

# There's no shortcut: Building understanding from information in ultrarunning

Journal of Information Science  
1–11  
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DOI: 10.1177/0165551516000000  
[jis.sagepub.com](http://jis.sagepub.com)  


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## Abstract

Now that information proliferates, information science should turn its attention toward higher-order epistemic aims, such as understanding. Before systems to support the building of understanding can be designed, the process of building understanding must be explored. This paper discusses findings from an interpretative phenomenological analysis study on the information experience of participants in a 100-mile footrace which reveal how these participants have built understanding in their athletic pursuits. Three ways in which ultrarunners build understanding – by taking time, by undergoing struggle, and by incorporating multiple perspectives – are described. The ensuing discussion leads to three questions that can guide the future development of information systems that support understanding: First, how can information science slow people down? Second, how can information science encourage people to willingly struggle? And third, how can information science stimulate analogical thinking?

## Keywords

Understanding; phenomenology; ultrarunning

## I. Beginning

To understand what is to be done by the Human: that would be to use what your understanding understands to nurture what your understanding does not understand. You could then live out all your natural years without being cut down halfway. And that would indeed be the richest sort of knowledge. [1: 39]

Modern information and communication technologies allow us to collect more data than ever before. In this clime, information scientists have been endeavoring to provide the public with the means to organize this data into information and knowledge. But is that the end? Is it simply the case that “knowledge is power,” as the cliché goes? The oft-cited hierarchy of data–information–knowledge–wisdom suggests that there may be more to the story. Perhaps knowledge is power only inasmuch as it contributes to wisdom. But the jump from knowledge to wisdom, too, may be an oversimplification: As Bawden and Robinson [2] observe, the original formulation of the DIKW hierarchy included, between the K and the W, the letter U, for understanding.

The epistemic aim of understanding has long been recognized for its relevance in hermeneutic phenomenology [3], and its importance has recently been highlighted for information science generally: As information retrieval technologies and literacies proliferate in the public, information professionals are no longer called upon or needed to provide information in many situations. A person, for instance, may tend to prefer a self-service approach to information acquisition by searching for information online [4]. This begs, Bawden and Robinson [5] argue, that information professionals reframe their practice as cultivators of understanding rather than mere providers of information. In the future imagined by Bawden and Robinson, information systems will support understanding. But at present, systems are not well equipped to do so [2]. In order to begin to develop such systems, we need a better account of how understanding emerges within information activities.

To this end, in this paper I present findings from a phenomenological study of the lived information experiences of participants in a 100-mile footrace. In this work, I extend prior research in ultrarunning that has demonstrated how the

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sport involves the experiential attention to and management of multiple modalities of information [6]. In this study, I focus on how the participants' cumulating information experiences in running have contributed to their understanding of running and themselves. From an analysis of post-race interviews, I draw out three thematic aspects of their process of building understanding – *time*, *struggle* and *perspective* – followed by a discussion of how these findings contribute to our grasp of understanding in other domains.

## 2. Understanding

Most discussions of understanding in information science have, until recently, occurred in the context of hermeneutic phenomenology. Budd [7], for instance, defines hermeneutic phenomenology as the study of understanding and argues for its adoption as a fundamental metatheory in information science.

Hermeneutic phenomenology was developed by Heidegger [8], who articulates understanding as the primordial way of being of authentic human being. Understanding is, for Heidegger, a person's interpretation of things they encounter in the world. Things are interpreted as possibilities, for the part they can play in the person's future. In Heidegger's view, a person *is* their future possibilities, as the person's very existence entails pursuing possibility. Thus, as a person goes about understanding – interpreting – they take responsibility for themselves and construct a meaningful existence. Notably, a person cannot truly exist in their wholeness without continuously understanding. This is because, in the phenomenological worldview, it is impossible for consciousness not to be directed toward something, and so things are always being encountered and interpreted. A person (or "person") who ceases understanding is one who has fallen into the machinery of the anonymous "they" of society; their self-directed possibilities are no longer meaningful guides.

Heidegger's account thus positions understanding as fundamental to the mode of human being. At first blush, it seems to have little to do with the epistemic sort of understanding that the word connotes in its everyday sense. As Heidegger wrote, "understanding does not primarily mean staring at a meaning, but understanding oneself in the potentiality-of-being that reveals itself [in possibilities]" [8: 252]. Yet Heidegger suggests that the sort of understanding akin to "staring at a meaning" can be built up from this primordial understanding. This can be more clearly seen in the work of hermeneuticists after Heidegger. Notable among these scholars is Gadamer, who has become, perhaps, the most well-known hermeneuticist within information science [3, 7]. Focusing on texts, Gadamer discusses how the contextualized, iterative act of understanding as interpretation is essentially a process of generating multiple interpretations that gradually lead to determinacy. As determinacy is approached, understanding is built up, revealing the dynamic relationships among the processes constitutive of the phenomenon under exploration [9].

The building up of understanding constitutes a bridge between the seemingly at-odds conceptualizations of understanding in hermeneutic phenomenology and by philosophers such as Floridi and Kvanvig that was observed by Bawden [10]. An account of the latter sort of understanding, what I refer to as *epistemic understanding* (as opposed to *hermeneutic understanding*) has been developed by Bawden and Robinson, through a synthesis of a number of contemporary philosophical approaches, for application in information science:

Information is taken to be well-formed, meaningful, truthful data. Knowledge is taken to be information organised in a network of account-giving interrelations. Understanding occurs when a conscious entity, supported as necessary by information systems, appreciates the totality of a body of knowledge, including its interconnections. The extent to which the knowledge is incomplete, contradictory or false determines the degree to which understanding is less than complete. [5]

This account seems suitable for application in certain domains, such as in the natural sciences, but its requirement that information must be true may make it overly limited for universal application. First, it seems to assume an objective entity of total understanding, which may be incompatible with certain epistemological frameworks. For instance, it does not seem to allow for one person's understanding of a phenomenon to differ from a different person's understanding of that phenomenon and for both understandings to be equally valid. Also, it does not account for the possibility that false information could lead to understanding (e.g., of the concept of betrayal), and moreover it does not consider the possible informativeness of things for which truth does not apply (e.g., artwork). Granted, the issue of whether truth is requisite for information is still debated among philosophers [5]. Floridi, for instance, proposes that true information and misinformation/disinformation (false "information") are subtypes of semantic content, and that understanding may result from all types of semantic content [11]. Moreover, in philosophy, the subject of the informativeness of art is taken up by Briesen [12], which will be discussed below, and also by Johnson [13]. In light of this, for the purposes of the phenomenological work at hand, I favor the broad, experiential definition of *information* given by Lupton: "Information is that which informs. This means that information is in the eye of the beholder – anything can be experienced as information" [14: 71], and I assume that all experienced information can play a role in the building of understanding.

Regardless of epistemological quibbles with Bawden and Robinson's [5] articulation of understanding, their account paints understanding as the grasping of a network of interrelations of pieces of information (by whatever name), a view that is shared by all the philosophers reviewed by Bawden and Robinson. They also, perhaps audaciously, suggest that information systems can play a role in fostering understanding. This, to be sure, is far from present reality:

[Current information systems are] intended to return relevant documents, to provide facts and figures, to answer specific questions, or, at best, to give fragments, or snippets, of knowledge. These things they may do well, but they offer little or no direct support to their users in building up a coherent, explanatory knowledge-base. [2: 295]

At a time when Google and Wikipedia – that is, information – are but a tap away for much of the world, the facilitation of understanding is an alluring and inspiring avenue for the future of information science. But in order to build such systems, we need a more concrete understanding, as it were, of how an individual builds understanding.

### 3. Running

Ultrarunning – participation in footraces longer than marathon (26.2 miles) distance – is my most impassioned hobby. I began running in 2010, when I could only run a mile at a time. I began running progressively longer distances, and in 2014 I ran my first ultramarathon. The activity of endurance running is ripe with information processes, including making training plans, building a knowledge base, talking with other runners and monitoring the body [6], and these information-based activities constitute information experiences [15]. As I gain experience in the information activities involved in ultrarunning, I understand the sport better and better. As a testament to this, I now routinely cover distances that I previously thought impossible. I have built understanding in this domain, but the processes involved in the building of this understanding have been invisible to me – indeed, the closest to hand can be the hardest to see. To appreciate what happened to me, I decided to look to the experiences of others. *How*, I asked, *do ultrarunners build an understanding of ultrarunning?*

To broach this question, I conducted a phenomenological study of ultrarunners' lived information experiences. Articulated by van Manen [16], phenomenology is a mode of interpretive and descriptive inquiry that attempts to look deeper into what is taken for granted. It is a method for cultivating wonder. Phenomenology, the study of consciousness and lived experience, is well-suited to the study of understanding because understanding is a phenomenon of individual consciousness and lived experience [5, 8]. Indeed, because understanding must always be an understanding *of* something, it must unfold within a specific domain. In this initial foray into the topic, I chose to study understanding in ultrarunning; this choice was made for personal resonance, logistical convenience and because distance running as an information-related practice has not yet been well documented in the literature. A grasp of the question of understanding in ultrarunning, I hope, will guide inquiry into understanding in other domains.

Though phenomenology is originally and primarily a mode of philosophical inquiry, it has been applied successfully to empirical questions in numerous domains of research and practice, lending validity to its employment [16]. Methodologically, phenomenology seeks to collect and consider concrete examples of a phenomenon in order to uncover its essential nature. However, what is deemed "essential" is subject to constant revision and reconsideration as more cases are considered, as in the Gadamerian iterative process of understanding described above [3, 9]. As such, "Phenomenology is primarily a philosophic *method for questioning*, not a method for answering or discovering or drawing determinate conclusions" [16: 29], though questions themselves may potentiate useful insights. In this way, phenomenological questioning frequently leads to further questions. What phenomenological findings *do* provide, though, is a framework for considering other cases and phenomena in their integrity; thus phenomenology offers analytical generalizability, whereas other methods seek statistical generalizability. Based on phenomenological findings, a person can consider how other phenomena are similar to and different from what was described in those findings. To be sure, all examples of any phenomenon have unique aspects, just as all phenomena, by virtue of being phenomena, share certain aspects (e.g., being a self-showing, having a tendency to be obscured in everyday dealings).

This study employed interpretative phenomenological analysis [17], an idiographic and hermeneutic research methodology designed for exploring how people make sense of their lived experiences by marrying the methods of phenomenological philosophy with the qualitative analysis of empirical data. This methodology has proven utility in information science [18]. Interpretative phenomenological analysis uses semi-structured interviews with a small group of individuals to provide a holistic account of the phenomenon under study, taking into account the lived worlds of the participants. In this way, the methodology provides an avenue for the rich description of complex processes without requiring a preexisting theoretical framework.

I recruited participants in the Kettle Moraine 100 Mile Endurance Run (Kettle 100), held in early June 2016 in southeastern Wisconsin. I am originally from this area, and I am familiar with the course, as well as the Midwestern U.S. ultrarunning ethos. In a pre-race email, the race director forwarded a message from me to all registrants of Kettle 100 inviting them to take part in a survey and, optionally, participate in a post-race interview. The survey is part of an ongoing study across a number of 100-mile races; in this paper, I report only on findings from the interviews.

In the week following Kettle 100, I conducted five interviews with participants of the 100-mile race, representing a range of ages and backgrounds. The crux of each interview began with the open question of, “Tell me about your experience at Kettle 100,” and I probed further based on the participant’s responses. As prescribed by Smith et al. [17], I sought to obtain participants’ descriptive accounts of their lived experiences of the race, as free as possible from causal explanations and post-race re-interpretations. To achieve this, I asked participants to tell the story of their race as it unfolded. To elicit further details, I asked about their preparation for the race, the part of the race they found most difficult, and the part of the race they found easiest. While the questioning revolved around each participant’s experience at Kettle 100, questioning also broached their running-related information seeking and use. Each interview lasted about one hour. With permission, I recorded each of the interviews and later manually transcribed them.

I analyzed the interview transcripts according to the methods described by Smith et al. [17]: Each participant’s account was first analyzed individually and inductively open-coded for topics that recurred and seemed relevant to the concept of building understanding. For example, initial codes included “online information seeking” and “talking during race.” After the initial round of coding, I abstracted and consolidated the codes into more general themes. I found, for instance, that many cases of “online information seeking” and “talking during race” were actually in the service of “collecting diverse perspectives,” which will be discussed below. When the themes from each account were established, I compared, contrasted and reconciled themes across participants’ accounts. Though each participant’s experience was unique, threads connected their accounts. From these threads, I wove three themes that seem essential to the process of building understanding in ultrarunning – *time*, *struggle* and *perspective* – each of which will be discussed in turn.

### 3.1. Time

Time is an ever-present factor in our lives – in Heidegger’s [8] view, being *is* time – but studies of information behavior have rarely taken time into account [19], perhaps because of the invisibility brought on by its ever-presence. Savolainen particularly suggests that research should look at how individuals experience time in the course of their information activities. Happily, then, in the gaining of understanding for these ultrarunners, time emerged as a key theme.

In my participants’ accounts, three temporal arcs were found to contribute to understanding: *lifetime*, *seasonal* and *single-race*. These correspond to the three temporal arcs that Hartel [20] identified in the serious-leisure hobby of gourmet cooking. Hartel described how each arc is a context for certain information activities; in my analysis, I discovered the same. Here I will discuss aspects of each arc that are related to the building of understanding.

The *lifetime temporal arc* constitutes the runner’s career in the sport and includes the understanding built throughout that career. Participants evoked this arc in their descriptions of the trajectories that led to their participation in Kettle 100. Participants also discussed how Kettle 100 fit into their long-term goals. Some approached Kettle 100 as part of an ongoing journey to finally complete the 100-mile distance. Others saw it as a keystone on their way to run longer distances still (such as a 200-mile or six-day race), or to complete as many different ultramarathons as possible in the span of their lifetime. For instance, Helen recounted her running history in this way:

I started running about 7 years ago, just to get out of the house, really. I had two little children, and I was pushing them in the stroller and just trying to get some space in my head to think from two kids and a full-time job. And it just grew. You think you can’t do it, and you start running from one sign to the next, and then you enter a race. I did a 10K, thinking that was really tough. And then in a year’s time I did two half marathons, and then the next month I did a marathon and just moved on up. A friend of mine was an ultrarunner, and I didn’t think I would ever do something like that, but we just started training together, and I actually suggested that we run a 50 miler. We just started training, and the 50 miler went great. I know a lot of people – other runners – didn’t think we could do it, cuz they just thought it was impossible. They were like, “How are you going to do that?” But we did it. I’ve done several 50 milers, 50Ks, and the dream just grew. Because once you hit a point, you just wanna go. (Helen)

As this account demonstrates, participants built, along this arc, an understanding of their own bodily and mental capabilities and possibilities as they now cover distances that they previously thought impossible. Every participant described gaining the ability and confidence to face and cover increasing distances. In this way, the understanding in this arc seems to be, above all, *self*-understanding. Over their careers, participants come to understand their motivations and goals regarding running, as well as how the sport fits into their broader sense of selfhood.

Accordingly, participants' information behavior evolved along this arc. Early in their running careers, participants described themselves as consuming all the running-related information they could find. They looked for detailed training plans, suggestions for products and performance tips from experienced runners. They were eager to get many different ideas and try things out for themselves. Over time, such wide-net information seeking became less necessary as the runners came to learn what works for them. As my participants – by virtue of having participated in a grueling ultra-distance event – are no longer beginners, many described no longer consuming voraciously the running-related trade publications and other information sources. As one participant put it:

I just kinda learn more from races than reading anything else anymore. (Ajax)

Thus, as a person progresses along the lifetime temporal arc, information seeking seems to become more limited and focused to specific tasks (e.g., determining the next race), which can be best viewed from the seasonal temporal arc.

The *seasonal temporal arc* constitutes a several-month block that includes one or more keystone running events. These seasons cohere as training cycles in preparation for a goal race, which is followed by a period of rest and then another training block. Some participants' seasons included several separate races or a race series (e.g., the Midwest Grand Slam of Ultrarunning, which includes five 100-mile races over the course of a summer). By conceptualizing their running as a series of seasons, participants found a concrete way to assess their learning and athletic development over time, offering a framework for understanding the sport of ultrarunning and their own running across time. The information activities along this arc include selecting goal races and devising a training plan. My participants gained understanding in this arc by considering how they would improve over the last season, either by completing a familiar distance faster or on a more punishing course, or by tackling a longer distance for the first time. This consideration involves taking the past into account in working toward the future – in the parlance of Heidegger [8], being-ahead-of-oneself-in-always-already-being-in-the-world. For instance, participants described learning to deal with issues such as humidity or chafing and preparing for aspects of their goal race, such as altitude, in their training seasons; they brought their learning and preparations from past seasons into their present and future seasons. For example, Odysseus described his disappointment with aspects of his recent races in light of his preparation and the goals he had set for himself:

I've been a little disappointed in my finishing in the last two 100-mile races. I suspect that's the same problem for both races, and that's not enough long runs this season. I don't want to say they went poorly, but they could have gone better. (Odysseus)

I also saw evidence for season-based understanding in my participants' capacity to imagine running in different conditions, based on their experiences across races. Penelope, for instance, who dropped out of Kettle 100 late in the race, suggested that if the terrain in the final stretch had been different, then she likely could have finished:

If it had been road terrain or different terrain, I could have walked in those ten miles, but not on technical terrain I couldn't do it, because I've actually been in worse shape. (Penelope)

Such suppositions arose from a reflection on prior experiences with information, formulated in conjunction with the self-understanding built along the lifetime temporal arc. This suggests that the three temporal arcs are not simply parallel, but interwoven. Moreover, of course, this understanding is built and employed in specific race scenarios, which unfold in the single-race temporal arc.

The *single-race temporal arc*, finally, constitutes the lived experience of time within a single race. For the ultrarunner, time is salient. At each race's conclusion, the performance is commensurated into a single time value. Race events also have time limits, and runners flirting with the time limit often describe "racing against the clock." In such cases, the experienced sense of time can be stressful. Just as often, however, time – and miles – can seem to fly by effortlessly. This latter experience of time is characteristic of flow experiences, to which running provides a prime gateway [21]. Evidence of understanding occurs along this temporal arc in the form of individual realizations or insights. When an ultrarunner notices that something is working or not working, connections are made to past experiences – earlier occasions of analogical circumstances or prior learnings. For instance, my participants described at certain mileage points during Kettle 100 thinking back to that same point in prior races. Odysseus expressed it this way:

That stretch is just some of my favorite running. That is a beautiful stretch of trail. I loved it in Ice Age [a race the previous month on the same trail]; I loved it this time. I always feel like I'm running very well through that, although I can't quite articulate why. When I ran Ice Age, that's where I felt like my race came together, and maybe it was that experience, running on those trails again. But I really enjoyed that section. I felt like I was running great. (Odysseus)

Also, because the Kettle 100 course is comprised of out-and-back and repeated loop segments, each participant runs each stretch of trail at least twice; every participant described operationalizing on later passes the knowledge they gained on their first pass through. For example, several participants discussed “the meadows,” which were ten miles of unshaded trail with no manned aid stations, requiring several precautions to be taken prior to beginning the segment (filling water bottles, bringing extra food, mental preparation) – mistakes that were made on the first pass through the meadows were not generally repeated.

With regard to understanding, the key in this analysis is that understanding takes time. Just as many seemingly “overnight” successes spring from years of travail, though understanding in ultrarunning may seem to appear in single “aha!” within the single-race temporal arc, understanding is really the culmination of a historical trajectory on the seasonal and lifetime temporal arcs. Bawden and Robinson [2] likewise suggested that that understanding takes time, pointing to the information balance model of Poirier and Robinson [22] as a conceptual framework for information behavior that, as it includes behaviors such as reflecting and considering, can be used to describe the gaining of understanding. In this model, people balance information inputs and outputs through a medley of behaviors, which can be done consciously or unconsciously. This model, in concert with the discussion at hand, suggests that, the more these behaviors are done consciously, the more they contribute to understanding. In the terms of Heidegger [8], such conscious dealings with information contribute to the emergence of the authentic self, whereas in unconscious dealings a person is swept up in the flow of the anonymous “they.” In this way, conscious dealings with information – which unavoidably take thought, time and trouble – contribute to both hermeneutic and epistemic understanding. But, in the words of Aldous Huxley, “thought, time and trouble are precisely what the overwhelming majority of men and women are not prepared to give, unless motivated by a passionate desire or an imperious need” [23: 30]. Here the question of how information science can facilitate understanding becomes: *How can information science slow people down?*

Such a question seems antithetical to the development of information science over the past century. As chronicled by Day [24], prior to the 20th century, books were characterized as friends, with whom one built companionship through critical and reflective dialog over an extended period of time. Following the work of Otlet at the turn of the century, this intercourse came to be seen as inefficient, and efforts were made to create information systems that satisfied users’ information needs as quickly and efficiently as possible. The information came easily, but perhaps it came at the cost of understanding.

Hearteningly, some recent work speaks to the question of slowing people down. In addition to the information balance model [22] described above, Burton and Collins-Thompson have conceptualized “slow search,” which challenges the information retrieval maxim that faster is always better. In a recent experiment, Burton and Collins-Thompson tested user responses to an online search tool that promises better results for users who are willing to wait longer, finding indeed that many users were willing to wait several minutes for higher-quality results [25].

### 3.2. Struggle

It is not merely that the passage of time leads to understanding, but it is also what is done in that time. Though ultrarunning can be enjoyable, not as much seems to be gained in terms of understanding in the times of ease as is gained in the times of struggle. Indeed, recent research on endurance running reveals that the very essence of distance running as a leisure pursuit hinges on pushing through suffering [26]. To describe this in terms of Csikszentmihalyi’s [27] framework for flow experiences, an athlete must be sufficiently challenged in order to build understanding. Without sufficient challenge, an athlete may not undergo new experiences that trigger them to make connections and associations that contribute to understanding. With reference to the temporal arcs described above, struggle occurs primarily on the single-race arc, and understanding from struggle is realized primarily on the seasonal arc.

Helen in particular viewed her running as self-experimentation. She thinks of her mistakes as learning opportunities. Kettle 100 presented her with a number of learning opportunities. In a discussion as to why, several times she brought up the hills. In her training, she had focused on ascents, logging many sessions on a Jacobs Ladder (a cross between a treadmill and a ladder). As a result, she was eminently prepared for the climbs, but she was surprised at how much her legs stiffened up from all the downhills. That, coupled with nausea, presented such a challenge that she did not complete the course. In her words:

I started getting a little nauseated at mile 31. I kept fueling, and I started feeling a little more wear on my legs. It was about mile 45 that we had to do a little more climbing back and down, and going down that just my legs were stiffening up. So then it got progressively worse and more painful. And I was in and out of nausea after that. So I think I need to rethink my – I need to go back to more hill training and then rethink my fueling even and recreate awful situations just to see what it is. (Helen)

As she describes, she now plans, based on this experience, to pursue further self-experimentation and willed suffering in order to build a deeper understanding of her running.

Absolute physical limits aside, one thing all ultrarunners come to understand is that the good and bad come in waves. As Ajax put it, it's recognizing that "this too will pass," a common piece of ultrarunning folk wisdom. He described suffering through the meadows stretch about halfway through the race, "riding it out" and reminding himself that it would be over eventually:

The sun was out again on the way back in the afternoon. So I thought I took it easy but once I got into the station at the end of it, my stomach was bad. So I had to hike. And I knew it would turn around eventually, but I just had to suffer through that. (Ajax)

Similarly, Nestor described dealing with a "low point" – a period of severe fatigue and demotivation – in the race:

I continued, and that's when I really hit a low point. There were several other times when I was feeling like that, but I gave myself a nice two or three miles of walking – really slow – and then I was able to recover and continue pushing forward. (Nestor)

Ajax and Nestor knew that they would get over their low points based on prior experience as well as ultrarunning folk wisdom. It was simply a matter of carrying on.

Csikszentmihalyi [27] argued that if the challenge is *too* high then anxiety rather than flow will result; still, at least in ultrarunning, it seems that states of anxiety can contribute to understanding just as states of flow can: Any ultrarunner will describe seriously considering dropping out during a tough event (sometimes many times) when they can't seem to see beyond their misery. But when the ultrarunner perseveres, glimpses of possibility can be ascertained at the edges of their anxiety, which gives them the power to continue. Such perseverance through struggle is so valuable that, as Helen described, ultrarunners seek to "recreate awful situations" during training in order to better train the skill of perseverance. These findings are consistent with recent developments in positive psychology which suggest that building mental toughness and learning to deal with negative emotions are important elements of human flourishing [28]. Indeed, Odysseus suggested that dealing with suffering, particularly in a social atmosphere, is a critical part of ultrarunning:

It's a really great community at these things, and everyone's out there sometimes suffering—everyone's suffering to greater or lesser degrees. But when you're out there with people doing the same thing who actually understand it and you can work with them, that makes a really positive impact in the races. (Odysseus)

As we saw above regarding time, here the question of how information science can facilitate understanding becomes: *How can information science make people struggle?* Again, this seems antithetical to the thrust of our work – and the development of technology, generally. What seems clear from the accounts of my participants is that, when it comes to the kind of struggling that contributes to understanding, people have to *want* to do it. But like Wally in the film *My Dinner with André*, what many people want is comfort, not struggle. Can people be encouraged to want to struggle?

### 3.3. Perspective

The final theme that emerged in my analysis of how ultrarunners build understanding is the multiplicity of perspectives. All my participants described, as a key part in preparing for and performing at Kettle 100, the collection of multiple perspectives. In their preparations, the participants sought and engaged with a number of external information sources: the textual descriptions, elevation profile and course map available on the race website; GPS data from participants in prior years on websites such as Strava; photographs showing the terrain at various points along the course; videos on YouTube posted by participants in prior years; race reports from participants in prior years; and in-person conversations with participants from prior years. For example:

I had no sense of though what the terrain would be before I signed up for the race, so I looked at YouTube videos of different people on the Ice Age Trail [the race venue]. Race reports – I sought out a lot of those to get a sense. Again and again what I saw was rain and humidity and bugs and heat, so that's what I was anticipating. It's more mentally knowing what the obstacles I would face were. ... Strava is the other source too that I use. I looked at some of the profiles of Kettle on Strava to get a sense of the terrain in terms of the elevation and things like that. (Penelope)

Referencing external information sources was not limited to before the race; some participants brought printouts of, for instance, the list of aid stations along with them as they ran, and all of my participants mentioned the informational value of having conversations with other runners on the course, particularly those who had run the race before. For instance:

Talking to other runners, you learn a lot of stuff too. Especially if they've run it before. That's always one of the first questions you ask someone if they're running, if they've run it before, and try to listen to whatever they say about it. (Ajax)

Ajax had run Kettle 100 a handful of times before himself, and even so, he mentioned spending some time in conversation with a woman who was running the race for the tenth time:

She's the one I wanted to talk to most. She knows the course backwards and forwards. (Ajax)

My participants sought this diversity of information in order to prepare themselves for the challenges ahead by building a deeper understanding of the course. They described this understanding as seeing what the course was "really" like and learning what it would take to finish the course from those who have done so, and they suggested that, as more different kinds of course representations are apprehended, this understanding deepens.

But understanding for these participants is not based solely in interacting with external information sources; rather, it is also built through bodily experience – or corporeal information [29]. Ajax said his understanding of the course deepens each time he runs Kettle 100, as he experiences the course under different conditions. In his view, the lived experience provides information that cannot be encapsulated in text or even imagery.

In addition to preparing oneself for a particular race, I found evidence for the seeking of perspectival diversity in order to build understanding of ultrarunning in general. All my participants discussed the value in this regard of conversations during ultramarathons. Penelope put it this way:

There's so many different stories and different types of experiences out there. (Penelope)

Such experiences can also be gleaned through textual accounts, for instance in essay collections like *Running Through the Wall: Personal Encounters with the Ultramarathon* [30]. Participants also described reading about the training strategies and watching videos of elite runners in order to adopt aspects of their workouts, nutrition and biomechanical form into their own running. For example:

In skiing we routinely pull up videos of what really efficient, good skiers look like. And I do the same thing running. I look at videos of guys at the front of the pack. When Scott Jurek was running the Appalachian Trail last year, there were a bunch of good videos of him running on the trail that I pulled up to see things like: How is he actually running with poles? What is his pole technique? How is he pacing these things? When is he taking breaks? So I really value being able to not just hear about good runners' races, but to see them in action and watch what they're doing. (Odysseus)

Briesen [12] has presented a framework for how multiple perspectives contribute to understanding. Defined by Briesen, understanding is the organization and systematization of a certain subset of beliefs and concepts by grasping inferential and explanatory relationships among them, which is not unlike the account of understanding given by Bawden and Robinson [5]. Briesen draws on the work of Thomas Nagel in describing how this organization and systematization takes place. In his work on scientific objectivity, Nagel described how a scientist must step back from their present situation in order to gain a new, broader perspective; as the scientist continues to step back, their view approaches objectivity. Briesen conceptualizes Nagel's "objectivity" as a specific form of understanding and thus posits that a person can intentionally and continually consider a phenomenon from different perspectives. As these perspectives are considered in relation to each other, a person gains a progressively more sophisticated view of the phenomenon – in other words, understanding.

The means by which these diverse perspectives are reconciled seems to be analogical thinking. Evidence for this emerged in my participants' accounts. For instance, Nestor, who is relatively new to ultrarunning but has experience in triathlon, described how he conceptualized his drop bags as the transition zones<sup>1</sup> of a triathlon, and so he could leverage his understanding of how to move through a transition zone efficiently in a triathlon to do the same with his drop bags during Kettle 100. He also described thinking about ultrarunning as driving on a highway: When driving, he said he tends to match his speed to the cars around him; he found that he tended to do the same regarding his pace during Kettle 100. Similarly, as quoted above, Odysseus brought learnings from his experience in skiing to bear on his ultrarunning

career. Such analogical thinking has previously been identified in the information science literature as crucial for creativity [31], and indeed, more generally, as the very mechanism by which human cognition functions [32]. This discussion motivates the question: *How can information science stimulate analogical thinking?*

#### 4. Unfolding

This paper has explored three ways in which ultrarunners build understanding: by taking time, by undergoing struggle, and by incorporating multiple perspectives. Time functions as the horizon for understanding – to borrow from Heidegger [8] – upon which struggle and multiple perspectives must be sought in order to deepen understanding. In understanding ultrarunning, athletes construct explanatory relations about nutrition, effort, strategy and other factors that allow them to become better runners. Moreover, as ultrarunners come to understand ultrarunning better, they likewise come to understand *themselves* better. Thus the understanding built around ultrarunning has ramifications far beyond the sport for dealing with challenges in one's everyday life, a view corroborated by sociological research on endurance running [26]. This demonstrates the capacity for understanding to contribute to human flourishing; the elements explored in this paper resonate with the elements of flourishing discussed by Seligman [28], as well as the value of serious leisure pursuits for personal life enhancement described by Stebbins [33].

Just as the value of understanding ultrarunning was, for my participants, not limited to the sport itself, the findings discussed in this paper are not limited to the domain of ultrarunning. Rather, the findings from this study can be applied analogically to other domains. It may be the case that understanding in other domains shares the same essential structure as I describe here. *Prima facie*, it would seem that the building of any sort of understanding would involve time, some sort of struggle and the assimilation of diverse perspectives. But, of course, the factual manifestations of these manifestations would be different; for instance, while coming to understand strategy in Tetris may indeed involve struggle, it is not likely to be the kind of struggle that entails nausea and heavy legs. All the same, we must be open to other possible eidetic structures in the study of understanding in other domains. In any case, it is this initial, exploratory foray into understanding in ultrarunning that can encourage further inquiry.

Indeed, the three elements of time, struggle and perspective do seem to present learnings for how the building of understanding may develop in other domains. For instance, there is a strong parallel with academic scholarship. In his treatise on the modern development of information science, Day [24] argues that scholarship has suffered a decrease in qualities that are reflective of understanding. In Day's view, many scholars are reluctant to take the time needed to digest information and build understanding. Evidence of this is seen in the tendency toward citing sources as evidence that is merely mentioned rather than engaging in critical dialog with the cited works. Yet the value of taking time in scholarship is eminently evident. In my own experience, I regularly discover new insights in work that I conducted months or years before. Of course, this is not automatic; it hinges on my regularly revisiting my past work in light of my present (and future) work. Moreover, Day sees a reluctance of scholars to engage with difficult texts. Instead, we prefer texts that are clearly structured, indexed and abstracted. On some level, this may be a necessary trade-off in attempts to traverse the vast sea of literature – *ars longa, vita brevis!* – but Day worries that too much of this behaviour results in impoverished scholarship. Finally, the trend toward ultra-specialization in the sciences may limit the diversity of our perspectives. Yet, on the level of lived experience, we always already know the value of incorporating diverse perspectives: We do so regularly in our literature reviews and triangulatory methods. And in writing up our results, we know that, for example, “it is helpful when a text about X is accompanied by a diagram, and it is even more helpful if different sorts of diagrams are used simultaneously” [12: 18]. In the face of institutions that encourage the singularity of perspective, we must actively seek and incorporate diverse perspectives. *Actively* is operative; as discussed above, when it comes to building understanding, it seems to be the case that a person has to want to do it.

This discussion sheds light on the broader power and responsibility of information science, which goes far beyond the mere provision of information *qua* facts. As data and information proliferate, it is becoming clear that we must turn our efforts to the facilitation of understanding. This paper has engendered three questions to guide these efforts, based on salient aspects of the building of understanding: First, how can information science slow people down? Second, how can information science encourage people to willingly struggle? And third, how can information science stimulate analogical thinking?

Once we have made sufficient progress in addressing these three questions, along with the others that will undoubtedly emerge along the way, then, perhaps, we can set our sights on what may be the final informational frontier: wisdom.

#### Notes

1. *Drop bags* contain a runner's preferred food, changes of clothes, etc. Runners assemble their drop bags before the race and race officials transport them to predetermined locations along the course. Most 100-mile races offer approximately four access points for drop bags, and using them is entirely optional. *Transition zones* in triathlon are the areas where athletes switch between swimming, biking and running; a triathlon contains two transition zones. In transition zones, athletes have access to bags that they assemble before the event that contain the supplies needed for the next segment of the event.

## Acknowledgements

I am grateful to the directors of Kettle 100 for allowing me to conduct this research, to my participants for sharing their stories, and to the anonymous reviewers for their comments, which strengthened this paper greatly.

## Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

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