possible.

Except for those few truly and obviously superior products, the producers are likely to prefer that the consumer does not compare brands at all.

Research on these questions is accomplished by a variety of scientists working in industry and in universities; most have training in psychology or business (or both). When their reports are not proprietary, they may be published in the *Journal of Consumer Research*, the *Journal of Marketing Research*, the *Journal of Advertising Research*, or in more general publications.

Product makers are not the only ones who do research. There are other organizations that, for both profit and public service, provide the research and testing that the consumers do not (and indeed often cannot) do for themselves. In North America an example is the monthly magazine *Consumer Reports*, published by Consumers Union. A nonprofit organization founded in 1936, Consumers Union reviews goods and services and publishes investigative reports intended to help consumers make intelligent purchase decisions. Consumers Union reinforces its independence (unlike some other "consumer guides") by not accepting advertising and not allowing their published opinions to be used in advertising. Other publications of this type include *Consumer Digest* and *Consumers' Research Magazine*, neither of which undertakes the extensive testing programs of *Consumer Reports*.

The publications of *Consumer Reports* offer a prime example of what the consumer needs to know to make an informed purchase. The magazine conducts comparative tests of many brands and styles of a product, presenting the results in simplified tables with accompanying text. No matter whether the cost of the purchase is small (e.g., peanut butter) or large (e.g., a new car), the goal is to reduce the often massive amount of salient information into a few key factors, rated or described in the simplest way possible.

Let's consider a hypothetical review of passenger cars (Table 2.1).

Table 2.1: Comparison of passenger cars test results for sedans.

Price	Mercedes C-300 \$41,000	Volvo S80 \$37,000	Lexus ES350 \$36,000
Likely reliability	••	•••	••••
Braking	••••	•••	••••
Ride	••••	•••	•••
Comfort	•••	•••	••••
Controls/displays	••	••	•••
Acceleration, 0–60mph	7.0 seconds	8.0 seconds	7.4 seconds
Required fuel type	Premium	Regular	Regular
Fuel economy	21 mpg	20 mpg	23 mpg

Imagine a consumer (we'll call her Julie) is shopping for a new car. Like many consumers, she already has some background information regarding cars: their makes, models, styles, cost, popularity, and perhaps a sense of their mechanical reliability. She has seen the models that interest her driving about town, and she has shared opinions about them with friends and relatives.

Having two children and a husband to transport, Julie wants a car of intermediate size and good quality. Three sedans made by Mercedes, Volvo, and Lexus interest her, because she has had at least one friend who owned each one of these models and was pleased with them.

Of course, to completely evaluate a car, one needs to drive it. However, from past experience Julie is wary of dealerships and salespeople, and has decided to go to them only after doing some background research. In fact, she thinks she might ultimately buy the car through a broker, making the deal over the telephone or the Internet after visiting the dealers to test-drive the models.

Julie starts her quest for facts with a review from a consumer magazine. Like many such publications, it contains color pictures of the various models, charts with dozens of facts on each model (e.g., dimensions, fuel consumption, features, and prices), comparisons of cars by type (e.g., the best luxury vehicles), and subject ratings and recommendations. What draws Julie to this particular publication is its reputation for objectivity and frequency-of-repair charts, based on hundreds of thousands of reports from owners of the vehicles reviewed and unique to this magazine.

Julie learns several facts from the magazine that help her differentiate the three cars. The first thing she notices is that the price range for the Mercedes is several thousand dollars more than the other two, apparently because of the manufacturer's prestige and reputation in North America. Acceleration is considerably slower with the Volvo, as it has a smaller engine than the other two. Fuel economy is similar among the three models, yet the Volvo and Lexus can use lower-octane fuel — making the Mercedes the most costly to operate. The Mercedes and Lexus are rated better for braking ability than the Volvo, while the Lexus and Volvo score better on dashboard design. Turning to the frequency-of-repair charts, Julie sees different patterns among the 14 “trouble spots” (electrical, brakes, transmission, etc.) but concludes that the Lexus may be more reliable than the other two. Julie concludes that, in matters other than the above, the three cars are similar.

Julie is leaning toward the purchase of the Volvo, reasoning that its use of ordinary fuel means a lower cost of operation, compounding those savings over many years of ownership makes the Volvo the least expensive of these higher end sedans. Yet she retains some doubt as to whether the Volvo is

truly equivalent in features to the other two. She knows she can get basic price information — dealer costs, sticker price, and the costs of major options — from a variety of sources.

In her office one evening after work, Julie locates the Website for *Kelley Blue Book*. Here she is able to get price quotes for the three cars with similar options; the Mercedes is considerably more expensive than the other two cars in price, yet the engine (3.5 L) is the same as that of the Lexus (3.5 L). Does the engine size really matter so much, Julie asks herself? Probably not, she concludes.

Armed with this information, Julie heads to the Mercedes and Volvo dealers for test-drives, deciding against any further consideration of the Lexus. She likes the Volvo but finds the salespeople at that dealership to be too persistently aggressive. At the Mercedes dealer, in contrast, the salesman subjects her to less talk, and puts her in a positive mood for her spin in the car; she immediately falls in love with the Mercedes she drives, but realizes that it has many more options than the basic version that she has been considering.

As the week goes by, Julie discusses the purchase with several friends and family members. One friend cautions her strongly against the Mercedes on the basis of maintenance problems she encountered with her own Mercedes, an anecdote that Julie finds persuasive. On the other hand, her husband, who up until now has remained silent on the topic, argues strongly for the Mercedes on the basis of its larger engine capacity. “What if we want to tow a trailer some day?” he asks. That is a scenario that Julie had not even thought of, and it causes her to go back to the Internet to find the costs of towing packages for each car. While still convinced that the Volvo would be the more sensible choice, Julie ends up buying a Mercedes through a nationwide car broker. And besides — it came in more attractive colors!

Three common anomalies of information seeking are worth pointing out in this scenario. One, the mysterious influence we call “taste” has a powerful role in the decision process. Two, personal contacts have strong influence, whether they compel agreement (e.g., the advice of a friend or loved one), or disagreement (an overbearing salesperson). Drawing upon basic human emotions, these two influences can overwhelm any collection of facts, no matter how large or persuasive, as noted in the Chapter 1 comments regarding the fallacy of rational decision making. Three, it is useful to keep in mind that affluence and education can make a great difference in both the sources of information available to people and their inclination to pay attention to that information. In this scenario, an affluent (and probably well-educated) shopper both knows about and has easy access to channels of information that a poorer or less-educated person may not be aware of or inclined to use.

2.1.2. Finding Information in a Library

In the widespread literature that could be included under the rubric of information seeking, there is a genre of empirical work that is larger than any other: studies of people finding information in libraries. Most of the publications in this genre focus on "information as a thing" (Buckland, 1991a), that is, use of books, journals, and other "packages" of information.

So let us imagine another information seeker, this one called Leslie. Leslie is writing a paper for her history class on the 1898 war between Spain and the United States. She has gone to the library to gather background data on the role of the United States president, William McKinley, in the decision to declare war on Cuba. Among her questions are these: Had McKinley favored war from the beginnings of his presidential campaign in 1896? Was McKinley reasonably well informed of the facts regarding unrest in Cuba and Spanish military weakness there and on the high seas? Who were McKinley's closest advisors and what was their advice to him regarding intervention? So Leslie has gone to a university library to find answers to these questions. The particular library she has chosen contains roughly 3 million books and subscribes to more than 4000 printed journals and has electronic access to many more.

Before we begin following Leslie's search, let us consider some tendencies of libraries and their users. First, it is important to recognize that all but the smallest libraries can be complex and intimidating. Although libraries make every attempt to place materials on similar topics in close approximation, this goal is elusive. For one thing it is hard to decide what any one document is "about"; for another, library materials are divided into a multitude of forms — books, journals, computer files (typically through a link from the online catalog), video recordings (on DVDs), and loose materials (in file cabinets or archival boxes) to name some major categories.

As if it were not difficult enough to classify the content of these different forms of media, sometimes information on the same topic and medium might still be found in different places; background material on international conflicts could be found on the shelves of the main collection, on nearby shelves reserved for oversized books, in the collection that serves the reference desk, or perhaps in a special collection or archive. For example, biographies of American presidents will be found on the main shelves of a library, but the personal documents to which they refer are likely to be held in the archives of a distant library.

Once one considers the various interactions of (intellectual) content with (physical) form, it can be seen why libraries become difficult places to search systematically, even with experience. Many visitors to a library end their search prematurely when faced with a large building full of millions of items and the imperfect tool of the electronic catalog.

Leslie begins by consulting the electronic catalog, a tool she has used before. Being a regular visitor to this library, she is aware that if she chooses to consider journal articles she will need to consult at least one other electronic index to obtain the titles and full-text of articles that contain relevant information, and that this would entail much more work than a simple search of the library's holdings. She decides to restrict herself to books about the war and McKinley.

This library offers two different interfaces for searching their holdings. The simpler one is a graphical interface that Leslie has not used before but hopes is less cumbersome than the "traditional" catalog. So first Leslie tries typing the words "war cuba mckinley" into the search box of the graphical interface. Immediately she is presented with a screen divided into two kinds of displays. On the left side of the display is a cluster of words, with lines connecting them. In the middle of this network-like diagram are her own search terms (war cuba mckinley) and branching out from them in all directions are other terms: Cuba, Spain, President, United States, History, Novel, Nations, Bartle, McKinley, McKinney ... and a variety of other words that appear to be synonyms or alternate spellings (and meanings!) of the words she typed. On the right of the screen is a list of books, a few of which are indeed relevant to her topic.

Not sure what to do with the cluster of words — many of which seem irrelevant — Leslie decides to retreat to the traditional interface for searching the catalog. Selecting the other interface she types "McKinley" into the "Search:" box and chooses "within Title" from the pull-down list to the right of the box. She is rewarded with a listing of 12 books. Looking at the book titles, however, she is dismayed to see that few of them are about the former president; rather, they are books that begin with the name "McKinley," whether that is the name of a county or a mountain or a person. Next she receives a list of four books by typing "William McKinley." Even though that seems like very little material to browse through, she heads for the shelves. Checking the books in the "E711" section of the Library of Congress system, Leslie immediately sees that there are many more books on her topic than were retrieved in her search — dozens more, in fact. Based on the titles alone, Leslie's first insight is that most of these books are about the life and/or presidency of McKinley, and are likely to contain merely brief descriptions of the war with Spain in 1898.

After browsing a while and picking up two books about the McKinley administration and one biography of the president, she heads to the reference department of the library. There she asks why her search of the electronic catalog was so incomplete. The reference librarian shows her that there are such things as subject headings in the catalog records. Returning to a terminal for the online catalog, Leslie this time selects the "within Subject" choice from the pull-down menu, and types in "McKinley, William."

This time, 25 books on McKinley are retrieved, even those that do not have his name in the title (Figure 2.1).

Leslie starts to examine the 25 listings, one at a time. The most promising title appears to be *The Spanish-American War and President McKinley*, a book that she just missed because it was at E715. She makes note of several other McKinley books she missed in her browsing session at the shelf, seeing also that two of the more relevant ones are already checked out.

Now that she knows about subject headings, Leslie sees one that could be useful: "Spanish-American War." Searching that phrase as a subject heading gives her 127 titles. Intimidated by the size of this new list, Leslie slowly pages down through the titles until she just cannot read any more. She has jotted down the call numbers of the most promising books, most of which are in the E711–715 range of the Library of Congress system, and a bibliography at Z8561 on the top floor of the library.

Still carrying her initial three selections, Leslie goes back to the E shelves and an hour later has examined 15 other books, selecting just two highly *relevant* ones to check out from the library and leaving behind all three of the first books she chose. She knows that the bibliography in the Z shelves would help her determine whether she has missed anything — this library does not own everything — but the bibliography is two floors above her and she is tired. "This is enough to finish my paper," Leslie says to herself as she heads to the circulation desk.

In this scenario several lessons about information seeking can be observed. Although perhaps two-thirds of adults in the United States and Canada make some use of libraries in a given year, relatively few (mostly

students and faculty in universities) search library collections in any degree of depth. Leslie is an untypical user in that she knows how to use a librarian and a catalog; the reluctance of even regular users of libraries to consult these resources is well documented (consider, for example, the commentary by Borgman, 1996).

Leslie is, however, typical in her nonlinear search pattern; her search is not a neat one that moves swiftly from catalog to shelf to circulation desk; rather, there is a back-and-forth movement between the catalog and the shelf, with considerable time taken to examine works and reconsider her query. Typical of library users, Leslie takes some shortcuts (choosing to consider only books, not journal articles), reverses some of her early decisions (leaving behind the initial choices of books), and ultimately ends the search process prematurely by not fetching the bibliography and checking that (presumably comprehensive) guide against her search results.

2.1.3. Healing a Patient

Although our usual focus in information behavior research is the individual, it is important to recognize that much information seeking takes place in groups, and that sharing of information with others is very common. In this scenario we consider the many exchanges that might take place among members of a health care team in a hospital. Because the information seeking plays out over several days and involves many individuals, it is possible only to sketch out some of the dozens of actions and interactions that are likely to occur. Also for simplicity's sake we will consider only a single patient, while recognizing that such a team would certainly be caring for multiple patients at any one time, each at different stages of crisis or healing. To further condense the description, we focus on only four key team members: physician (Dan), day nurse (Marta), night nurse (Gary), and pharmacist (Ming).

The story begins without the team, in the emergency entrance to a rural hospital, where a 22-year-old male has been brought in by an ambulance shortly after midnight. The man was in a car accident and is semi-conscious but shows no other injuries other than contusions. Unfortunately, the man carries no identification and the car was registered in a female name out of state. Thus, he must be admitted without access to a medical history.

The patient is first examined by a nurse, and then by an attending physician. Both of these administer the Glasgow Coma Scale (GCS), a 15-point neurological measurement of consciousness. A score of eight is recorded each time, which could indicate severe brain injury. Then he is taken for CT scan of the head and upper body, and a blood test for presence of alcohol and drugs. Afterwards, the patient is taken to the intensive care

SearchRequest: S = MCKINLEY, WILLIAM
Subject Index

University Online Catalog
Search Results: 25 Entries Found

MCKINLEY, WILLIAM 1843-1901

1 COMPLETE LIFE OF WILLIAM MCKINLEY AND STORY OF HIS ... [1901]
2 DICKEN TROUTMAN BALKE FAMILY PAPERS [1816] archive-mss
3 EDWARD HENRY HOBSON PAPERS [1857] archive-mss
4 FROM MCKINLEY TO HARDING PERSON RECOLLECTIONS OF ... [1923]
5 ILLUSTRIOUS LIFE OF WILLIAM MCKINLEY OUR MARTYRED ... [1901]
6 IN THE DAYS OF MCKINLEY [1959]
7 LIFE OF WILLIAM MCKINLEY [1916]
8 LIFE OF WILLIAM MCKINLEY SOLDIER LAWYER STATESMAN [1896]
9 MAN WHO SHOT MCKINLEY [1970]
10 MCKINLEY MEMORIAL IN PHILADELPHIA HISTORY OF THE ... [1909]

CONTINUED ON NEXT PAGE

Click on entry to display full record

Figure 2.1: Portion of an online catalog listing.

unit (ICU). Here the night nurse, Gary, supervises the movement of the patient to one of the ICU's 15 beds. The patient is soon fitted with an IV to deliver fluids and medications, and devices to monitor blood pressure, heart rate and oxygen levels of the blood. His temperature is taken, and he is given periodic ice packs to reduce swelling. Gary also gives the patient the coma test again, consulting a "flashcard" he keeps for this purpose, as he has trouble recalling the individual indicators. He records a score of 10 on the chart using the conventional breakdown for the Eye, Verbal, and Motor components of the scale: "GCS 10 = E2 V4 M4 at 01:17." The patient is given no medications at this point, as they might interfere with indicators for the scale.

The patient's hospital room contains a number of potential sources of information, the ultimate origin of which, in some cases, is the patient himself. Among these sources are: the monitors attached to the patient (including blood pressure, heart rate, and oxygen level of blood); the CT scan results, viewable at a nearby workstation; electronic and paper versions of the patient records, including orders for medications administered; and a bedside white board for nurses to record any facts that need to be called to the immediate attention of anyone who enters. On this board Gary has noted the latest coma scale score and the words "Patient Name Unknown." In a nearby alcove outside the room is a nursing station, where a number of medical reference works (e.g., the *AACN Procedure Manual for Critical Care*, *Quick Reference to Critical Care*, and *Micromedex*) are available online, along with medical databases like *MedLine* and *Drug Interaction Checker*.

The fact that the patient's name is not yet known is a serious problem, as nothing is understood about medical problems that might have predated the accident. This situation is resolved early in the morning as the responding police officers report to the hospital switchboard that they were finally able to contact the registered owner of the wrecked vehicle and determine that the patient is her son; now they have a name, which is passed upstairs to Gary where he duly records it on the patient's white board. As the morning shift Gary verbally passes on his recorded observations to the day nurse, Marta: the patient is partly consciousness now, and has vomited twice during the night; temperature has been only slightly elevated, although blood pressure has been high for someone of this age and weight; his GCS is currently 11.

Marta, with the help of other hospital staff, begins a series of inquiries is about the patient's medical records and history, and the status of his health insurance. Emergency medical procedures allow for medical records to be transferred electronically to the treating hospital in such cases. The medical records — which are relatively few in number — become part of the data accessible in the ICU. Late in the morning, the attending physician, Dan,

shows up to examine the patient and be filled in on the situation. Marta calls his attention to several important facts: the patient is not yet fully consciousness for more than short periods of time; the blood test showed presence of both alcohol and opiates, which makes the accident a legal matter; the patient has a current prescription for Adderall (for attention deficit disorder); and he has no medical insurance.

Among other treatment decisions Dan and Marta decide to consult one of the unit's pharmacists, Ming, about whether the patient should be given an anti-emetic (anti-vomiting medication), and the implications of administering any other medications, given the patient's medical history. A two-way radio call reveals that Ming is unavailable until later, which is agreeable. Meanwhile, Marta consults the *Drug Interaction Checker* for possible interactions with Adderall, although Dan has told her that the patient could well do without this medication, given the circumstances. She learns that Adderall can be addictive and can also raise blood pressure — factors to keep in mind in this case. She notes this in the patient's electronic chart.

Late in the afternoon the patient is more conscious for a longer time, moaning and complaining of a severe headache. Ming and Dan appear for their consult, and are able to ask the patient questions about his current and past condition, and his medication habits. He claims to have been in good health before the accident (which he does not remember), but denies taking any drugs (prescribed or otherwise), including Adderall. He asks for some Oxycodone, an opioid, for his headache. These responses cause some skepticism among the three medical professionals about the patient's truthfulness.

Outside of the room, the three caregivers discuss what to do. Given that the patient shows possible signs of drug abuse, they are unwilling to prescribe strong pain medications. They decide that small doses of acetaminophen are warranted, as the GCS is now at the high end (12) of the moderate injury portion of the scale. Another CT scan would be advisable if the patient worsens, but not if he improves. They decide to continue monitoring him and checking in again during the evening.

The next day the patient appears better in several respects. Apart from evident bruising, other vital signs are good: lower blood pressure and normal body temperature. His GCS is 13. The patient continues to complain about headaches, but not so loudly as the day before; from training and experience Marta and Dan know that headaches are common for concussion victims for several days after injury. The ICU has an interest in moving patients along as quickly as possible, so that they always have beds free for emergency patients. Two days into the patient's stay the ICU has come close to capacity, and Dan and Marta agree that the patient is stable enough to be discharged to his family. This is done, but not before a

police officer makes arrangements to take a statement before the patient leaves the state. Through a warrant, the police also obtain the results of the blood test administered at the time of admission, however they are not given any other medical records.

Among the features in this scenario are continuing measures of, and searches for, information, careful recoding of any relevant data, and frequent sharing of information among team members. Given the life-and-death nature of the work, missing or inaccurate information is a constant worry, as there are many opportunities for potential adverse events. There is also a concern for control of patient information, due to privacy and legal issues. The collaboration of multiple skilled workers, equipped with both deep knowledge and extensive physical resources, makes a positive outcome much more likely.

2.1.4. Betting on Race Horses

As in the previous scenario, for horse races the seeker makes a choice. Despite the prevalence of horse-racing language in politics (e.g., "the dark horse candidate" and "backing the right horse" in an election), there are some differences between choosing a candidate and picking a horse. Rather than choosing one candidate from among two or three, in a typical horse race several choices might be made from among roughly 5 to 12 horses, and the type of bet that might be made on the horse(s) multiplies the number of possibilities many times over.

The complexity of horse racing leads to a common, sheepish admission at the tracks: "I choose horses based on their name." That is, if a name like "Gambling Everything" makes one laugh and seems to capture the moment, why not bet on that horse? Infrequent visitors to the race course, attending more for fun than the hope of profit, freely admit the unsentimental basis for their choices; if the name is especially clever, reminds them of a friend or circumstance in their lives, then that is a sign to bet on the horse. It is not the only simplified system for betting. Some bet on an animal's color, with the gray horse in a race likely to create odds more favorable than the horse's reputation deserves. Occasionally the gender of a horse will determine many bets, especially in a race in which a talented filly vies with stallions. Races that draw horses from other countries may elicit bets based on nationality. Some wager not on the horse but on the record, gender, or nationality of the jockey (and so on).

Why is properly picking a horse so complicated that people will resort to simple strategies like the above? First, it must be obvious that no matter how much data are considered, horse racing itself is not a science and offers many unexpected surprises. The most dramatic example of this is when a

highly ranked horse stumbles in a race, or bumps an opponent in such a way as to be disqualified. Even in the most mundane race, the horse most favored by the bettors wins only one-third of the time (Ainslie, 1986, p. 49).

Serious bettors who gather and use as much information as possible about the horse, the jockey, the trainer, and the track (among other things) are called "handicappers." Handicappers firmly believe that, given enough information, they can swing the odds to their favor in an enterprise where the average bettor loses about 20 cents on the dollar. Not surprisingly, a large publishing industry has grown to serve the information needs of handicappers.

The publications on horse racing are many. Most people who have been to a track are familiar with the racing program sold at the track itself, important for its listings of information about the horses and races to be held on that day at that track. However, a track's own program is just the tip of the iceberg of information about horses. Whatever data a North American track distributes about its own races, that information is overwhelmed by what can be found in the *Daily Racing Form* (published by Triangle Publications, Inc.), which is published every racing day and distributed internationally. The *Daily Racing Form* is in turn dwarfed by the *American Racing Manual*, an encyclopedic by-product of the *Form* that covers an entire year. In addition, there are several (mostly weekly) magazines devoted to racing. Among them are *American Turf Monthly* (advice for handicappers), *The Blood-Horse* (the inside story on horse breeding), and *Turf and Sport Digest* (news for the horsing industry as well as the frequent bettor).

Just what information could merit so many publications? Considering only information about the horse and jockey, there are many items of data to consider. The key category of information is the horse's recent record of racing (the *Form* usually lists the last nine races) and sometimes one to three workouts (trials that were not races). Regarding each race, there are approximately 25 items of information (all on a single line), including the date, length, type, timing, and top three placers of the race, along with the jockey, odds, and weights carried by the horse, and often ending with a subjective evaluation of the horse's performance (e.g., "tired" or "failed to menace"). Elsewhere on the page are summaries of the horse's lifetime earnings by year, and the names of the sire, dam, owner, breeder, and trainer. Altogether, the *Form* typically offers about 250 discrete data items regarding each horse — and there are typically 5–12 horses in each race! Even without considering the other relevant information contained in the *Form* about the race itself (e.g., what types of horses can race and how much they can win) and the track (top times for each of up to 16 different lengths that races can run), we can see that each race offers the potential for consideration of several thousand data items.

But humans do not want to digest several thousand items of information and often simply do not have the time to do so. Therefore each handicapper relies on a selection system that eliminates most of this information; typically they focus on just a few dozen data items about each race and sometimes considerably fewer. Less successful but a lot less work are the systems described above, such as "Always bet on the prettiest horse!"

Let us consider the case of an occasional bettor who would like to become a regular handicapper, a common enough circumstance. Joe, our bettor, goes to the track and buys a copy of the *Racing Form*, along with a program of the day's races. It is his first time with the *Form*, and he is at first overwhelmed by the scope and depth of information he finds there. With the first race just an hour away, he settles into a comfortable spot and starts making notes on what he reads.

Joe has a few rules of thumb in mind to guide his reading. Looking at the listing for the first race, he notes the "morning line" (projected) odds for each of the nine horses that will start that day. Joe can see right away that three of the horses are expected to run at much better odds than the other six; horses one and two are likely to pay \$3 for every \$1 bet (i.e., odds of 3:1), whereas horse three is expected to run at 4:1. All of the other horses have odds of 8:1 or worse, with one poor horse paying 50:1 for a win. For a moment Joe ponders what he could do with \$50 for every dollar he bets, then shakes himself back to reality with a reminder that such horses very rarely win; he also reminds himself that he has to check the TV monitors at race time to see how much the odds have changed as bets are wagered; in parimutuel betting the odds are based on the actual pattern of bets made, rather than the estimates of the *Racing Form's* handicappers.

Joe decides to concentrate on what are clearly the best three horses in the race and on just three types of information: the horse's performance in recent races, the jockey's record, and something called the "speed rating." He notes that horse one, Entropy, won one of his last nine races, and has placed second (i.e., "placed") in three others. Horse two, Uncertainty, has also won one of his last nine races, and has placed second in two others. The number three horse, Signal, has not won a single race, yet has managed to come in second three times, and has come in third (i.e., "showed") two times as well; furthermore, all of Signal's second-places were in the last three races, indicating an improving performance.

Not seeing a clear pattern in these data, Joe decides to look more closely at each race for further clues. He considers an important question: has the horse won *at this distance* before? Joe knows that distance is an important factor and that an earlier win at the same distance is a strong indicator of potential success today. Races can be a variety of different distances, and many horses excel at the shorter or the longer distances, but not both; in addition, some races are run on the turf (i.e., the grass strip inside of the dirt

track), and some horses specialize in such a surface. From the top of the *Racing Form* Joe sees that this is a 1-mile race on the dirt track, and recalls that it has not rained this week; a track muddy from recent rains would require consideration of yet other factors, and Joe feels like he has too much to think about already.

Our bettor happily reads that Uncertainty's win and places have all taken place on the turf, and that may well allow him to eliminate that horse from consideration. His comfort is lessened when he realizes that Entropy's victory was in a race of 6 furlongs (three-fourths of a mile) whereas Signal's near-misses have all been in races of 1 mile. So neither horse has won at this race before, but Signal looks better prepared for this long race.

Next Joe considers the speed rating, which is an objective metric that compares the horse's performance with a rating of 100, meaning that the horse's running time (in a particular race) equaled the track record for that particular distance. Entropy, Joe sees, has a speed rating of 80 for his winning race, indicating a performance 4 seconds slower than the track's record; his places earned similar ratings. Although not usually a dirt racer, Uncertainty is undoubtedly a faster horse at an average rating of 84 for his three best races. Signal begins to look worse with speed ratings between 77 and 81.

So now the picture is looking even more muddy. Joe turns to a separate table in the *Racing Form* that lists the performance records of each jockey, over many races and with different horses. Here, at last, is clear-cut information: Entropy's jockey has won 17% of his races, while the other two jockeys hover near 8%. Joe jots this down on a little table he has been sketching on a notepad (Table 2.2). This cinches it: Entropy is to be the horse Joe bets to win.

It is now 32 minutes to race time and Joe remembers that he needs to check out the latest information on the track TV monitors. Up to this moment he has been dealing with information that is at least hours, and in some cases months or years, old. It is with a shock that Joe reads on the monitor that Entropy has been scratched from the race, and that Signal has had a change of jockey. Another look at the table in the racing form tells him that the new jockey has a better record — 11% wins — than Signal's old jockey. Joe looks

Table 2.2: Joe's notes on the three top horses.

Horse	Odds	Wins	Places	Track	Speed	Jockey won (%)
Entropy	3:1	1	3	Dirt	80	17
Uncertainty	3:1	1	2	Dirt	84	8
Signal	4:1	0	3	Turf	79	8

at the latest odds and realizes that the turf horse, Uncertainty, is now the crowd's favorite at even odds (1:1) while Signal has crept up to 5:2. "Do the other bettors know something I don't?" Joe wonders.

Joe considers spending more time with the *Racing Form*. He knows that it contains information on the horse's recent condition, class, parentage, and so forth, but he is feeling undecided and a bit pressed for time; he needs to place a bet within the next 20 minutes. It is then that Joe recollects a potentially valuable source of information that appears in no published document: the horse's condition at this moment. Walking quickly over to the rear of the racing stands, in a few minutes Joe finds himself at the paddock, where the horses for the first race are being paraded for a large number of bettors crowded around the rails. After a few minutes of craning his neck and standing on his toes, Joe manages clear glimpses of both Uncertainty and Signal; the former animal appears nervous while Signal appears calm and strong. With his mind made up, Joe rushes to the nearest betting window where, after 5 minutes of waiting he bets \$10 on Signal to win at the latest odds of 2:1.

Ten minutes later the finish line is crossed first by Channel, a horse that Joe had not even considered. Trying to salvage a lesson from this first race, Joe notices that in the last 15 minutes of betting, Channel's odds moved from 6:1 up to 3:1 — a sign that many bettors had begun to favor the horse. "I would have noticed that trend if I had been paying more attention to the monitor," Joe says to himself, and then with a start realizes that he has much less time to do the next analysis: Race Two will begin in only 25 minutes.

We can notice a few principles in this case study: the searcher has much too much data to systematically analyze in the brief time before each race. Hence Joe attempts to simplify the "search space" for a solution by ignoring many categories of information he deems less relevant. Unlike many other search processes that result in some kind of decision, in this case the most important data — the betting odds — keep changing constantly, right up to 2 minutes before the race. Like the opportunity for first-hand observation of additional information (the horse's condition), the need to "monitor the monitor" can be a distraction from further analysis.

2.1.5. Finding the Law

George is spending his Saturday in the law library. A lawyer in a small Kentucky law firm, George has been practicing just 5 months (problem 1) and is overwhelmed by his work (problem 2), which is chiefly tax law (problem 3). Nevertheless, he promised his sister, Edna, to write a legal memorandum on her alimony case even though he feels that he does not

have the experience, time, or background to do a perfect job of it. The hard fact is that Edna cannot afford a lawyer, is starting to have trouble paying her rent, and besides, she is his sister. So even though the course George took in family law is only a dull memory now, today he joins dozens of other lawyers and students in a quest to find the law.

George knows the basic facts of the case all too well. Last year when Edna divorced her husband Fred, the court ordered him to make monthly alimony payments. Three months ago Fred took a new job in another town, moved to an apartment, gave up his phone, and stopped making payments. Fred's only direct communication with Edna was a phone message warning that he would have to skip her next payment to afford the deposit on his new place, and that he would "make it up to her later." The first few weeks Edna was annoyed yet somewhat sympathetic, because she was the one who filed for divorce. But after a month went by with neither the next nor the previous alimony payment, Edna felt foolish that she had not acted more quickly; to make matters worse, Fred has proved to be impossible to contact.

Edna knows that she has legal recourse through the court, but also knows that it could be a struggle to document the facts and recover lost payments. So she turned to George first. George is determined to settle this dispute as quickly as possible, even if it means he has to pay another attorney to follow up his work later; unfortunately he has precious little time over the next few weeks to devote to it. Though George believes that Edna's case is a straightforward one, he wants to check two issues in particular: first, whether a recent raise in Edna's modest salary could reduce alimony or impede collection of what is owed to her; and second, whether Edna's hesitancy to act when the first payment never arrived might allow her husband to argue that she had agreed to the stoppage of payments.

George starts with the index to the *Corpus Juris Secundum* (referred to as the CJS) and locates the section on Divorce in this encyclopedia-like reference tool. He finds, two subheadings down, a section on "arrears"; he spends some time reading this section of the main body of CJS, and also in a newer *Supplement*. As well as reminding himself of the key points of the law in this area, he locates a citation to a recent case decided in Kentucky. George jots down the citation to the Kentucky case, a parallel citation, and a frequently cited decision from New York State. Next George turns to the *Quick Index* to the state volumes of the *American Law Reports* and finds an entry (Figure 2.2) to a discussion of "arrears" under the heading "Alimony — Delinquent or overdue payments." After reading the discussion in *American Law Reports*, and noting references to yet other cases, George decides to read the cases themselves.

George looks up the Kentucky case in *Kentucky Decisions*, which reports cases for his state, and another in the *New York Reports, Second Series*. For his last task of the day, George uses a public terminal and his office's LEXIS

ALIMONY—Cont'd

Delinquent or overdue payments
debt, right of spouse to set off debt owed
by other spouse against accrued spousal
or child support payments, 11 ALR5th 259

laches or acquiescence as defense, so as
to bar recovery of arrearages of permanent
alimony or child support, 5 ALR4th 1015

visitation, withholding visitation rights for
failure to make alimony or support payments,
65 ALR4th 1155

Figure 2.2: Excerpt from the *American Law Reports*.

account number to search the online version of *Shepard's Citations* to check on the continuing validity of the cases he examined; he finds the most relevant cases are still valid.

George has spent 3 hours in the library and is tired. But at least he feels grounded in the relevant law and has checked the case updates. Tomorrow George will draft a memorandum on Edna's situation, and the following week he will discuss it with a colleague who practices family law. He knows that it may be hard to get money out of Fred if he continues to avoid responsibility, but George is certain that, should Fred attempt legal resistance, Edna's case would be most compelling to a court.

Given Brenda Dervin's emphasis on "everyday" information seeking (see Chapter 1), most of her 10 points are not particularly relevant to a highly structured search of formal information sources by an experienced attorney. However, it is worth noting that, although George certainly found "the law" governing his sister's situation, her problems are not over yet! There is much work to be done before the records of law and previous decisions may result in some kind of action in Edna's favor. As Dervin implies, few problems are immediately solved by the discovery of relevant information. And as some psychologists and criminologists have documented, court decisions are not always as rational as we might hope, either.

2.1.6. "I Want to Know More about Cancer"

Let's consider an entirely different kind of desire for information, one in which there is no decision or choice to be made, and in which it is difficult to determine exactly what the "need" is. "Curiosity" is the label that we

might apply to the situation described below; according to Webster's *New World Dictionary*, curiosity is a word that is used to indicate a general "desire to know," sometimes "about things that do not necessarily concern one."

It is certainly hard to say what makes us curious about a subject. In a famous article about why and how people ask questions, Robert Taylor (1968) wrote about "visceral needs" of mysterious origins that make themselves known only through a vague uneasiness about not knowing something. The visceral need remains "unarticulated" until we verbalize it to ourselves or someone else. In the process of trying to state what it is we want to know, the information need usually comes out in an imperfect and unsatisfactory statement ("compromised," in Taylor's words). Brenda Dervin's (1983a) investigations into "sense making" employ a similar concept: the information gap. That is, until we recognize the existence of a gap in our knowledge — often signaled by a mild anxiety and/or a need to act — we are not motivated to search for information. However, whether we ask questions, read books, or take another kind of action to find something out, it is important to recognize that information often comes to us, fortuitously, in the course of our normal lives. The *serendipity* factor — the seemingly accidental discovery of relevant information — operates more often than we might expect.

Our searcher this time is named Maria. Maria, who is in her early 30s, was never particularly concerned with matters of personal health until a favorite cousin discovered that a firm, red lump on her arm was cancerous. Through several weeks of a successful treatment plan, Maria kept in frequent telephone contact with her worried cousin, who lived in a distant state.

Maria had heard the dreaded word "cancer" her entire life. When she was a teenager her grandfather had died of lung cancer, but other than him, nobody close to her had ever been diagnosed with cancer. She knew that many old people died of cancerous growths. Cancer, like death itself, was something that Maria would rather not think about.

Not long after her cousin's discovery, Maria came down with a sore throat and visited a nearby medical clinic. While in the waiting room she noticed a brochure, "What You Need to Know about Skin Cancer," published by the National Cancer Institute of the National Institutes of Health. She took the brochure home to read and was surprised to learn that almost half of all mature adults are likely to have had skin cancer. She had thought cancers were pretty rare, except among the elderly. At least Maria felt confident now that she knew how to spot skin cancer herself and what to do to avoid it. And, for a time, that was all she wanted to know about cancers.

Some weeks later, coming across the brochure on skin cancer in her living room, Maria found herself curious. What *was* cancer, exactly, and what

caused it? The brochure did not say much about the underlying nature and causes of carcinoma, but it listed a toll-free number for further information (1-800-4-CANCER), which she called to request other brochures in the National Cancer Institute series. Later she had coffee with a friend who was a nurse and asked some very basic questions about cancer. Maria did not understand quite everything that she was told by her friend, but understood enough to know that she wanted to know more. *Why* she needed to know more, she was not exactly sure, but maybe it could be useful in defending herself against future illness.

One day Maria bought some skin cream made by the Avon company. With the skin cream came a list of other Avon products, which mentioned that company's "Breast Cancer Awareness Crusade" and listed a Website. Out of curiosity Maria used her home computer to reach Avon's Web page, where she found, along with answers to frequently asked questions about breast cancer, some fascinating narratives by women who had survived the illness. She had never thought about using the Internet for this sort of information; somehow it made it easier for her to read about the scary topic of cancer.

Maria noticed that the Avon site did not refer to any other related sites. She decided to do a search on the word "cancer" and was bewildered by the number of sites (over 200 million) that contained a reference to the word. Obviously, she had to be more specific. Her nurse friend had mentioned the Mayo Clinic as a good source of information; searching for the words "Mayo Clinic" lead to a site called the "Mayo Breast Cancer Center" that included many pages of clearly written material on cancer in its various forms. She printed some pages, and skimmed or read others.

Finding more information on cancer became a kind of challenge. Through the Mayo site she found a link to a page sponsored by the National Institutes of Health. Maria felt like she might be able to trust this information more, because it was provided by a national government. However, she found the site somewhat overwhelming — so much information was about government projects or about research projects — and she did not find the sort of common-language explanations she was looking for. She noticed a link to the National Cancer Institute's Website and there found the same material that she had read in the brochures they had sent her. At this point she decided to call it a day and stop searching.

Maria's interest in cancer did not stop here. At various times she spent hours browsing the personal health sections of a local bookstore and the public library in her town. She talked to her friends about "all this stuff I've learned on the Internet" and became known as somebody who liked to talk about health matters. In turn, Maria learned a great deal listening to the experiences of her friends — their worries about staying healthy, and their stories about relatives who had cancer and heart disease. It seemed like every

conversation Maria had with others about health sent her back to the Internet to answer a question, to learn about a disease, or simply to surf.

Maria's case represents two of the softer dimensions of information seeking: a tendency to avoid certain information until one is ready to deal with it, balanced against a curiosity motivated by deeply held feelings. In situations like Maria's, the urge to find facts and hear personal stories may satisfy some emotional need to be reassured, to be comforted, to *connect* with others. In this sense there is no final answer that will end information seeking — it is the project of a lifetime.

2.2. Summary

We have seen, through six fictitious case studies, the playing out of information seeking in different contexts. Common to them all has been the need to deal with (potentially, at least) great volumes of information, much of it complex. In all cases the searchers have attempted to lessen their cognitive load by jettisoning some types of information, taking a shortcut to a state of satisfaction or decision.

The results of most searches, although incomplete and perhaps even resulting in failure (witness Joe's lost bet), were, at the time, *good enough* to satisfy the needs of the seeker, a type of behavior that is called *satisficing*. With the exception of the ICU team (a group of professionals with considerable resources) the seekers of information did *not* make every possible attempt to attain the most complete, accurate, and detailed information available (*optimizing*) but rather gathered just enough data, opinions, and impressions to feel satisfied with the process. When a person reaches such a stage, he or she may end the task with a feeling of closure.

These six scenarios were chosen to provide readers with contrasting elements across different information seeking activities. These contrasts are highlighted in Table 2.3, in which the scenarios are ranked in order of *time pressure*. The primary *motivation* in each of the six scenarios varies widely; two searches are prompted by assignments given to the seeker by other persons, and the rest are personally chosen by the seeker out of self-interest. *Sources of information* used by each person are more homogeneous. Most seekers use a mixture of formal (e.g., printed publications or electronic sources) and informal information (e.g., the opinions of friends); the major exceptions are the three assigned tasks, in which documentation of official sources is important.

Time pressure is determined by how quickly a search for information must be concluded: minutes, hours, days, weeks, or months. The *degree of thoroughness* roughly summarizes the ratio of data-actually-gathered-and-considered to all-data-potentially-relevant in a search. The *time pressure* and

Table 2.3: Comparison of six case studies.

Seeker(s) and situation	Main motivation	Sources of information	Time pressure	Degree of thoroughness
Julie: car purchase	Optimize functionality and value	Friends, Web pages, salespeople	Low (months)	Low
Leslie: library research	Class assignment; earn credit/grade	Online catalogs, books, journals, professional advice (on how to search)	Moderate (weeks)	Moderate
Hospital ICU team	Work assignment; desire to help others	Observation of patient, paper and electronic records, monitoring devices, medical manuals, hospital employees	Very high (hours or days, based on patient improvement)	High
Members: caring for an accident victim				
Joe: horse race wager	Desire for thrill; to win money	Special journals, observation, intuition	Very high (minutes)	High
George: legal research	Work assignment; help relatives	Special databases and publications, professional advice	High (days)	High
Maria: information on cancers	Curiosity; preemptive information search	Web pages, books, brochures, friends, experts	None (lifetime)	Moderate

required degree of *thoroughness* faced by the seekers of information vary the most, as can be seen by examining the more extreme cases.

Maria's interest in cancer-related information comes out of a personal curiosity that may last a lifetime; in her case there is no identifiable time pressure at present. In an optional purchase such as Julie's, the decision could be postponed indefinitely, making the search for information protracted; as well, the number of variables is large and the importance of subjective judgment (e.g., taste) is so important that a relatively low proportion of potentially relevant data are considered in the final decision. In the case of Joe's racing wager, a decision must be made within minutes, and the amount of information of potential relevance is so large that only selective use of information is possible. Finally, George's legal research requires not only very fast turnaround (days) but absolute accuracy as well; therefore, George must be especially careful to search all of the relevant sources and to do so thoroughly. The other cases lie in between these extremes regarding time and thoroughness.

The cases we have examined represent quite common scenarios: writing a term paper, buying a product, satisfying our curiosity, and so forth. There is one sense in which they are *not* representative, however: most of the academic research conducted on information seeking examines scenarios more like those of George (work in a professional or occupational setting) and Leslie (searching formal sources, particularly in libraries).

In fact, a high percentage of the situations examined in traditional information seeking research have involved either laboratory scientists, engineers in private firms, or university research faculty (in a broad array of disciplines). Because we will be reviewing such cases in future chapters, there is no need to emphasize such complicated research settings at this point in our discussion. The human factors bearing on information seeking are similar with all questions and in all fields of inquiry.

Now that we have grounded the topic in familiar human situations, we will next turn our attention to a basic question: their corresponding definitions and corollary concepts. What is "information?" What is "information seeking?"

Recommended for Further Reading

Aspray, W., & Hayes, B. (Eds.) (1956). *Everyday information: The evolution of information seeking in America*. Cambridge, MA: MIT Press.

This edited book features examples of how individuals have pursued their daily information needs over several decades, including chapters on car buyers, airline travelers and sports fans.

Connaway, L. S., Dickey, T. J., & Radford, M. L. (2011). "If it is too inconvenient I'm not going after it": Convenience as a critical factor in information-seeking behaviors. *Library & Information Science Research*, 33(3), 179–190.

A review of two recent studies of library users, noting that they frequently cite convenience as a factor in how and where they search for information, however their definition of convenience may change over time, depending on their situation.

MacIntosh-Murray, A. (2001). Scanning and vicarious learning from adverse events in health care. *Information Research*, 7(1). Retrieved from <http://InformationR.net/ir/7-1/paper113.html>

This review of studies of information failures in medical practice discusses how health care organizations can systematically learn to avoid such problems.

PART 2

CONCEPTS RELEVANT TO INFORMATION BEHAVIOR