

The Deep Structure of Lives

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Résumé : La psychologie a toujours traité le comportement et l'expérience comme étant enchâssés dans un flux temporel unidimensionnel, « le courant du comportement » dans lequel les événements et les actions occupent des intervalles de temps qui ne se chevauchent pas. Pourtant, une analyse phénoménologique révèle que la structure de nos vies est bien plus riche et intéressante. En utilisant la notion de « quasidécomposabilité » de Herbert Simon, je décris cette structure comme un assemblage d'épisodes quasi-indépendants se réalisant de façon concurrente, et de nature asynchrone. Il s'agit d'une « structure profonde » des vies contrairement à la conception courante qui conçoit les vies comme « plates ».

Abstract: Psychology has always treated behavior and experience as embedded in a unidimensional flow in time, the “stream of behavior”. This means that events and actions occupy non-overlapping time-intervals in this stream. Nevertheless a phenomenological analysis reveals that the structure of lives is richer and far more interesting. Using Herbert Simon’s notion of near-decomposability, I describe the structure of lives as a composite of nearly independent strands that run concurrently, and are asynchronous. This is a “deep structure” of lives in contrast to the current conception, which conceives of lives as “flat”.

In this article I contrast two conceptions of the structure of lives: the “stream of behavior” framework (which I call “flat”) and the “concurrent strand” framework (which I call “deep”). The stream of behavior approach has a distinguished history, going back at least to William James. For example, William James writes about the stream of thought: “Within each personal consciousness thought is sensibly continuous” [James 1981, 220]. In contrast, according to the parallel strand framework, lives consist of multiple concurrent and asynchronous **strands**, each endowed with a rich structure.

As a foil against which to present the new approach, I have chosen the work of Daniel Kahneman on the measurement of well-being. This choice will reveal that taking a stance in this matter is not just a debate about theory—it has practical consequences as well.

1 The unbearable flatness of being

1.1 Kahneman’s two selves

In his *Thinking, Fast and Slow*, Kahneman distinguishes between two selves, the “experiencing self”, which answers the question *Does it hurt now?*, and the “remembering self”, which answers the question, *How bad (or good) was the experience on the whole?* [Kahneman 2011, chap. 35]. In his work on well-being, he documents how the response of the remembering self to this question leads to paradoxical results, because it confuses experience with the memory of it.

The remembering self is sometimes wrong, but it is the one that keeps score and governs what we learn from living, and it is the one that makes decisions. What we learn from the past is to maximize the qualities of our future memories, not necessarily of our future experience. This is the tyranny of the remembering self. [Kahneman 2011, 381]

The purpose of this article is to answer a question that was beyond the scope of Kahneman’s project: what is the structure of the life of this remembering self?

Here is how he introduces the other self, the experiencing self:

Two different interpretations of the term “utility” have been used [...] . In its original interpretation, which derives from Bentham, utility is interpreted in hedonistic terms, as a measure of pleasure and pain. [...] Edgeworth [Edgeworth 1881/1967, 98–102] suggested the idea of what he called the ‘hedonimeter’—an imaginary instrument, [...] which could measure the level of pleasure or pain that an individual was experiencing at any moment and then plot this as a continuous function of time. The area under the curve plotted by the hedonimeter would be a measure of the individual’s happiness for a given period. A developing strand in the recent research literature of economics is to try to revive this interpretation of utility as *experienced utility*. [Kahneman & Sugden 2005, 162]

The diagram in Figure 1 illustrates this notion of experienced utility, which the experiencing self computes. According to Kahneman, this *duration weighting*

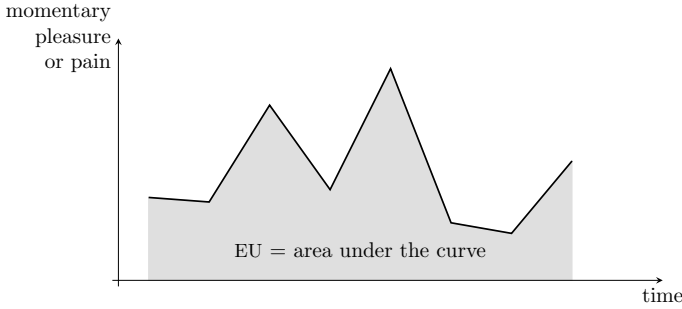


FIGURE 1: Experienced utility (EU)—which is computed by Kahneman’s experiencing self—is additive. It is the area under the curve described by a measure of momentary pleasure or pain.

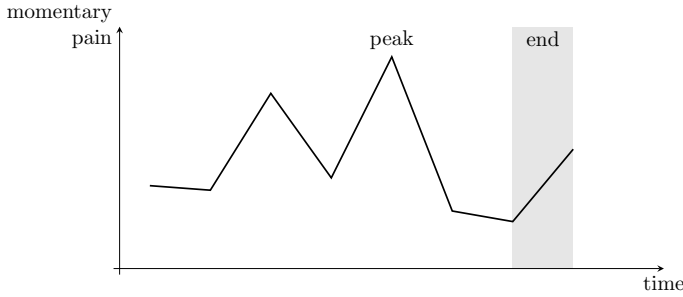
is the rational way to assign value to an experience. It is rational because it adheres to a normative rule—the *principle of temporal monotonicity*: all other things being equal, the utility of a shorter period of pain is higher than the utility of a longer period of pain.

And yet, when a person is asked for a retrospective evaluation of an experience, it is the less rational remembering self that does the evaluation. Unfortunately, the remembering self does not adhere to the principle of temporal monotonicity. Instead, it seems to obey the *two rules of retrospective evaluation* (illustrated in Figure 2):

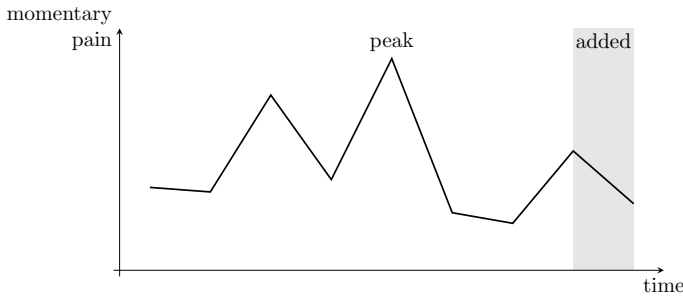
- *Peak-end rule*: The retrospective evaluation of an unpleasant episode is the average of the evaluation of discomfort at its worst and the evaluation of discomfort at its end.
- *Duration neglect*: The duration of the episode does not affect the retrospective evaluation.

The peak-end rule resembles Freytag’s dramatic pyramid (Figure 3) designed to capture the five acts of a classical play [Freytag 1876]. The peak in Kahneman’s rule is analogous to the *the climax* of the play. The end is analogous to the *dénouement* (traditionally called the play’s *catastrophe*, from the Greek for *overturn*). In tragedies the protagonist is worse off at the end than at the beginning; in comedies the protagonist ends up better off.

Several studies provide empirical support for these rules. In one, participants viewed a series of plotless films that were either pleasant or highly aversive and of either short or long (triple) duration [Fredrickson & Kahneman 1993]. Their ratings of the emotional impact of the films were well predicted by their peak and end ratings, regardless of the length of the films. These rules also predict the willingness of patients to undergo unpleasant medical procedures or listen to annoying sounds [Redelmeier & Kahneman 1996],



(a) Short episode



(b) Long episode

FIGURE 2: Two episodes of pain, one short, (a), and one long, (b). The long episode is composed of the short episode to which a less painful stretch of time has been added. People prefer the long episode of pain (b) over the short episode (a), even though the total amount of pain is larger in (b) than in (a). This is a manifestation of duration neglect. Kahneman calls this “*the tyranny of the remembering self*”.

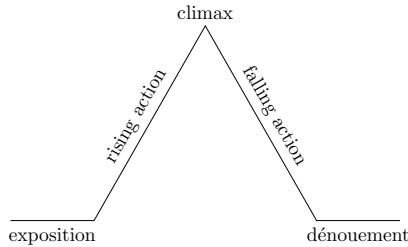


FIGURE 3: Freytag’s pyramid—an attempt to capture the structure of a classical five-act play [redrawn from Freytag 1876, 100], which resembles Kahneman’s peak-end rule.

[Redelmeier, Katz *et al.* 2003], [Stone, Broderick *et al.* 2000], [Schneider, Stone *et al.* 2011], [Schreiber & Kahneman 2000], to motivating people to exercise [Hargreaves & Stych 2013]. They have been applied in a variety of areas: the pricing, advertising or promotion of commercial products, the optimization of fundraisers [Baumgartner, Sujan *et al.* 1997], [De Maeyer & Estelami 2013], [Do, Rupert *et al.* 2008], [Nasiry & Popescu 2011], [Simonson, Carmon *et al.* 1994], and augmenting the appeal of art [Diener, Wirtz *et al.* 2001], [Krumhansl & Schenck 1997].¹

1.2 Moment-by-moment assessment

As noted earlier, Kahneman believes that the experiencing self is laconic—it can convey nothing more than momentary assessments of pleasure and pain. At the same time he also claims that on normative grounds an objective observer should speak on behalf of this taciturn self. Such an observer should evaluate an unpleasant episode in the life of π by first tracing the curve described by π 's moment-to-moment ratings of pain and then obtain the area under this curve.

In making such a claim, Kahneman is also telling us that the proper measurement of well-being should have little to do with the claims of the Gestalt psychologists [Wagemans, Elder *et al.* 2012], [Wagemans, Feldman *et al.* 2012], namely that:

Phenomenal experience consists of part-whole structures, configurations, or *Gestalten*. [...] A Gestalt is an integrated, coherent structure or form, a whole that is different from the sum of the parts. [Wagemans, Feldman *et al.* 2012, 1219]

Kahneman's idea of the experiencing self negates the possibility that the value of our lives may be *different from* the sum of the values of its moments. It represents lives as if they were "flat". In a flat representation, lives are seen as a succession of abutting episodes, each containing one activity. This is in sharp contrast with the Structure of Lives, to be presented in the second half of this paper.

To understand how Kahneman measures experienced utility, we look to his *Day Reconstruction Method* (DRM). He and his colleagues [Kahneman, Krueger *et al.* 2004a,b] gave 909 employed women four packets in which they asked for (a) demographic information, (b) facts about yesterday, (c) feelings they experienced yesterday, and (d) information about their job. The second and third packets are central to the DRM. In the second packet (which the participants knew they could keep to themselves) they first recorded when

1. This supporting evidence is not unanimous [Ariely & Loewenstein 2000], [Geng, Chen *et al.* 2013], [Kemp, Burt *et al.* 2008], [Miron-Shatz 2009], [Robinson, Blissett *et al.* 2011], [Rode, Rozin *et al.* 2007].

they woke up and when they went to bed. They then constructed a diary of the preceding day (illustrated in Table 1) with the following instructions:

Think of your day as a continuous series of scenes or episodes in a film. Give each episode a brief name that will help you remember it (for example, ‘commuting to work’, or ‘at lunch with B’ [...]). Write down the approximate times at which each episode began and ended. The episodes people identify usually last between 15 minutes and 2 hours. Indications of the end of an episode might be going to a different location, ending one activity and starting another, or a change in the people you are interacting with. [Kahneman, Krueger *et al.* 2004a, 1777]

TABLE 1: Diary, based on [Kahneman, Krueger *et al.* 2004b].

#	Episode name	Time it began	Time it ended	Notes to yourself: What happened? What did you feel?
Morning				
1M				
2M				
..				
10M				
Afternoon				
1A	Lunchtime			
2A				
..				
10A				
Evening				
1E	Dinnertime			
2E				
..				
10E				

In the third packet (which the participants knew they would turn in) they answered questions about each episode:

When it occurred (start and end times); what they were doing (by checking one or more of 16 activities); where they were; with whom they were interacting; and how they felt, using 12 affect descriptors. [...] The affect scales ranged from 0 (not at all) to 6 (very much). [Kahneman, Krueger *et al.* 2004a, 1777]

To obtain a measure of *overall positive affect* they calculated a mean of the ratings of *happy*, *warm/friendly*, and *enjoying myself*. Likewise, to get a measure of *overall negative affect* they calculated the mean of the ratings

of *frustrated/annoyed*, *depressed/blue*, *hassled/pushed around*, *angry/hostile*, *worried/anxious*, and *criticized/put down*.

The results are fascinating. First, the overall measure of positive affect was much higher than the overall measure of negative affect. As Figure 4 shows, they differed by 3.4 points on the 7-point scale. Second, participants reported only mild negative affect (mean rating: 0.7) with relatively low frequency (1/3 of ratings were 0 and of the remaining 2/3, nearly all were 1), and they reported a complete absence of positive affect rarely (only 3% of the time) [Kahneman, Krueger *et al.* 2004a, 1777].

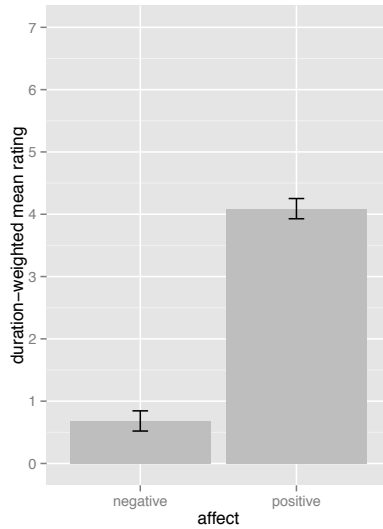


FIGURE 4: Positive affect is higher than negative affect in the DRM data. The error bars represent 95% confidence intervals, based on data in [Kahneman, Krueger *et al.* 2004a, Table 1].

As we saw earlier, each woman reconstructed her Yesterday as a sequence of episodes. Since most of the episodes contained just one activity, each episode was assigned to one of 16 categories of activities. Disregarding the category *working*, which was—by stipulation—present in all the diaries (and consumed 6 hours and 54 minutes per day), I used their Table 1 to calculate an index of prevalence for each activity: $\text{mean hours/day} \times \text{proportion of sample reporting}$. Figure 5 shows the activities in order of prevalence. As is evident from the figure, the three top activities were *eating*, *relaxing*, and *watching TV*, and the bottom three were *pray/worship/meditate*, *exercising*, and *intimate relations*.

This diagram points to a troubling implication of the way the DRM is analyzed. Since the normative approach to the calculation of experienced

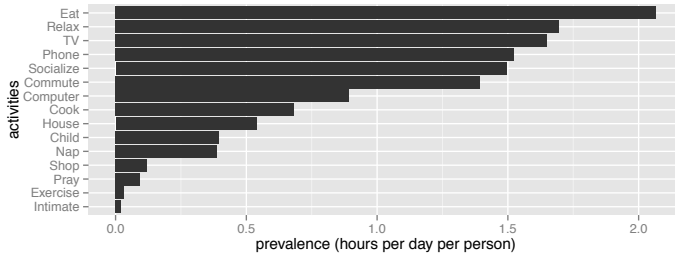


FIGURE 5: Proportion of participants reporting activities, based on data in [Kahneman, Krueger *et al.* 2004a, Table 1].

utility must weight activities by their prevalence, then one’s spiritual life, one’s physical discipline, and one’s intimate life—which presumably are central to many people’s mental and physical well-being—could only marginally affect the DRM’s estimate of a person’s objective well-being.

It would be tempting to assign differential weights to episodes by virtue of the import and gravity of the activities they contain. But Kahneman’s hedonimetric assessment of experienced utility does not offer us the wherewithal to do this. Such a weighting would not be in the spirit of assessing moment-by-moment pleasure or pain, because the significance we attach to an activity or an event so often depends on its aftermath, which can be known only after the activity has taken place.

Two rebuttals to this objection come to mind. First, the prevalence of these activities in the lives of those for whom these activities are central would be much greater. For avid runners, surely exercise would have a prevalence far greater than 1:55 minutes per day per person. Second, we have no evidence that what a person considers important in life contributes to a person’s well-being.

Undoubtedly these rebuttals raise important empirical questions. However, when the tool used to assess well-being *assumes* that lives are flat, these questions cannot be answered.

1.3 Flatness is the rule

Kahneman tacitly adopted the stream of behavior framework because it has had no competition in contemporary cognitive science. The earliest empirical work to adopt this framework was done by Barker and his colleagues [Barker 1963, 1965], [Barker & Wright 1954]. They found that the behavior stream consists of discrete, qualitatively different, and repeated behavior units. In Cognitive Science, the focus shifted to the study of the *perception* of event structure [Condon & Ogston 1967], [Newson 1976], [Newson, Enquist *et al.*

1977], [Zacks & Tversky 2001]. Participants in their studies watch films in which actors perform an activity such as dish-washing or bed-making. While watching, they tap a key whenever they see a *breakpoint*, a boundary between one unit of behavior and the next [Swallow, Zacks *et al.* 2009]. From these data, researchers infer which features of the stream of behavior cause us to parse it into successive “events”. But they do not question the idea that life is a single stream of behavior. There is no place for concurrent streams within their framework.

2 The deep structure

Although earlier I promised to address the Structure of Lives from the point of view of the remembering self, I now must back off, because the term “remembering self” is too restrictive. Of course memory plays an important role in how we experience our lives, but memory is only part of the story.

And while we are rethinking labels, we might ask whether the name of the experiencing self is apposite. The so-called “tyranny of the remembering self” implies that *it* is the self that is central to our experience. And since, furthermore, Kahneman implies that the output of the experiencing self is by and large ignored in the management of our lives, it may not be *experienced* as a self.

2.1 Lives are nearly decomposable into strands

The Structure of Lives, summarized in Figure 6, is based on the premise that we experience our lives as a complex system that is (a) hierarchical, and (b) nearly-decomposable into strands. To characterize strands, we need Herbert A. Simon’s notion of nearly decomposable (ND) systems.

According to Simon, “a complex system [is] made up of a large number of parts that interact in a non-simple way. In such systems, the whole is more than the sum of the parts, [i.e.,] given the properties of the parts and the laws of their interaction, it is not a trivial matter to infer the properties of the whole” [Simon 1962, 468]. This captures perfectly how I propose we think about lives.

Rather than present the systems of differential equations to characterize nearly decomposable systems (for which the reader may consult [Simon & Ando 1961]), I will characterize the idea informally, using a metaphor borrowed from [Simon 2002]. Imagine a building with rooms that have thick exterior and interior walls. These rooms are divided into thin-walled cubicles. Now suppose a storm suddenly forces the building into a temperature disequilibrium, so that there are sizable temperature differences within cubicles, between adjoining cubicles, between adjoining rooms, and between the building and the outdoors.

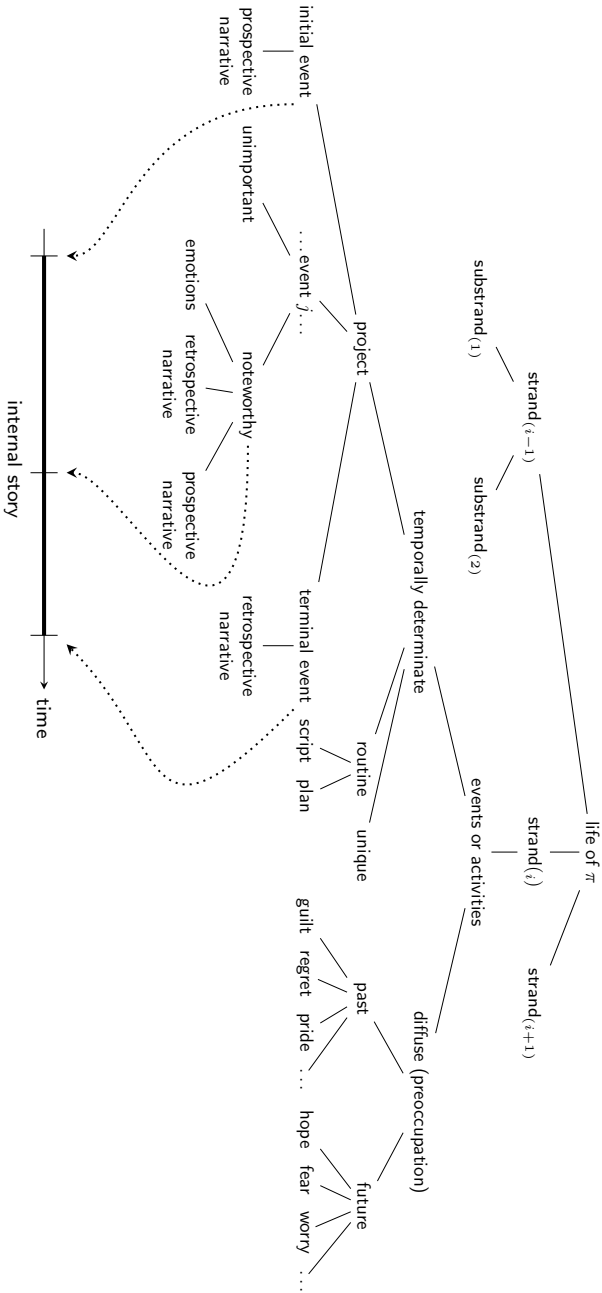


FIGURE 6: The Structure of Lives.

Suppose also that the storm shut off the heating and the AC, and that the outside temperature remains steady, and that at this moment we begin to measure the evolution of the indoor temperatures.

The temperature within cubicles will rapidly become uniform; gradually, the temperature of the cubicles in each room will approach equality; more slowly, the temperatures of the different rooms will converge. Finally, the temperature of the rooms will be equal to the outside temperature.

Now imagine that the building is the life of a person, who we will call π . The rooms are **strands**, and the cubicles are **substrands**. Now suppose that each cubicle contains a space-heater whose thermostat is set at a different temperature. The temperatures in different cubicles in the same room, being poorly insulated from each other, despite the different thermostat settings, will tend to fluctuate together. This is also true—but to a lesser degree—of the temperatures in different rooms.

The near-decomposability of lives into **strands** implies that—over the course of π 's life—**strands** will fluctuate together. But in the shorter run, **strands** will be independent. (Later I will suggest that such compartmentalization is not only normal, but an indicator of mental and physical health. Its failure is, at the very least, an indication of stress.)

Many people have **strands** such as HOME, WORK, SCHOOL, TRANSPORTATION AND TRANSITIONS, SHOPPING/ERRANDS, PERSONAL BUSINESS, and RECREATION/ENTERTAINMENT [Jiang, Ferreira *et al.* 2012]. Each is a collection of related activities that π *tacitly* groups together and discriminates from other **strands**. Three features characterize each **strand**:

- π 's *role*,
- the *cast* of characters, and
- the *place* where it typically unfolds.

Table 2 lists likely features of a few common **strands**.

TABLE 2: Examples of **strands**, with primary role, cast, and place

strand	role	cast	place
HOME	parent	child(ren)	home
WORK	attorney	co-workers	office
SCHOOL	student	students, etc.	school
COMMUTE	traveller		
SHOPPING ₁	shopper		shop
SHOPPING ₂	shopper		Amazon.com

Because π 's **strands** are determined from a first-person point of view, the number of **strands** and the activities constituting each of them is primarily up to π . If π were asked to generate a catalog of his or her **strands**, there is no reason

to expect it to be exhaustive. Such a catalog may justifiably be amended by an observer (e.g., a therapist) who knows π well. It is even conceivable that π and the therapist might disagree on the structure of π 's life, and that their views may never be reconciled. In short, in the approach I am developing here, there is no need to assert that π 's claims about **strands** (or any other feature of his or her life)—to which he or she has privileged access—are incorrigible.

Some **strands** may be idiosyncratic (a hobby such as DRAG RACING), other **strands** may be bound to a culture (such as the “parallel universe” of spirits in the *zār* possession cult described by [Boddy 1989]) but other are inevitably present at some point in all human lives (e.g., RELATIONS WITH PARENTS or HEALTH) and some are *always* present (FOOD, REST), although their labels may vary from person to person. In other words, some **strands** are universal. They can be based on (a) physiological needs (FOOD, REST), (b) social needs (FRIENDS), (c) *roles* in the sociological sense (PARENT, TEACHER, SPOUSE), (d) *places* (YOUR HOME, YOUR OFFICE, THE SCHOOL YOU ATTEND), or (e) Goffman frames (BUS-QUEUE or MEDICAL PATIENT) [Goffman 1974]. If a **strand** is based on a role or a frame, a person's behavior is constrained by it as long as the person is in it.

From π 's first-person point of view, **strands** are concurrent and independent streams carrying the flow of π 's activities and experiences. They are parallel and independent in three ways:

1. Each **strand** is a sequence of events that π experiences as potentially *causally-related*, often occurring in a fixed place and with a stable cast of people. When we think (from a first-person perspective) about our JOB, we think of it as an organized sequence of activities, even if it is interrupted by sleep or activities from other **strands**. What William James says about the continuity of personal consciousness applies perfectly to **strands** [James 1981, 231–240]. He points out that even when there is a time-gap in our consciousness (e.g., due to sleep) we experience the events after the gap as belonging with the events we experienced before it, as belonging to the same self. Likewise, even when there is a time-gap in a **strand** (e.g., due to sleep) we experience the events after the gap as belonging with the events we experienced before it, as belonging to the same **strand**.
2. With respect to most pairs of **strands**, we do not experience events in one to be causally related to events in the other; they are, by and large, compartmentalized. For example, adults with siblings are likely to experience events in their WORK **strand** as having no effect on their SIBLING **strand**, and vice versa.
3. **Strands** are *asynchronous*; they do not share a clock. Imagine that you are at the office (**strand A: WORK**) writing a report, when the phone rings. It's the babysitter (**strand B: CHILD-CARE**) asking to pick up your child early. You agree and return to your report. Toward the end of the day, you remember your promise and get ready to leave early. As you're

leaving, it is unlikely that you will remember what you were doing when the phone rang, although you may remember what you did during your time at the office.

Since to an outside observer π does not appear to be doing more than one thing at a time and π appears to be in one place at a time, it is tempting to describe π 's life as a succession of abutting episodes: what I earlier characterized as a “single-stream” or a “flat lives” conception. For an observer watching π working on the report at home, π may appear to engage first in one activity a (taking care of the children), and then another, b (writing the paper), which is interrupted by a return to a , and so on. activities a and b appear to be *interleaved*. From a first-person point of view, however, π did two things this evening: worked on the report, and took care of the children. π inhabited two continuing **strands** (which extend into the past and into the future, each following its own course) concurrently.

The relation between the inevitable interleaving of activities and the first-person continuity of strands may be likened to Faulkner's narrative in *As I Lay Dying*. The book is narrated (and therefore must be read) from alternating—interleaved—points of view. But literary scholars have shown [Ross 1975] that it is possible to seamlessly stitch together each of the two narratives into concurrent stories. The transition from one to the other is akin to moving from a flat stream of events to a world of strands unfolding concurrently.

Exceptions to the near-decomposability of lives into strands are not uncommon. Many mothers of young children, for example, experience an unwelcome interdependence between WORK and FAMILY [Ashforth 2001], [Michel, Kotrba *et al.* 2011], [Nippert-Eng 2008], which can be challenging [Powell & Greenhaus 2010]. The Structure of Lives does not constrain every activity to be a member of a strand, nor does it forbid an activity to be the member of more than one strand. Indeed the degree to which a life is nearly decomposable into strands may vary from individual to individual and from one life-stage to another.

2.2 Activities

Strands consist of activities. As Figure 6 shows, activities are of two kinds: temporally determinate and temporally diffuse.

Temporally determinate activities can be placed in a time-slot: SHOPPING or SLEEPING, for example. Such activities fall into three categories:

1. **Unique.** An incident is unique if it is an accident (e.g., a fall), a disaster (natural or caused by humans), or a singular coincidence (e.g., meeting a long-lost friend on the street).
2. **Routine.** Most of our activities are routine. Routine activities follow a script, “a predetermined, stereotyped sequence of actions that defines a well-known situation” [Schank & Abelson 1977]. For example, we

all have scripts for different types of restaurant: the formal restaurant (*order-eat-pay*), the lunch buffet (*take food-eat-pay*), the cafeteria (*take food-pay-eat*), the fast-food restaurant (*order & pay-get food-eat*) and so on.

There are two ways for an activity to be routine:

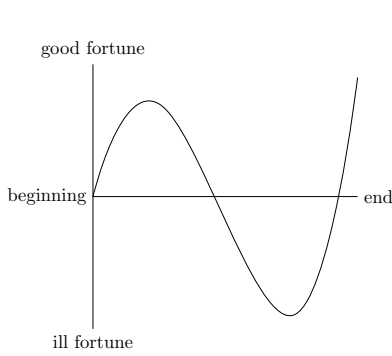
- (a) *Scripted*. It is repeated but its repetitions are not linked: when I *made breakfast* today, I followed the same *script* as yesterday, and yet I do not think of today's breakfast as a continuation of yesterday's.
- (b) *Planned and unhindered*. It is planned, and it proceeds according to plan. Even though it was my first trip to Santa Fe the travel was routine because it proceeded according to schedule in a manner familiar to me from other trips: *taxi-check-in-board-fly-disembark-pick up luggage-taxi*.

Most routine activities have a hierarchical structure [Pantic, Pentland *et al.* 2007]. A "workout at a gym" in FITNESS may consist of the sub-activities *drive-check-in-change-treadmill-weights-shower-change-leave-drive*. Each of these can be further broken down to yet smaller-scale activities. For example, a *run on treadmill* begins with *activate treadmill* and *enter settings*, each of which may in turn be further decomposable.

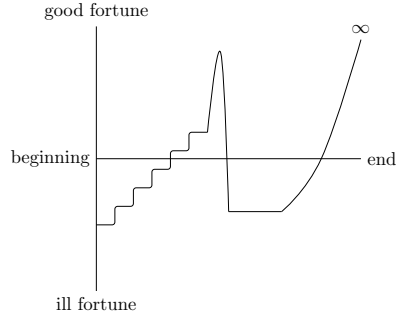
3. **Project**. As illustrated on the left side of Figure 6, an activity is part of a project if it is linked (in my mind) to a past or a future event (an activity or an incident). All projects begin with an initial incident and end with a terminal incident. The initial incident is a *challenge*, which is either
 - (a) *self-imposed*, when I decide to do something (have a child, get a degree, write a paper), or
 - (b) *externally imposed*, when routine activities are thwarted (my computer crashes; I fall severely ill).

Projects are frequently the topic of narratives. Our propensity to generate narratives is central to the Structure of Lives.²

2. We do not, however, take a stance on sweeping claims (criticized by [Strawson 2004]) that "each of us constructs and lives a 'narrative' [...] this narrative *is* us, our identities" [Sacks 1985, 110], that "we are virtuoso novelists, who [...] try to make all of our material cohere into a single good story" [Dennett 1992, 114], that "identity itself takes the form of a story, complete with setting, scenes, character, plot, and theme" [McAdams 2001, 101], or that a person "creates his identity [only] by forming an autobiographical narrative—a story of his life" [Schechtman 2007, 93]. Although some people formulate "identity narratives"—for example, in memoirs and autobiographies—they do not play a role in the present account of the structure of lives. The relation of what psychologists call autobiographical memory [Fivush 2010] and the Structure of Lives is a worthy topic, the treatment of which is beyond the scope of this article.



(a) Boy meets girl, boy loses girl, boy gets girl.



(b) New Testament/Cinderella: humankind receives many gifts from God, then falls from grace, but eventually will achieve redemption and eternal bliss.

FIGURE 7: Two Vonnegut plot diagrams (redrawn) [Vonnegut 2005].

It is plausible that **narratives** are the source of both the peak-end rule and of duration-neglect. Certain literary forms, such as Freytag’s characterization of a classical play as a pyramid (Figure 3), are indeed marked by the peak-end rule.

Even so, the peak-end rule may be the exception among narratives we generate, and a fortiori among those we consume. Few conform to the peak-end rule or to Freytag’s pyramid. Kurt Vonnegut, for example, produced plot diagrams for common types of stories [Vonnegut 2005], two of which I redraw in Figure 7.

Beyond that, even familiar bodily episodes, such as urinary urgency, provide models of narratives more elaborate than can be described by a peak-end account. The increasing urgency, illustrated in Figure 8, consists of a sequence of episodes of tension followed by relief, each reaching a peak more intense than the preceding one [Chapple, Artibani *et al.* 2005]. This is of course a pattern common in suspense narratives.

As we mentioned earlier, the centrality of narrative in human life may also account for the phenomenon of duration-neglect, which is Kahneman’s main reason for wanting to replace the remembering self with the experiencing self. A narrative describes a sequence of events or activities. None of these would appear in the narrative unless they (a) were rife with emotion and tension, and (b) advanced the narrative to its conclusion. In narratives, as in episodes of urinary urgency, only the order of tension-relief events counts. Clock-time plays little or no role in the narrative of an experience or in literary narratives.

Some activities are not temporally determinate. If their timing is hard to pinpoint, we say that they are *diffuse*. Diffuseness is a defining characteristic

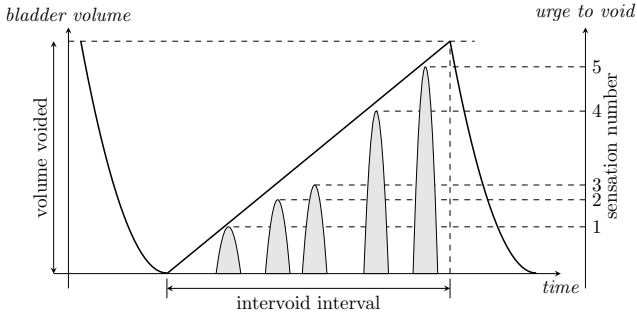


FIGURE 8: The growth of urinary urgency which resembles the pattern followed by suspense narratives. The shaded areas represent successive episodes of increasing urinary urgency. (Redrawn from [Chapple, Artibani *et al.* 2005, Fig. 1].)

of **preoccupations** (also called *time perspectives* [Frank 1939]), such as *guilt* or *worry*. When we become aware of a **preoccupation**, we rarely register where we were or when it was that a **preoccupation** surged (typically unbidden). We experience **preoccupations** as *infiltrating* experiences whose object is either in the past or in the future, and they rarely take center stage in consciousness. They may refer to events (a) in the *future*: *positively* (*expectations, wishes, daydreams, hopes, plans*), or *negatively* (*fears*); or (b) in the *past*: *positively* (*pride in an achievement*), or *negatively* (*guilt, shame, regret*).

2.3 Noteworthiness

Noteworthiness is the third central feature of the Structure of Lives.³ It is a property akin to the perceptual phenomenon of figure-ground segregation (Figure 9). To say that an incident or a preoccupation is **noteworthy** is tan-

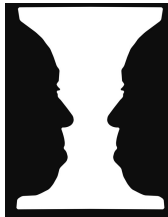


FIGURE 9: The segregation of figure from ground as a model for the emergence of an activity as **noteworthy**.

amount to saying that it is in the foreground of one's life. Furthermore, if a

3. A detailed treatment is beyond the scope of this article.

strand contains many noteworthy activities, then it is likely to inherit the noteworthy-ness of its activities. The concept is essential if we are to understand how it is possible that people who are suffering physical or psychological pain can claim that their life is fulfilling.

3 Conclusion

3.1 The standing of these claims

Perhaps the best way to characterize this effort is to say that it is a researcher's attempt to give a systematic account of the structure of *his* experience in the expectation⁴ that this account resonates with others. Thus the scientific standing of the Structure of Lives is not straightforward. On the one hand, it looks like a description—a phenomenological description—of how we humans experience our lives. In this respect it is an attempt to answer the question, “What is it like to have a life?” On the other hand, it looks like a theory—an attempt to answer the question, “What *is* the structure of lives?” It would seem that in any phenomenological discourse such as this, description and theory are ineluctably intertwined.

This expectation that the Structure of Lives will resonate with others may remind the reader of the use of acceptability judgments in the study of generative syntax [Chomsky 1965], [Schütze 2011]. There is, however, a crucial difference. Acceptability judgments are used as evidence for a complex theory that posits generative machinery of which we are not conscious. In contrast, my appeal to the reader is about the Structure of Lives itself, all of which is available to any human being, who (tautologically) has and lives a life. If it is deemed a faithful description, no further evidence is required. And even if further evidence were demanded, where could we find it?

Some readers may think that the Structure of Lives looks like an ontology (i.e., a formal structure common in information science, e.g., [Smith 2014]). There are three reasons it is not.

1. It does not adhere to Smith & Ceusters's *fundamental principle of ontological realism*: “[We] advocate the creation of [...] *reference ontologies* designed to embody the representational content of settled science” [Smith & Ceusters 2010, 140]. Since this is the first time such an attempt has been made, no settled science is available.
2. It does not readily fit into current ontologies. For example, SUMO, the ontology developed by Pease offers us the choice of classifying a life either as a **physical entity** or as an **abstract entity** [Pease 2011, Figure 56, 101]. Neither is acceptable.

4. In the light of many lectures on the topic to a variety of audiences.

3. It cannot satisfy the Smith, Kusnierczyk *et al.* requirement that ontologies have three levels of entities [Smith, Kusnierczyk *et al.* 2006, 58]:
 - Level 1: the objects, processes, qualities, states, etc., in reality (for example on the side of the patient);
 - Level 2: cognitive representations of this reality on the part of researchers and others;
 - Level 3: concretizations of these cognitive representations in (for example textual or graphical) representational artifacts.

I consider these in turn:

- Level 1: What is the “reality” captured by the Structure of Lives? It is phenomenological, i.e., always initially formulated from a first-person point of view. Nothing rests on the accuracy of π 's account, even though under some circumstances “reality” may come into play: a journalist hearing π 's fanciful account of a voyage may wish to do some fact-checking.
- Level 2: It is not the case that the Structure of Lives is a researcher's “representation of a single reality”. As I said earlier, it is *my* attempt to give a systematic description of the structure of *my* experience. If it also describes the structure of the lives of many other people, then it may be considered a “single reality”, but not quite in the sense intended by [Smith, Kusnierczyk *et al.* 2006].
- Level 3: There is no reason (at this early stage) to treat Figure 6 as a separate “concretization”. It is part and parcel of the Structure of Lives.

3.2 The value of this approach

In conclusion, what does the Structure of Lives have to offer? It makes a contribution on two levels:

1. It is of value to cognitive science because
 - it offers a new way to illuminate everyday human experience, and it does so without postulating processes inaccessible to that experience.
 - it offers new directions for research on the perception of event structure.
2. It is of value to the understanding of well-being because it raises many new questions, of which two are:

- To what degree does leakage between strands undermine well-being?
- Does the Structure of Lives offer a better basis for assessing well-being than other methods? It suggests that well-being might best be assessed strand by strand, after which a global measure may be formed by giving each strand a weight determined by the noteworthiness of its contents.

Acknowledgments

I want to thank M. Bar-Hillel, I. Bianchi, D. Dobolyi, J. Shatin, for their insightful reading of earlier versions of this article, K. Mulligan, U. Savardi, for helpful comments when I presented this work at conferences. I dedicate this article to my mentor D. Kahneman, who has had a profound influence on my life, and two decades ago triggered my interest in this topic.

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