

More Than Boundaries: Exploring the Characteristics and Attributes of Daily Life Events.

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Abstract

Conventional methods in event cognition often focus on identifying boundaries by instructing participants to mark transitions. While effective for detecting shifts, they offer limited insight into how events unfold. This study examines six characteristics—location, people, activities, mood, bodily states, and purposeful actions—and their stability across daily events. Using nightly segmentation, 41 participants captured and reviewed daily images over 14 days, defined events, and described each using the six dimensions. People (0.58) and location (0.55) were most stable, followed by mood (0.38) and bodily states (0.31). Activities (0.07) and purposeful actions (0.18) were highly variable. These findings emphasise that characteristics such as goals and activities not only serve as effective markers for identifying transitions at boundaries but also provide valuable perspectives on how events are distinguished and understood within the broader context of daily life.

Keywords: Daily Events, Event Cognition, Nightly Segmentation.

Introduction

People experience daily life as discrete units called “events,” which structure our perception and understanding of continuous experience (Zacks, 2020). Defining events has been a challenge in event cognition research, though a widely accepted definition describes them as “a segment of time at a specific location with a clear start and end” (Zacks & Tversky, 2001). Events vary in duration, from brief encounters to extended episodes (Sastre et al., 2022; Zhuang et al., 2013).

Event segmentation helps structure continuous experience into manageable units. Boundaries are often identified when location shifts, such as moving from one room to another (Baker & Levin, 2015; Zacks et al., 2010). Similar patterns are observed in studies on narrative text comprehension,

where changes in context signal end points for events (Rinck & Bower, 2000; Rinck et al., 1997; Morrow et al., 1989). These event boundaries serve as cognitive cues, allowing people to break down continuous experiences into manageable, meaningful segments.

Studies in event segmentation have identified key characteristics of segmentation behaviour, including the tendency for observers to set boundaries when there are significant changes in the elements of the stimulus (Pauly & Schwan, 2024; Zacks, 2020; Pettijohn & Radvansky, 2016; Zacks, Speer, et al., 2009; Magliano et al., 2001). Among the important dimensions in event segmentation, temporality has been studied for its role in memory retrieval and narrative comprehension, as it helps integrate events within a shared temporal framework (Zacks & Tversky, 2001; Zwaan & Radvansky, 1998). Temporal changes, such as transitions from morning to afternoon or temporal markers, are commonly used in media representations such as text and film to organise information and enhance memory (Speer & Zacks, 2005; Magliano et al., 2001). However, unlike media narratives, real-life events unfold continuously without abrupt time jumps or gaps, highlighting the importance of considering characteristics beyond time, such as location, entities, activities, goals, mood, and bodily states.

Location provides spatial context, helping to differentiate events as shifts reconfigure perception and organisation (Zacks, 2020; Lawrence & Peterson, 2016; Radvansky et al., 2011). For instance, studies have demonstrated that when people move from one room to another, this transition prompts the activation of a new event model while deactivating the previous one (Lawrence & Peterson, 2016; Swallow et al., 2009; Zacks, Speer, et al., 2009; Kurby & Zacks, 2008).

Entities—whether animate (people/animals) or inanimate (objects)—also shape perception. Research highlights the

role of facial recognition, body movements, and object interactions in predicting events and maintaining narrative clarity (Hafri et al., 2013; Cutting et al., 2014).

Goal states also shape the nature of events by providing structure and influencing how they are experienced, perceived, and remembered. For example, goals function as desired outcomes of actions or sequences of actions, including unobservable mental states that guide behaviour (Su & Swallow, 2024; Newton et al., 1977). Emotions, an internal state, enhance attention and memory, for example, recent research has demonstrated that participants exposed to highly emotional scenes reconstruct event sequences more accurately than those viewing less emotional content, highlighting the role of emotions in enhancing attention and memory for event details (Dev et al., 2021). Similarly, bodily states like stress heighten sensitivity to event boundaries, demonstrating the interaction between internal and external factors in shaping perception and memory (Sherrill et al., 2019).

Traditional research methods, such as instructing participants to press a button to indicate event transitions (Newton, 1973; Newton et al., 1987), often involve simplified tasks with single actors and well-defined endpoints (Yates, 2023; Ji & Papafragou, 2020). While effective for brief events, the Newton method is less suited for studying longer or more immersive events. To explore its applicability in real-world contexts, we conducted a pilot study in an ecological setting, which revealed additional challenges: participants frequently forgot to press the button during complex or engaging activities where they were fully immersed in their experiences.

To address these limitations, researchers have adopted ecologically valid approaches such as experience sampling methodology (ESM) and nightly segmentation. ESM facilitates the real-time study of daily experiences over extended periods using smartphones and wearable devices (Larson & Csikszentmihalyi, 2014; Sreekumar et al., 2018). Nightly segmentation complements this by employing lifelogging to collect multimodal data (e.g., GPS, images, and audio), with participants reviewing their photos nightly to identify event boundaries and describe their characteristics (Zhuang et al., 2012; Sastre Gomez et al., 2024). These studies suggest that some of the patterns seen in segmentation on shorter timescales hold true for longer timescales: Event boundaries tend to occur when more activity features are changing and when activity is less predictable.

For both shorter-timescale and longer-timescale studies (e.g., Sastre Gomez et al., 2025), most research has focused on what patterns are predictive of an individual boundary. Equally important, though, is the question of which features tend to persist stably across multiple successive events (Teigen et al., 2017; Ji & Papafragou, 2020). These characteristic attributes of events can inform about how event boundaries are placed, but also about the larger structure of activity.

The current study aimed to identify which characteristics remain stable and which change across consecutive events. We examined six dimensions—location, people, activities,

mood, bodily state, and purposeful actions—selected based on both theoretical and empirical work in event cognition. Changes in location, people, and activity have been shown to be key segmentation cues and are referred to in both Feature Change and Event Model theories of segmentation (Zacks et al., 2007; Kurby & Zacks, 2011). Internal states like mood and bodily sensations are increasingly informing our understanding of how events are experienced and remembered (Dev et al., 2021; Wang et al., 2024). Additionally, Hamm et al. (2013) showed that when freely tagging events from daily life, people intuitively rely on features such as activities, locations, and social context. By integrating both external and internal features, this study aimed to examine what characteristics change or remain the same across naturally occurring experiences in everyday contexts.

Methods

Participants

Forty-one participants (26 females, 15 males; aged 18 to 67 years, $M = 32.14$, $SD = 10.1$) were recruited via Unforgettable.me (Dennis et al., 2019), Facebook student groups, and university campus flyers. Participants were required to be over 18 years old, own an Android phone, and reside in Australia. Compensation ranged from AUD 103.65 to AUD 112.70, based on the number of completed surveys and data collected. Of 230 potential recruits, 74% declined due to privacy concerns, job constraints, disinterest, or time limitations. Initially, 58 participants joined, but 17 withdrew due to mobile issues, leaving a final sample of 41 participants.

Twenty-five participants (61%) identified as university students. Regarding employment status, 11 (27%) reported working part-time, 10 (24%) full-time, and 20 (49%) were not currently working. Participants represented diverse racial and ethnic backgrounds: 27 (66%) Hispanic/Latino, 4 (10%) East Asian, 4 (10%) White Mexican, 3 (7%) White/Caucasian, 2 (5%) South Asian, and 1 (2%) White/Sephardic Jew. All provided written consent and received study materials in English.

Materials and Procedure

Participants in this study were instructed to wear Android phones with front-facing cameras hung around their necks, as shown in Figure 1. These cameras automatically captured the surroundings at 10-minute intervals, from 8:00 a.m. to 8:00 p.m., over a 14-day period.

Using an event segmentation interface (Figure 2), participants reviewed daily photos each evening or the next morning, manually marking the start and end of events by selecting time stamped images. The interface did not assume that the end of one event automatically marked the beginning of another. Participants grouped and categorised images belonging to the same event and completed a short survey for each event over the 14-day period. Images could also be deleted for privacy, ensuring only consented content was included.



Figure 1. Demonstration of Phone Positioning: Around Neck, Camera Uncovered.

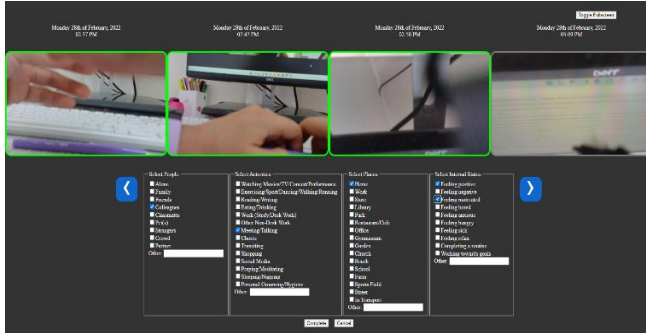


Figure 2. Nightly Segmentation Interface.

Selecting Event Categories The nightly segmentation survey, integrated into the event segmentation interface, followed the framework established by Hamm et al. (2013), which categorised daily events into 15 activities, nine locations, and six people domains. Building on this, a pilot study by Sastre et al. (2022) revealed frequent use of the "Other" response option, prompting the inclusion of additional categories to reflect participants' experiences more accurately.

In the activity domain, six new tags were added (e.g., working/studying, using social media, praying/meditating), and some original categories were merged or redefined (e.g., various lecture-related tags under "working/studying"; "walking" grouped with exercise). Rarely used categories (e.g., "tend to a baby") were removed. In the location domain, 11 tags were added (e.g., gymnasium, garden, transport), and redundant entries were merged (e.g., "my office" and "other's office" under "Office"). For the people domain, four new tags were added, including "alone" and "partner."

To explore a broader range of event characteristics, three new domains were introduced: mood/emotion, bodily states, and purposeful actions. The mood domain included four tags (positive, motivated, bored, negative), and the bodily state domain also had four (anxious, relaxed, hungry, sick). Purposeful actions included two goal-related categories: completing a routine—reflecting automatic but goal-oriented tasks (Levine et al., 2017)—and working towards goals, which captured long-term, adaptive behaviours (Baker et al., 2009). This refinement resulted in 14 activities, 16 locations, 9 people, 4 moods, 4 bodily states, and 2 purposeful action categories (see Table 1), balancing detail with usability. Although participants could provide free-text responses via the 'other' option, these were excluded due to their variability.

Multiple selections were allowed for all sections, except for Location, which was restricted to a single choice.

Table 1: Nightly segmentation survey categories.

Categories	Tags
Activity type (14)	Watching movies/TV/listening to a concert/other performance, Exercising/playing sport/dancing/walking/running, Reading/writing, Eating/drinking, Work (studying, working at a desk), Other non-desk work (e.g. bar-tending, paramedic, carpenter, vendor), Meeting/talking/chatting/discussing, Chores (cooking, cleaning, laundry), Transiting (drive/fly/bus/taxi, other vehicles), Shopping, Using social media, Praying/meditating, Sleeping/napping, Personal grooming/hygiene (e.g. brushing teeth, showering, doing hair)
People (9)	Alone, Family, Friends, Colleagues, Classmates, Pet(s), Strangers, Crowd, Partner.
Places (16)	Home, Work, Store, Library, Park, Restaurant/café, Office, Gymnasium, Garden, Church, Beach, School, Farm, Sports field, Street, In transport (car/airplane/ship/truck and rail).
	Mood (4) Feeling positive, feeling negative, feeling motivated, feeling bored.
New Categories (10)	Bodily (4) Feeling anxious, relaxed, hungry, sick.
	Purposeful actions (2) Completing a routine, working towards goals.

Results

To analyse the extent to which characteristics were tied to events, we focused on contiguous events—that is, immediately adjacent events uninterrupted by technical issues or participant-driven gaps in mobile data collection—allowing for observation of how attributes may change or remain consistent from one event to the next. From an initial dataset of 4,772 recorded events, we excluded 1,289 non-continuous events due to interruptions caused by factors such as upload issues, low battery, participants opting to turn off the device overnight, or choosing not to collect data in certain situations. As a result, the final dataset consisted of 3,483 contiguous events, representing 73% of the total data collected.

To explore the features of daily events—location, people, activities, mood, bodily state, and purposeful actions—we first examined their frequency distribution. People's characteristics were most frequently solitary (54.5%), followed by interactions with a partner (18.7%) and family (8.5%). Home was the predominant location (57.9%), followed by streets (10.2%) and workplaces (8.1%). This pattern may reflect the sample's composition—primarily

university students and participants not in full-time employment—as well as contextual factors such as hybrid work/study routines and the 8 am–8 pm data collection period.

The most common activities included transiting (16.5%), eating/drinking (14.4%), and studying or working (10.7%), while less frequent activities were praying/meditating (<1%) and shopping (2.4%). Mood was reported in 70% of events, with positive feelings (42%) and motivation (19.9%) being the most frequent, while negative emotions were rare (1.8%). Relaxation (34.9%) was the most reported bodily state, contrasting with hunger (5.0%) and sickness (4.5%). Purposeful actions were noted in 18.8% of events, with completing routines (13.7%) being more common than working towards goals (6.0%).

After examining the frequency distribution of event characteristics, we focused on transition probabilities to explore how likely these features were to persist from one event to the next. As shown in Figure 3, people (e.g., people: 0.58) and places (0.55) exhibited the highest stability, followed by mood (0.38) and bodily states (0.31). Purposeful actions (0.18) and activities (0.07) showed lower transition probabilities, highlighting their variability. These results suggest that while some characteristics remain consistent across events, others vary more frequently, reflecting their role in shaping transitions and defining new events.

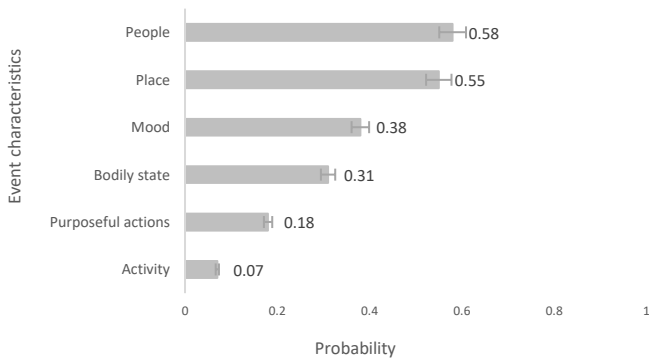


Figure 3. Consistency in Event Characteristics Across Contiguous Events.

To explore the stability of specific characteristics across events, conditional probabilities were examined, reflecting the likelihood that features such as people, location, or mood persist into subsequent events. Figure 4 presents a heatmap, with the X-axis showing people in the current event and the Y-axis people in the subsequent event. Darker colours indicate the highest likelihood of persistence, such as being alone (72%) or with family (64%), compared to being around strangers (24%).

Locations also varied in their consistency. Home environments demonstrated the highest persistence (81%), followed by farms, schools, and workplaces. In contrast, gyms, sports fields, and stores showed minimal continuity, indicating that these settings are more situationally specific (Figure 5).

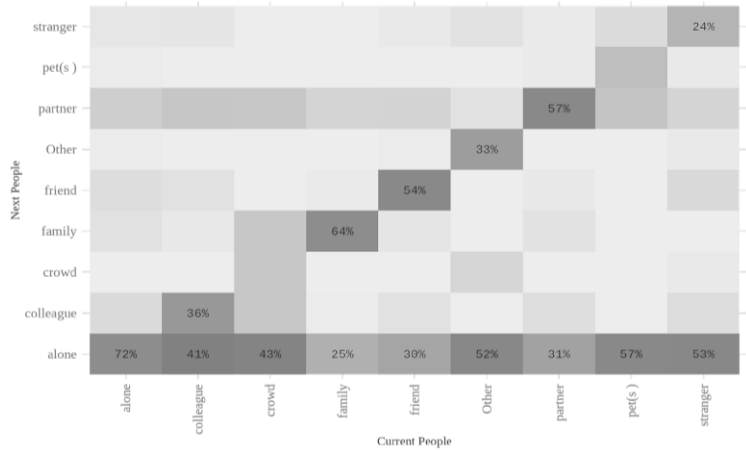


Figure 4. Heatmap of Conditional Probability for People in Subsequent Event.

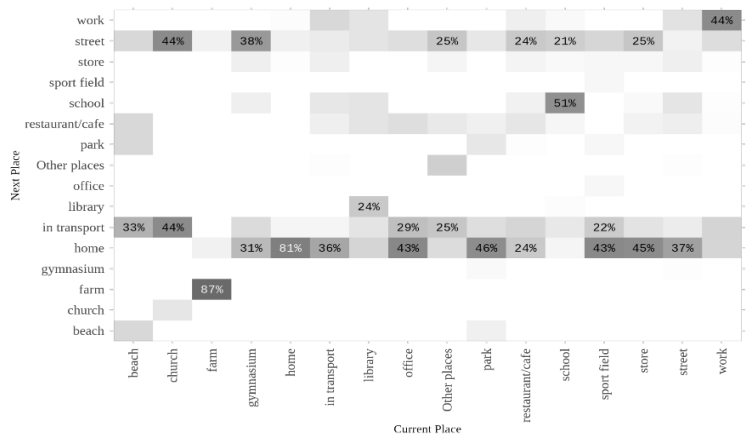


Figure 5. Heatmap of Conditional Probability for Subsequent Events in Specific Locations.

Mood states also demonstrated varying levels of persistence, with positive feelings (71%) and motivation (56%) being the most likely to carry over into subsequent events. Negative feelings (50%) and boredom (46%) exhibited lower levels of consistency, indicating a greater tendency for these states to shift between events (Figure 6). Bodily states, such as relaxation and sickness, were among the most stable, persisting in 86% and 77% of events, respectively. In contrast, hunger showed much lower stability, with a persistence rate of less than 25% (Figure 7).

When examining purposeful actions, completing routines (72%) and working towards goals (56%) displayed moderate consistency, highlighting their relevance for structured daily activities.

In contrast, activities exhibited the lowest persistence, with no specific activity surpassing a 20% likelihood of continuing into the next event. These findings underscore the variability of activities as a defining characteristic of transitions between events (Figure 8).

Discussion and Conclusion

This study examined how key characteristics of events contribute to their organisation and differentiation in daily life. By focusing on characteristics such as location, people, activities, mood, bodily state, and purposeful actions, the research explored their stability and variability across consecutive events. Understanding how these characteristics remain consistent, or change provides valuable insights into how events are perceived as cohesive units while also highlighting the dynamic elements that mark transitions

Our study found that locations and the people involved tended to remain stable across event boundaries. In contrast, activities and purposeful actions tended to vary the most, with mood and bodily states showing moderate variability. This suggests that activities and goals may be more tightly linked to event structure than enduring social or spatial contexts- at least at the granularity level captured in our study. This is not to say that changes in spatial and social contexts are not relevant for event segmentation and previous experimental research has indeed shown that they are closely connected with event boundaries (e.g. Cutting et al., 2014; Lawrence & Peterson, 2016). Rather, our study suggests that some characteristics are more relevant than others at particular granularities or within particular situations. This potentially varied weighting of characteristics is not a new idea (e.g. Newton 1973) and is well supported by many of the current theoretical approaches (e.g. Richmond & Zacks, 2017; Shin & DuBrow, 2020; Zacks et al., 2009). However, the understanding and theory of weighting event characteristics remains underdeveloped. Our study contributes to this gap by examining how various characteristics evolve across longer events in real-world contexts, revealing differential patterns of variability and stability across characteristics compared to those found in small-scale events in experimental contexts.

When analysing the specific components of event characteristics, it was found that most events occurred either at home or at work. Similarly, events frequently involved only the individual themselves or a close family member, representing specific instances within the general characteristic of "people." Transition probabilities revealed a high degree of stability in both these components, suggesting that, within daily routines, these characteristics serve more as consistent background elements rather than defining features of individual events, at least at the level of granularity coded. For instance, movements between different rooms (e.g, kitchen to living room) might have been grouped under a broader category such as "home", resulting in finer-grained spatial changes being captured within a single higher-level label. Thus, changes that might prompt event model updates could have been registered differently at the coding level applied in our study. Nevertheless, while the general consistency of place and people provides continuity throughout the day, it offers limited differentiation between events. Instead, it is the changes in other features-such as activities and proposed actions-that appear to be critical for distinguishing one event from another.

In the activity domain, most events involved transiting, eating, or working/studying. However, when analysing

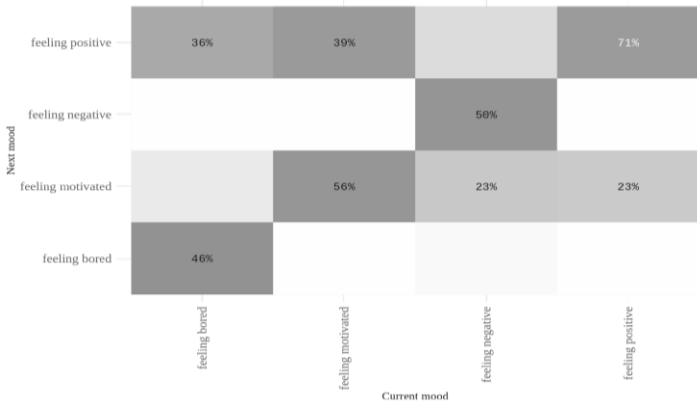


Figure 6. Heatmap of Conditional Probability for Subsequent Events in the Same Mood.

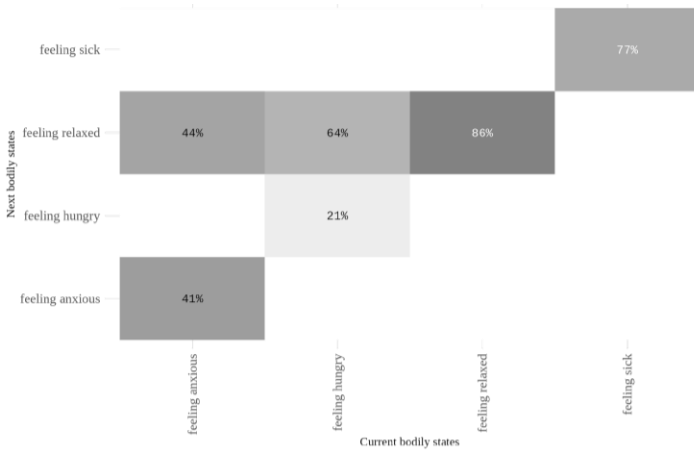


Figure 7. Heatmap of Conditional Probability of Subsequent Events in the Same Bodily State.

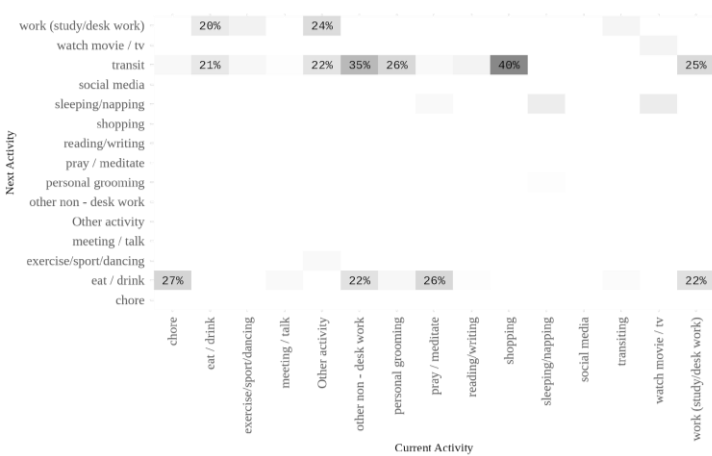


Figure 8. Heatmap of Conditional Probability for Subsequent Events in the Same Activity.

transition probabilities between consecutive events, no single activity consistently carried over from one event to the next. This finding suggests that activities often change at event boundaries, highlighting activity changes as a key factor in distinguishing one event from another. Within the category of purposeful actions, contrasts appear between its subcategories. Completing a routine often involves familiar tasks that provide a stable and predictable structure, which could explain why it appears more likely to remain consistent across events in our results. However, the way we assessed this subcategory only captures the persistence of completing a routine as a general category, without specifying if the exact routine was maintained. This adds complexity to interpreting these results and limits our ability to draw strong conclusions about the continuity of specific routines across events.

Working towards a goal, such as preparing an academic paper, tends to show more variability. Goal-oriented actions can span days or even weeks, with each step contributing to a broader purpose and reflecting an evolving progression as individuals move through subgoals. Progressing towards a goal usually requires conscious adjustments as individuals adapt to ongoing developments and situational factors. This flexibility means that goals may be pursued through evolving steps rather than a fixed pattern, introducing a level of variability marked by ongoing progression toward a broader objective.

Event cognition research has consistently shown goal changes have a high correspondence with event boundaries that changes in goals correspond to high agreement among participants when identifying event boundaries, with much prior work focusing on goal completion or shifts in goals as segmentation cues (Wang et al., 2024; Wang & Egner, 2022; Su & Swallow, 2024; Kurby & Zacks, 2011; Zacks et al., 2009; Travis, 1997). Our study diverges from this approach by examining purposeful actions more broadly, through the lens of completing routines and working towards goals. Nevertheless, purposeful actions were unlikely to persist across daily events. It is possible that this reflects the agent-focused nature of the nightly segmentation method, which invites participants to reflect on their own goal-directed behaviours. However, given the known importance of goals in event segmentation, we find it interesting that whether the event was completing a goal or working towards a goal emerged as a salient organising dimension in how people mentally structure daily experiences. This suggests that a more nuanced study investigating specific goal changes as well as our purposeful action variable would be well warranted.

Participants frequently reported positive emotional states, such as feeling motivated or relaxed, which are strongly associated with well-being (Diener et al., 2009, 2010; Heo et al., 2012; Cheung & Lucas, 2014). This trend aligns with prior research using Experience Sampling Methods (ESM; Oishi et al., 2007; Conner & Reid, 2012; De Vuyst et al., 2020), showing that low-intensity positive emotions occur more frequently and are more accessible in memory, leading to their generalisation as daily experiences. Positive emotions

are also more likely to be recalled and reported due to their contribution to overall well-being (Diener et al., 2009; 2018).

A limitation of our study is the absence of a “neutral” option in the mood dimension. This choice aimed to capture moods with clearer affective valence, prompting participants to reflect on meaningful changes rather than default states. However, “feeling positive” may have been used as a proxy for neutrality, potentially inflating the apparent stability of positive affect. While this warrants caution in interpreting the absolute consistency of these states, optionality of specifying mood and the overall pattern—frequent reports of low-intensity positive or motivated moods—remains consistent with findings from studies using Experience Sampling Methods (e.g., De Vuyst et al., 2019) and broader affective research on the frequency of low-intensity positive emotions (Diener et al., 2009).

In terms of variability, positive emotions and pleasant bodily sensations remained relatively stable across events, contributing to general well-being but offering limited utility in distinguishing one event from another (Diener et al., 2009; 2018). In contrast, transient internal states—such as boredom, anxiety, and hunger—showed greater variability. For instance, “feeling hungry” exhibited a low transition probability (see Figure 7), likely because it is typically resolved through eating. These findings suggest that internal states linked to discomfort or tension may be more effective for differentiating events than stable positive states.

The nightly segmentation method provides an ecologically valid approach to studying participants' daily events in real time, enabling the collection of longer-duration events and offering valuable insights into dynamic features such as activities, goals, and social interactions. Unlike traditional laboratory-based studies, which often rely on videos of everyday activities in controlled scenarios (e.g., a single character or activity with defined start and end points; Boggia & Ristic, 2015; Zacks, Speer & Reynolds, 2009; Zacks, Braver, Sheridan et al., 2001; Zacks, Tversky & Iyer, 2001), this method captures the spontaneity and flow of events in natural settings while enabling the study of events on a longer timescale than most previous research, offering a broader perspective on event structure. By overcoming the constraints of laboratory environments, which limit observations of how events naturally unfold and how characteristics like social context and emotional shifts interact, the nightly segmentation method provides a more comprehensive analysis of patterns that shape event continuity and differentiation.

This study advances event cognition by illustrating how overarching characteristics—such as location, people, activities, mood, bodily state, and purposeful actions—inform the transitions between events and offer broader insights into their differentiation in daily life. By leveraging an ecologically valid methodology, this research contributes to refining current models of event cognition, highlighting the interplay of stability and variability that shapes the perception of everyday experiences.

Acknowledgments

This study was funded by J S McDonnell Foundation grant #20201143 awarded to Professor Zacks and Professor Dennis.

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