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Afterlife future thinking: imagining oneself beyond death

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Abstract
Studies on episodic future thinking (the capacity to simulate possible experiences in one's personal future) have ignored future thinking that extends beyond death. We here examined personal afterlife projections in comparison with autobiographical memories and future projections in Thai (Study 1) and American (Study 2) samples. Participants reported all three types of events and rated their characteristics. In both studies, the characteristics of afterlife events were rated lower than those of memories and future events. Participants who believed in the afterlife generally rated afterlife events higher than non-believers and those who were uncertain, although this effect was most pronounced in Study 2. The content of afterlife events followed religious beliefs in the afterlife, and the majority of afterlife events were expected to take place immediately after death. The findings show that afterlife thoughts demonstrate characteristics that are comparable to memories and episodic future thoughts, and are shaped by religious beliefs.

Keywords Afterlife belief · Autobiographical memory · Episodic future thinking · Mental time travel · Religion

Introduction

> "After my spirit leaves the body, I will go to my funeral to see who comes to my funeral. Then, I will travel to wherever I want to go. The most important thing is that I am going to see my grandpa, my aunt, and my dog. I want to talk to grandpa so much, and I will take him to travel." (An imagined afterlife event of a participant)

To some, death seems to be the end of life and consciousness. To many, death is only another step of life, not the final destination of the self and consciousness. Many believe that after death, their consciousness continues on in some form, travels to, and even lives in some places. An extensive survey of 35,000 American adults by Pew Research Center (2015) showed that 72% of the participants believed that a heaven exists, whereas 58% believed that a hell exists. People who were affiliated with a religion were more likely to believe in the afterlife than those who were unaffiliated.

Imagining one's afterlife in terms of concrete and elaborate imagination and conceptual impressions, as in the example above, can be viewed as a kind of *mental time travel* (MTT) – that is, the ability to mentally project oneself into one's personal past or future, in terms of memories of personal past events or projections of possible events in the future (Wheeler et al., 1997). However, the conceptual and empirical connection between MTT and the imagined afterlife has not been examined. To begin to fill this gap in the literature, we here examine what people imagine will happen to them in their afterlives, as well as the qualities and functions of personal afterlife imaginations in comparison to those of memories and future projections.

The aim is twofold. First, we introduce a new type of MTT in terms of future afterlife imaginations and establish its similarities and differences with autobiographical memories and future projections. Second, we examine the often-neglected connection between cognitive processes and culture (e.g., Bartlett, 1932) by exploring how religious belief and cultural background may affect the content of afterlife imaginations.

Belief in the afterlife: When consciousness persists after death

Belief in the afterlife has been part of human society since ancient times. The conceptualizations of the afterlife are related to people's key understandings of life itself, such

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as life goals, cosmology, and morality. For instance, there are 42 sins listed in the ancient Egyptian Book of the Dead – the collection of texts that provided guidance in and knowledge of the underworld. They believed that, in the afterlife, the dead must confess in front of the gods that they had not committed these sins, and subsequently receive a judgment as to whether they would be admitted to the eternal paradise or not (Taylor, 2010). As the sins described are generally socially undesirable, punishment-bringing behaviors, we may infer how the ancient Egyptians viewed morality during their time. Although the concepts of afterlife are diverse across religions, we may group how the afterlife is viewed into two broad concepts. In Abrahamic religions (e.g., Christianity, Islam, and Judaism), when death comes, the deceased departs this world and makes their way to another plane of existence – Heaven or Hell – determined by divine judgment. They then spend their eternity in that destined place. In Indic religions (e.g., Buddhism, Hinduism, and Sikhism), all living beings are in Saṃsāra – the cycle of death and rebirth. When one passes away, one is reincarnated into a different body in the realm where one deserves to be, driven by one's own deeds or karma (see Nagasawa & Matheson, 2017, for an exemplary review). Nevertheless, it is worth noting that there are differences within these concepts. For instance, the descriptions of Heaven in the Bible and Jannah in the Quran are different. In addition, the ways of gaining salvation in these religions are also different. In contrast to these two major beliefs, there are also other views including oblivion after death (there is nothing after death, and the mind and consciousness simply cease to exist).

Belief in the afterlife has been found to relate to many psychological properties. Flannelly et al. (2006) found that such beliefs were associated with better mental health, indicated by lower scores on psychiatric assessments. They argued that belief in the afterlife provides a sense that this life is a small part of one's existence. Daily problems, bad experiences, and traumas may be viewed as temporary and limited to the material world (i.e., they do not carry over to the life after death), and thus become less threatening and induce less stress. Cohen et al. (2005) found that belief in the afterlife positively correlated with life satisfaction, and negatively correlated with death anxiety. Afterlife belief also plays a part in the late-life spousal loss coping mechanism, in that a pessimistic view of the afterlife predicts maladaptive coping strategies for the person suffering the loss (Carr & Sharp, 2014). For terminally ill patients, belief in the afterlife is linked to lower levels of end-of-life despair, and a higher level of spiritual well-being (McClain-Jacobson et al., 2004).

Humans may be naturally inclined to imagine an afterlife. Studies on the afterlife beliefs (Bering, 2002; Bering & Bjorklund, 2004) revealed that when people are asked to think about the continuation of mental states of living beings after death, they believe that some mental states, particularly those involving emotions and desires, as well as epistemic states, continue after death. This tendency to attribute continuity of mental (and some physical) states after death develops early in childhood, then fades when children grow older (Bering et al., 2005; Misailidi & Kornilaki, 2015). Bloom (2004) proposed that this belief in the continuation of mental states after death is a result of intuitive dualism – that is, a naturally developed idea that mind and body are two separate entities, which allows one to think that souls or consciousnesses can exist without bodies. Hodge (2011) argued that, by nature, humans intuitively believe that others survive death, and are somewhere doing something in the afterlife. Their imaginations of the deceased loved one are supported by what is known as the offline reasoning process – an ability to think about or imagine other people in their absence – as well as our social nature and social embodiment of the deceased ones.

Mental time travel

Mental time travel (MTT) refers to an ability to mentally construct personal events from past experiences and project oneself into the future, driven by autonoetic (self-knowing) consciousness (Tulving, 1985; Wheeler et al., 1997). Episodic memories and episodic future thoughts, as the products of MTT, contain perceptual information, temporal information, and inferences about actors' goals, allowing people to evaluate the qualities of the events in various dimensions, such as vividness, intensity, specificity, and importance. As such, concretely imagined scenes referring to life after death may be viewed as a form of MTT.

Research on MTT shows that past memories and future thoughts share many comparable phenomenological characteristics and underlying neural mechanisms. For example, past and future MTT responds similarly to a range of experimental manipulations (e.g., Anderson et al., 2012; D'Argembeau & Van der Linden, 2004; Spreng & Levine, 2006). Tulving (1985) found an amnesic patient who lost the ability to recall their past episodes was also incapable of eliciting future events. Addis et al. (2007) found the neural structures for constructing past and future events extensively overlapped, particularly during the elaboration phase when participants generated details in their visual imaginations (see also Schacter & Addis, 2007; Szpunar et al., 2007. See Schacter et al. (2017) for a recent review). However, differences have been observed as well. Regarding phenomenological characteristics, a substantial body of literature (e.g., Anderson & Dewhurst, 2009; Berntsen & Bohn, 2010; D'Argembeau & Van der Linden, 2004; Özbek et al., 2020) has revealed past events are generally more vivid, more

specific, easier to think of, and richer in sensory-spatial detail than future events. In contrast, future events are typically perceived as more important and more positive than past events.

Many researchers have considered possible functions of MTT. For example, Boyer (2008) outlined several functions of episodic recall and episodic counterfactual thinking,[1] such as foresight and flexible planning, hindsight, and case-based inferences. Schacter et al. (2017) suggested episodic future thinking helps to delay gratification, regulate emotions, boost memory, and shape a sense of self and identity. Rasmussen and Berntsen (2013) found past and future MTT served adaptive functions to different extents. Moreover, the emotional valence of the episodes also influenced the functions of MTT, as well as interacted with the temporal directions.

Hypothesized characteristics of afterlife future thinking

Afterlife future thinking underscores the extraordinary ability of humans to imagine things in their absence and mentally construct complex events and entities they have never encountered. In doing so, people are likely to draw upon collectively shared schemata guiding their imaginations to be consistent with norms and values within their culture and religion. Cultural life scripts, that is, culturally shared representations of the timing of major transitional life events (Berntsen & Rubin, 2004), have been shown to strongly influence how people imagine important events in their personal future (e.g., Berntsen & Bohn, 2010). Similarly, we expect culturally shared schemata or scripts to shape people's imaginations of afterlife events. To the extent such schemata operate and affect cognition, we should expect high levels of similarity between the contents of imagined afterlife events within religions and clear differences between the imagined afterlife events generated by people with different religious and cultural backgrounds.

The fact that one's own afterlife must take place in the future, after death, raises the possibility that personal afterlife events may be viewed as future events that lie in the distant future. Even in cases where people imagine they might die in the near future, logically, personal afterlife events would be temporally more distant than any future event that would take place before (the imminent) death. Moreover, people typically think that they will live until old age rather than dying soon, which has been shown in studies on desired lifetime (Lang et al., 2007), subjective nearness to death (Bergman et al., 2018), and cultural life scripts (e.g., Berntsen & Rubin, 2004).

Previous research on mental time travel has revealed that temporal distance influences several qualities of imagined future events (e.g., Addis et al., 2008; D'Argembeau & Van der Linden, 2004; Özbek et al. 2017), consistent with temporal construal theory (Trope & Lieberman, 2003). Temporal distance was found to have negative relationships with vividness, ease of imagining, and specificity, and positive relationships with importance, valence, and event centrality (D'Argembeau & Van der Linden, 2004; Özbek et al. 2017). Thus, if afterlife events were to be viewed as extremely distant future events, they would be rated lower than ordinary future events on measures related to ease of imagination. Conversely, afterlife events would be rated higher than future events in the characteristics related to the personal significance of imagined events.

Regarding the content of afterlife scenarios, De Cruz and De Smedt (2017) proposed afterlife imaginations to be generally positive, similar to future events. They also proposed that the imaginations should match cultural ideas and practices that one possesses. Accordingly, semantic knowledge and prior experiences should determine how life after death is visualized (Corballis, 2019; Radvansky, 2017).

In sum, we expected people would be able to engage in the imagination of afterlife events in the same ways as they engage in MTT for personal past and future events. We also anticipated belief in the afterlife would affect the ability to imagine the afterlife events. Those who believe in the existence of the afterlife would rate both the phenomenological and functional characteristics of the afterlife events higher than those who do not believe it. The content of imagined afterlife events was expected to be consistent with concepts and narratives of the afterlife in the religion to which one ascribes. Buddhist participants were expected to produce afterlife imaginations that included the birth and the existence in the next realm according to their karma, whereas Christian participants were anticipated to imagine events about God, Heaven, and the resurrection. Furthermore, we were also intrigued to see the imagined afterlife events of those who denied the existence of an afterlife.

Study 1

In Study 1, we examined how people imagine events in their personal afterlife, including characteristics and functions of imagined afterlife events. We compared these afterlife imaginations with episodic future thoughts and memories of past events. We recruited the participants from among university students and young adults in a Buddhist community

[1] Episodic counterfactual thinking refers to an ability to simulate alternative versions of the past; that is, events in the past that could have happened but did not (Schacter et al., 2015).

in Thailand. This enabled us to examine the topic in a relatively homogenous population in a distinct culture in order to reduce noise caused by variation in religion and other sociodemographic characteristics.

Method

Participants

A total of 148 university students and young adults in a Buddhist community participated in the study on a voluntary basis. We excluded seven participants who were affiliated with Christianity and Islam, as their perspectives on the afterlife were likely to be influenced by different sets of religious teachings. However, 17 participants who stated they were irreligious and three participants who were agnostic were retained in the final sample for the reason that they were raised in the Thai culture where Buddhism is the dominant religion, although they chose not to believe in that religion. As Buddhism is in the curriculum of Thailand's basic education and has long been embedded in Thai culture, these participants were expected to have some knowledge of the afterlife in the Thai context. The final sample thus comprised 121 Buddhists and 20 non-Buddhists (56 males, 80 females, and five others). Table 1 shows the demographic and psychological characteristics of the sample including age, years of education, religiosity, and death anxiety.

Design

We used a within-subjects design with three conditions: Memories for past events, imagined future events, and imagined future afterlife events. Participants were randomly assigned to answer the events task in one of six possible orders.

Procedure

After agreeing to participate in the study, the participants were given a link to an online questionnaire. First, they answered the demographic questions, including age, gender, education year, and religious affiliation. They then proceeded to the recall and imagination task in which they were asked to recall one important past event, think of one important future event, and imagine one important event in their afterlife. They subsequently rated the phenomenological and functional characteristics of the remembered and imagined events. When the participants finished one condition, they moved on to the next condition until all conditions were finished. The conditions were presented to the participants in random order.[2] Lastly, they completed psychological scales measuring religiosity, belief in the afterlife, and fear of death.

Materials

The recall and imagination task We asked the participants to give a brief description of the personal event they were asked to recall or imagine. There were no time or word limits for the description. The instructions for the main recall and imagination task were adapted from Berntsen and Bohn (2010). The following instructions were for the past-event condition.

> We would like you to recall a memory of an important event in your life and provide a short description of it in the space below. The memory can come from any point in your life. It can be from yesterday or deal with something that happened many years ago. The memory has to be about a specific event. This means that it should deal with something that happened to you on a specific day in your past. After you have recalled an important event, you will be asked to answer a number of questions about it.

The instructions for the future-event condition were similar, except for the reference to a future event instead of a past event. The instructions for the afterlife-event condition were, however, slightly different from the other conditions. Death was used as a starting point from where an afterlife event would take place. To reduce confusion on whether participants should focus on their bodies – and how people would treat them after death – or their minds, we further instructed them to focus on what would happen to the latter. The instructions were as follows:

> We would like you to imagine an important event in your life after death (preferably your soul, spirit, or mind) and provide a short description of it in the space below. The imagined afterlife event can come from any point in your afterlife. It can be about something that happens right after death or deal with something that may happen later in your afterlife. The imagined afterlife event has to be about a specific event. This means that it should deal with something that can happen to you at a specific point in your afterlife. After you have imagined an important afterlife event, you will be asked to answer a number of questions about it.

The questions for the phenomenological and functional characteristics of the events were comparable across events

[2] The six possible orders were: (past [P], future [F], afterlife [A]); (P, A, F); (F, P, A); (F, A, P); (A, P, F); and (A, F, P).

Table 1 Demographic and psychological characteristics of the participants

Study 1										
Variable	Exist (n = 44)		Uncertain (n = 65)		Not exist (n = 32)		Total (N = 141)		F	η^2
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Age	23.82	6.86	20.86	3.311	20.63	2.90	21.73	4.83	4.00[a*]	.086
Education year	14.63	2.00	14.69	1.92	14.59	2.42	14.65	2.06	0.03	.000
CRS score	3.56	0.76	2.51	0.56	2.32	0.59	2.79	0.82	38.40[a**]	.408
DAI score	46.41	13.42	44.92	16.15	38.69	16.42	43.97	15.59	2.55	.036
Study 2										
Variable	Exist (n = 75)		Uncertain (n = 41)		Not exist (n = 30)		Total (N = 146)		F	η2
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Age	40.81	12.17	37.56	9.94	39.73	11.40	39.68	11.44	1.07	.015
Education year	15.24	1.87	16.05	2.12	15.30	1.73	15.48	1.94	2.52	.034
CRS score	3.99	0.82	2.36	0.94	1.95	1.10	3.11	1.29	72.55**	.504
DAI score	55.69	19.76	60.85	18.39	57.40	20.58	57.49	19.55	0.92	.013

*$p < .05$, **$p < .001$

[a]*Welch's F*

CRS = Centrality of Religiosity Scale; DAI = Death Anxiety Inventory

and were presented below the text field on the same page. Most of the questions were modified from other studies on remembering and future thinking (e.g., Berntsen & Bohn, 2010; Otten & Berntsen, 2015; Özbek et al., 2017; Rasmussen & Berntsen, 2013). Table 2 shows the questions and scales in the afterlife and past conditions (the future condition was an adapted version of the past condition with references to memories replaced by references to future events). We measured the phenomenological characteristics including *Importance*, *Vividness*, *Visual Perspective*, *Valence*, *Intensity*, *Rehearsal*, and *Specificity*. We revised the characteristic called *Belief* in Berntsen and Bohn (2010) and split it into two dimensions: *Realness* and *Probability*.[3] *Realness* refers to participants' perception of the extent to which the elements of their memory or imagery had occurred or would take place as they thought, whereas *Probability* refers to participants' perception of how likely an event would take place in the future. The question for *Probability* was not applicable for the past condition because such events, by definition, had happened before. Furthermore, the question for age estimate of an event was modified to match the afterlife context and renamed *Time estimate*. Instead of asking at what age a mentioned event took/would take place, we asked participants how long after death the imagined afterlife event would take place, and gave them the freedom to fill in an appropriate time point.

For functional characteristics, we measured the *Directive*, *Self*, and *Social* functions (Bluck & Alea, 2002). The *Directive* function refers to the use of memories and imaginations in planning and decision making in the present and future. The *Self* function refers to the use of memories and imaginations in developing a sense of self as well as supporting continuity of the self over time. The *Social* function serves to provide materials for creating and maintaining social relationships.

Psychological scales Religiosity. We employed the Centrality of Religiosity Scale inter-religion seven-item version (CRSi7; Huber & Huber, 2012) to measure religiosity levels of the participants. The scale measures religiosity on five dimensions: Intellectual dimension, ideology, public practice, private practice, and religious experience. The scale has a Thai version normed for that population ($M_{norm} = 3.24$, $SD_{norm} = 0.62$). The Thai sample in this study was significantly less religious than the overall Thai population ($M_{sample} = 2.79$, $SD_{sample} = 0.82$, $t(163.57) = 6.27$, $p < .001$, $d = 0.69$). The internal reliability, as measured by Cronbach's alphas, was high ($\alpha_{\text{Study 1}} = .83$, $\alpha_{\text{Study 2}} = .91$).

[3] In Berntsen and Bohn (2010), the *Belief* scale for the past and future conditions measured different dimensions of MTT. In the past condition, participants were asked how accurate they believe their memory to be ("I believe that the event really took place the way I remember it, and that I did not imagine anything or invent anything that did not take place" 1 = 100% fantasy; 7 = 100% real), whereas the question in the future condition focused on how likely participants' imaginations would happen in the future ("How likely is it that the imagined event will take place in your future?," 1 = not at all likely; 7 = completely likely). Therefore, we decided to split this characteristic into two: *Realness* and *Probability*.

Belief in the afterlife. We asked the participants a simple question: "Do you think there is life after death?" There were three answer choices: yes, no, and uncertain. This question was positioned near the near end of the questionnaire to prevent it from influencing the generation of personal afterlife events. This question was used when analyzing the data for assigning the participants into one of three groups based on their belief in the existence of the afterlife.

Fear of death. We included the Death Anxiety Inventory (DAI; Tomás-Sábado & Gómez-Benito, 2005) to measure participants' fear of death. The scale consisted of 20 statements about death and related topics. The participants rated each statement on six-point Likert scale ranging from "totally disagree" to "totally agree." Cronbach's alphas for the DAI were .91 in Study 1 and .93 in Study 2, indicating high internal consistency.

Personal afterlife event categorization

The main goal of the categorization of the personal afterlife events was to understand themes and concepts presented in the imagined personal afterlife events of the sample. The coders worked with the participants' responses in their original language, Thai, to prevent misunderstandings and a loss of nuances in translation. Both coders were native Thai speakers. Initially, the first coder (Worawach Tungjitcharoen) familiarized himself with the written responses by reading through every response. He then created subject indices for participants' responses based on impressions he got from the materials. At this stage, each subject index represented small meaning units. After that, he created categories for the subject indices. Each category represented an overarching theme that covered multiple similar indices. For instance, *going to another realm* covered going to heaven or hell, reincarnation, as well as going to another universe, dimension, or planet. *Emptiness* included emptiness, darkness, and lightness. *Others' action* referred to various actions happening to the remains, including mourning and funeral ceremonies. At this stage, the Buddhist narrative and folk beliefs of life after death were taken into account when generating the overarching categories. This process resulted in a total of 13 categories (the first 13 categories listed in Table 4), according to which each individual record was classified. A record could be classified as belonging to more than one of the 13 categories if it contained multiple themes. For example, if a participant mentioned they would first go to visit their loved ones and places they would like to see, which would then cause them to realize they were dead, this response was coded for *visiting a place or a person* and *realizing a new form*. Six additional categories were added to ensure comparability with Study 2 (to be detailed in Study 2).

To ensure the reliability of the coding scheme, the second coder then worked on the coding scheme that was developed by the first coder. He received the coding scheme of the categories. He then coded the responses into categories without knowing the categories the responses were given by the first coder. The percentages of agreement were calculated individually for each category, as the categories were not mutually exclusive. The percentages of agreement ranged from 88.65% to 97.87%. Finally, both coders reviewed the categories together and resolved the discrepancies by discussion.

Results

In the present study, each participant answered all three tasks; thus, the three event types were treated as a within-subjects factor in the analyses. Belief in the afterlife was hypothesized to influence participants' personal afterlife imagery. This variable was generated on the basis of participants' answers to the question addressing their belief in the existence of the afterlife, and, therefore, was treated as a between-subjects factor. Based on participants' answers to the question about the existence of the afterlife, there were 44 participants who answered that the afterlife exists, 65 participants who were not sure about the existence of the afterlife, and 32 participants who answered that the afterlife does not exist.

Perspectives on the afterlife and participant characteristics

Table 1 shows the descriptive statistics of the demographic and psychological characteristics broken down by belief in the afterlife. We tested whether the three groups reflecting different beliefs in the afterlife also differed on other measures. We found significant differences in participant age (*Welch's* $F(2, 74.47) = 4.00$, $p = .022$) and religiosity score (*Welch's* $F(2, 73.38) = 38.39$, $p < .001$). Games-Howell post hoc comparisons showed that the participants who believed the afterlife exists were significantly older and scored higher on the religiosity scale than the participants in the other groups.

The effects of event type and afterlife belief on phenomenological and functional characteristics

Figure 1 displays the means of the phenomenological characteristics of the past, future, and afterlife events, broken down by the three afterlife belief groups (for the numerical values of the means and standard deviations, see Supplementary Table 1 in the Online Supplementary Material (OSM)). Figure 2, left panel, shows the means of the functional characteristics broken down by group. We ran a series of 3 (event type: past, future, afterlife) × 3 (afterlife belief: exist, uncertain, not exist) ANOVAs to test the effects of event type and belief in the afterlife and their interactions

Table 2 Questions about event characteristics in the personal past and afterlife event condition

	Afterlife and future event condition	Past event condition	Scales
	Phenomenological characteristics of the event		
Age at event [a]	How long after death will this event take place?	How old were you when the remembered event took place (Age estimate in years)?	
Importance	This imagined event is important to my life.	The remembered event is important to my life.	1 = not at all; 7 = to a very high degree
Vividness	My imagination of the event is vivid.	This memory is vivid.	1 = not at all; 7 = to a very high degree
Perspective	When I imagine the event, I primarily see what happens from a perspective as seen through…	When I recall the event, I primarily see what happened from a perspective as seen through…	1 = my own eyes; 7 = an observer's eyes
Valence	The emotions I have as I imagine the Event are…	The emotions I have as I recall the Event are…	-3 = extremely negative; 3 = extremely positive
Intensity	The emotions I have when I imagine the Event are intense.	The emotions I have when I recall the Event are intense.	1 = not at all; 7 = to a very high degree
Rehearsal	I have previously thought or talked a lot about this Event.	Since it happened, I have thought or talked a lot about this Event.	1 = not at all; 7 = very often
Ease of thinking	Imagining this event is…	Remembering this memory is…	1 = very easy; 7 very difficult
Specificity	The imagined event is specific in the sense it will happen at a specific time and location in the afterlife.	The remembered event was specific in the sense it happened at a specific time and location in the past.	1 = not at all; 7 = very specific
Realness	I believe that the imagined event will really place the way I imagine it, and that I did not imagine anything or invent anything that will not take place.	I believe that the event really took place the way I remember, and that I did not imagine anything or invent anything that did not take place.	1 = 100% unreal; 7 = 100% real
Probability	How likely is it that the imagined event will take place in your future?	N/A	1 = not at all likely; 7 = completely likely
	Functional characteristics of the event		
Directive	I think of this event in order to handle present and the future.	I think of this memory in order to handle present and the future.	1 = not at all; 7 = to a very high degree
Self	The event tells me something about my identity.	The memory tells me something about my identity.	1 = not at all; 7 = to a very high degree
Social	I have often shared this imagined event with other people.	I have often shared this memory with other people.	1 = not at all; 7 = to a very high degree

[a]For the future event condition, this question was as follows: How old will you be when the imagined event takes place (Age estimate in years)?

for each characteristic. Table 3 shows the F values, p values, and effect sizes of the main effects and interactions. We found that event type had significant main effects on every event characteristic, with considerably large effect sizes (all ps $< .001$, η_p^2s ranged from 0.092 to 0.464). Belief in the afterlife had significant effects on the ratings of importance, vividness, valence, and realness. Interaction effects between event type and belief in the afterlife were significant for the ratings of intensity and realness.

We ran pairwise comparisons with Bonferroni correction to test the main effects of event type on every characteristic. Afterlife events were rated as the least important and least thought about, followed by past events, and finally future events. Afterlife events were rated as the least vivid, least specific, and least real, followed by future events, and then past events. Afterlife and past events were regarded as less positive and were rated lower on the self function than future events. Compared with past events, afterlife and future events were harder to bring to mind and were more likely to come to mind in a third-person perspective than past events. Afterlife events were rated as less intense and were rated lower in the directive and social functions than past and future events. Lastly, afterlife events were rated as less likely to take place than future events (see Fig. 1; see OSM S1 for the Ms and SDs).

For the main effects of belief in the afterlife, we found participants who believed the afterlife exists rated all their events as more important, more vivid, more positive, and more real than those who were uncertain about the existence of the afterlife. In addition, participants who either stated

the afterlife exists or stated it did not exist, rated all their events as more vivid than participants who stated they were uncertain.

We ran simple effect analyses on intensity and realness to explore the interaction effects found in these variables. We observed that belief in the afterlife significantly affected the intensity ratings of afterlife events ($F(2, 138) = 4.13$, $p = .018$, $\eta^2 = 0.056$). Tukey's HSD test revealed participants who believed the afterlife exists had more vivid imaginations of afterlife events than participants who were uncertain. Further, belief in the afterlife also significantly affected the realness ratings of afterlife events ($F(2, 138) = 6.52$, $p = .002$, $\eta^2 = 0.086$). Participants who either stated the afterlife existed or did not exist rated their afterlife events as more real than participants who were uncertain.

Frequencies and percentages of personal afterlife event categories

Table 4 shows the percentages and frequencies of the afterlife themes mentioned by the participants. There was considerable content overlap between the generated afterlife events, suggesting culturally shared conceptions or schemata influencing the content. The prevalent themes of afterlife events include *visiting a person and a place* (19.15%), *going to another realm* (19.15%), *realizing a new form* (17.02%), *interacting with living people* (18.44%), *disembodiment of the spirit* (17.02%), *emptiness* (15.60%), and *shutting down the mind and the body* (13.48%). The majority of participants described their minds or spirits that continued after death acting with an agency that would enable them to be capable of taking action and moving around freely. The actions ranged from the passive, such as watching their bodies and their loved ones, to the active, such as a trying to hug their loved ones and using a supernatural power to give a hint to their relative for winning lotteries. "Another realm" in the theme, *going to another realm*, refers to one of the realms where the spirit could go, including one of the heavens and spirit realms, the next life (the human realm), as well as reincarnation. *Realization of a new form* indicates participants believed they would turn into spirits after death. Furthermore, some also mentioned their spirits would realize they were already dead by viewing their own bodies. Participants who mentioned the *disembodiment of the spirit* often incorporated floating out of the body as a part of the process.

A large portion of participants who did not believe in the afterlife (53.13%) described their imagined afterlife events as emptiness and/or the process where their minds or bodies are shutting down. Some participants used metaphors to describe these, for example, "after death, everything is pitch dark, like sleeping but not dreaming," "…it will be as if we sleep without dreams," and "[w]hen dying, it is probably like a computer shutting down." Thus, the projection of their lives ended with death.

Time estimate of recalled and imagined events

Previous research has found a tendency for remembered past and imagined future events to be dated close to the present (e.g., Spreng & Levine, 2006). To examine this tendency, we binned the time estimates of the past and future events into 5-year intervals based on temporal distance from the present. We found that most events both in the past and in future conditions took place or were anticipated to take place within the first 5-year interval (70.92% of the past events and 63.83% of the future events) of the temporal distributions. This finding was also in line with previous studies (e.g., Rasmussen & Berntsen, 2013; Spreng & Levine, 2006).

This tendency also extends to afterlife thinking. Table 5 displays the frequencies of the afterlife events that were expected to take place at different points of time after death, based on participants' responses to the *Age* question in Table 2. Most participants imagined a relatively early afterlife time. We added an N/A category for events with a specific time (e.g., in the year 2070), an ambiguous time estimate (no time unit given after a number), a conditional time estimate (e.g., "when my partner dies," or "after the soul leaves the body"), or an absence of time estimate.

The cumulative percentages column showed 53.9% of the participants mentioned their events would occur within 1 hour after death, while 78.7% of the participants mentioned their events would occur within 1 week after death. These results are consistent with the content of the afterlife events descriptions, which greatly focused on events that were scripted by traditions and religion. For example, a Thai funeral ceremony generally takes place within 7 days after death.

Discussion

The findings revealed that participants were indeed able to generate representations of afterlife events that shared many phenomenological characteristics with those of memories of past event and imagined future events. In general, participants, even those who did not believe in the existence of the afterlife, were capable of eliciting personal afterlife events. The characteristics of afterlife events were generally inferior to those of past and future events (i.e., less important, less vivid, less specific, less real, etc.). Belief in the afterlife also contributed to the differences in the ratings of several event characteristics.

There were many conceptual similarities of the characteristics of the imagined afterlife events suggesting high levels of agreement between participants as to what they should expect in afterlife. Imagined afterlife events seemed to take place relatively early after death. Concerning the content, personal afterlife events seemed to be guided by a mixture

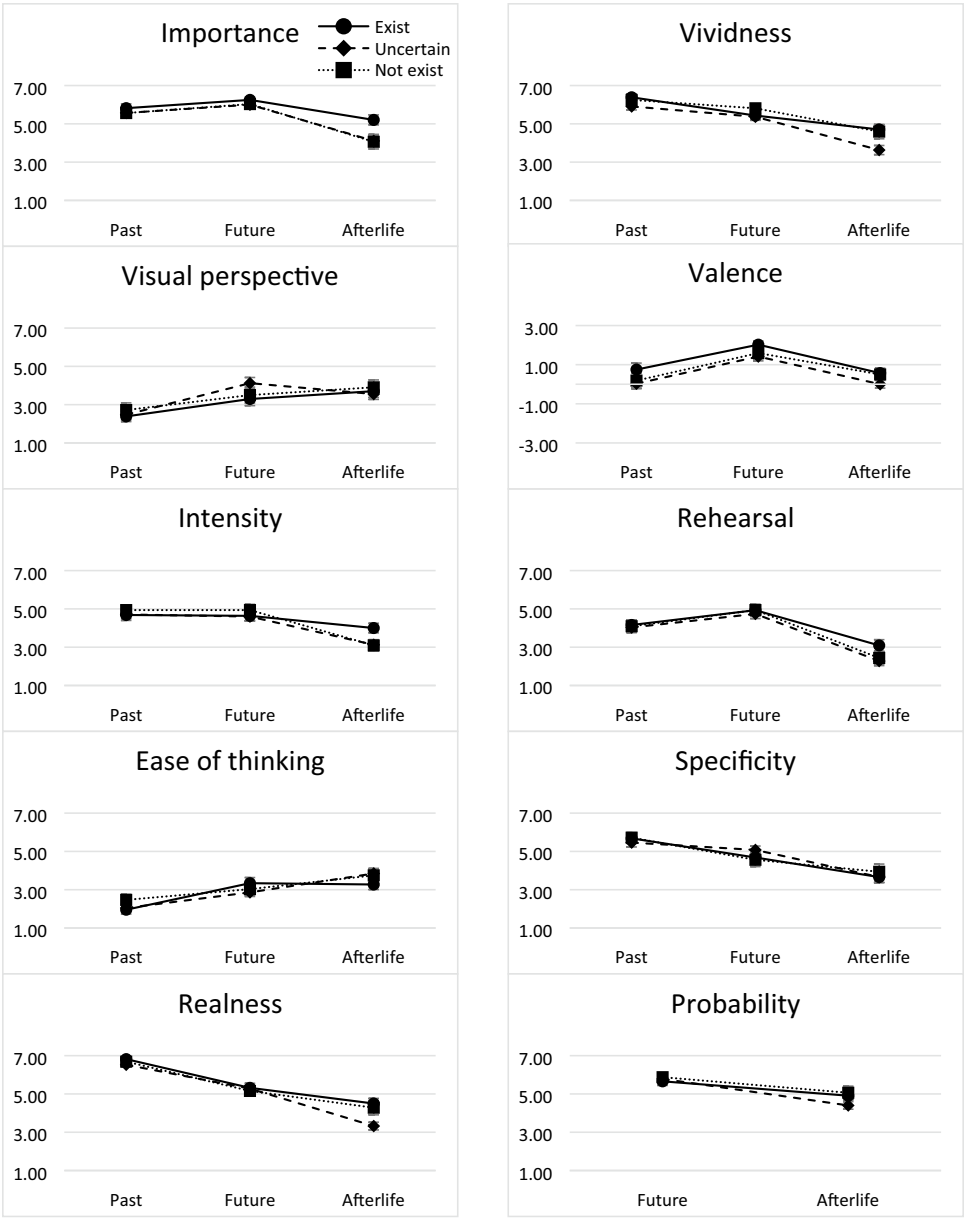

Fig. 1 Mean plot by event type and afterlife belief for the event phenomenological characteristics of the Thai sample in Study 1 (error bars represent ±1 standard error)

of religious script and folk beliefs. In Buddhism, when a person dies, they suddenly go to the next realm.[4] This can be seen from the large number of participants (19.15%) who mentioned going to another realm. However, contradicting the fact that 17% of the records featured the soul leaving the body, in Buddhism there is no floating or leaving-the-body actions as part of the disembodiment of the spirit. The way in which one is born in a new realm is neither by floating out of the body nor leaving the body as a spirit. In fact, the floating or leaving-the-body actions are told primarily in folk beliefs. This has often been portrayed in the media (e.g., in movies, TV series, or cartoons), and participants might have assimilated it into their personal beliefs.

Although our findings showed afterlife future thinking was accomplishable, possessed somewhat unique characteristics, and linked to participants' belief in the afterlife, the generalizability seemed to be limited by the age homogeneity and culture of the present sample. Thus, we were intrigued to know whether the results would replicate in other settings, specifically in the Western culture and with a broader population.

[4] There are six realms in Buddhism, although realms can overlap. Thus, beings from different realms can sometimes see one another.

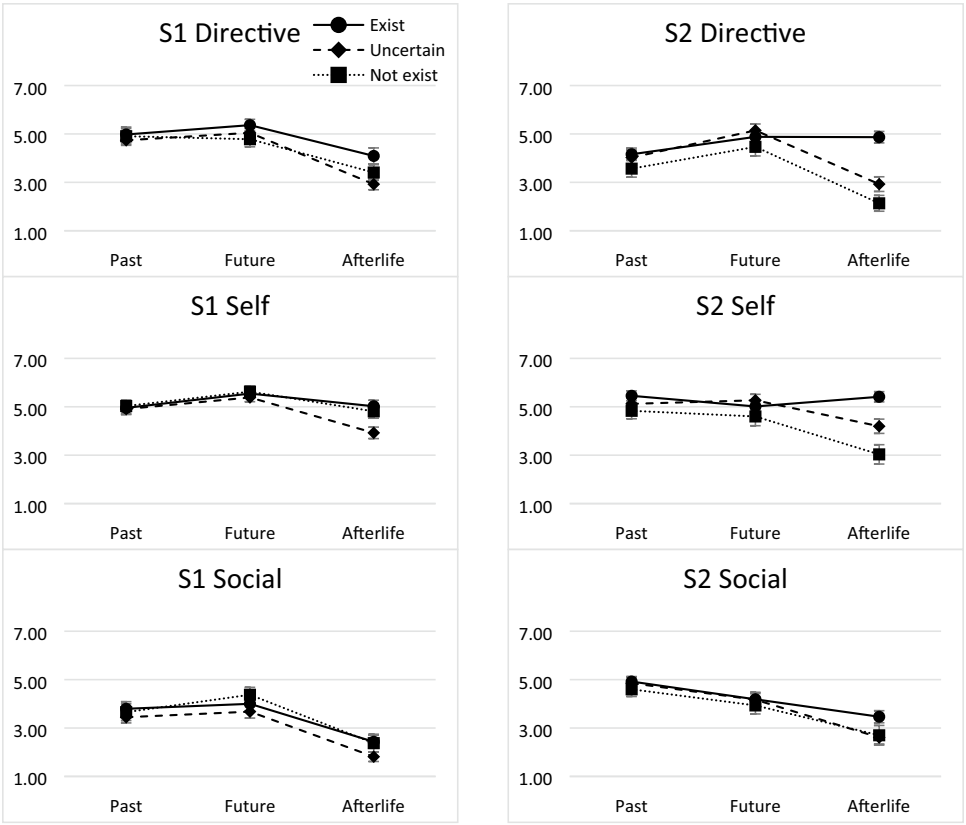

Fig. 2 Mean plot of the event functional characteristics as a function of event type and afterlife belief comparing between the Thai (S1) and American (S2) samples (error bars represent ±1 standard error)

Study 2

The goal of Study 2 was to examine whether the results of the previous study would replicate in a different context, and whether we would observe differences in dominant content of the imagined afterlife events by involving participants from another population. Therefore, this study was conducted online via CloudResearch, an Internet-based research platform designed to recruit participants for the social and behavioral sciences operating on Amazon Mechanical Turk (MTurk) (Litman et al., 2017). We restricted the country of the MTurk Workers to the USA; however, we did not restrict participants' age or religious affiliation.

Method

Participants

A total of 146 MTurk Workers in the USA completed the survey (74 males, 70 females, and two others). For religious affiliation, the sample consisted of 86 Christians, four Buddhists, and 56 who reported they were either atheists, agonistics, or spiritual but not religious. We did not exclude the four Buddhist participants from the sample, as we had already had event categories for Buddhists from the previous study. Removing them would not affect event categorization and the findings. All participants were paid US$3 after completing the survey. Table 1 shows the demographic and psychological characteristics of the sample, including age, education year, religiosity, and death anxiety.

Procedure and materials

To keep the current study in line with Study 1, the questionnaire was administered in the same way as with the previous study. All questions answered for each event followed the same order. The three events in the recall and imagination task were presented in a randomized order. The only difference was the language of the questionnaire, which was in English instead of Thai.

Personal afterlife event categorization

Whereas the participants in Study 1 were mainly Buddhists, the majority of participants in Study 2 aligned themselves with Christianity. This difference in religious compositions of the samples might affect how participants thought about

Table 3 Two-way ANOVAs for the effects of event type and afterlife belief on event characteristics

Event characteristic	Variable	Study 1			Study 2		
		F	*p*	η_p^2	*F*	*p*	η_p^2
Importance	Event type	40.70	< .001	.228	58.52	< .001	.290
	Afterlife belief	3.98	.021	.055	17.88	< .001	.200
	Interaction	1.67	.165	.024	20.23	< .001	.221
Vividness	Event type	55.63	< .001	.287	71.93	< .001	.335
	Afterlife belief	5.61	.005	.075	10.53	< .001	.128
	Interaction	1.83	.129	.026	3.82	.006	.051
Visual perspective	Event type	16.05	< .001	.104	12.15	< .001	.078
	Afterlife belief	0.39	.681	.006	0.45	.683	.006
	Interaction	1.33	.261	.019	3.62	.009	.048
Valence	Event type	24.10	< .001	.149	8.25	.001	.055
	Afterlife belief	4.98	.008	.067	3.94	.022	.052
	Interaction	0.206	.929	.003	7.19	< .001	.091
Intensity	Event type	43.20	< .001	.238	19.24	< .001	.119
	Afterlife belief	0.66	.519	.009	4.92	.009	.064
	Interaction	2.86	.024	.040	5.07	.001	.066
Rehearsal	Event type	55.67	< .001	.287	39.92	< .001	.218
	Afterlife belief	1.30	.275	.019	2.71	.070	.037
	Interaction	0.69	.598	.010	2.61	.036	.035
Ease of thinking	Event type	25.31	< .001	.155	70.19	< .001	.329
	Afterlife belief	0.39	.680	.006	0.39	.680	.006
	Interaction	1.56	.189	.022	7.15	< .001	.091
Specificity	Event type	36.20	< .001	.208	70.70	< .001	.331
	Afterlife belief	0.04	.965	.001	2.85	.061	.038
	Interaction	0.86	.487	.012	4.73	.001	.063
Realness	Event type	119.65	< .001	.464	84.92	< .001	.373
	Afterlife belief	5.42	.005	.073	5.76	.004	.075
	Interaction	3.12	.022	.043	4.76	.003	.062
Probability	Event type	34.39	< .001	.199	36.93	< .001	.205
	Afterlife belief	1.34	.264	.019	8.12	< .001	.102
	Interaction	1.79	.171	.025	5.00	.008	.065
Directive	Event type	46.60	< .001	.252	26.81	< .001	.158
	Afterlife belief	2.48	.088	.035	8.36	< .001	.105
	Interaction	2.03	.090	.029	9.92	< .001	.122
Self	Event type	13.98	< .001	.092	14.39	< .001	.091
	Afterlife belief	2.62	.076	.037	7.57	.001	.096
	Interaction	2.34	.060	.033	7.39	< .001	.094
Social	Event type	47.61	< .001	.257	47.61	< .001	.250
	Afterlife belief	1.88	.157	.026	1.21	.302	.017
	Interaction	0.45	.772	.006	1.31	.266	.018

their personal afterlife events, and, thus, whether events in Study 2 would fit into the content categories generated in Study 1, especially for categories with religious references, such as *paying karma* and *going to another realm (including reincarnation)*. Therefore, we revised the coding scheme to match the religion affiliations of the participants. Six new categories emerged, including *rejection of the afterlife*, *going to heaven*, *meeting and interacting with God*, *the world goes on*, *becoming one with the universe*, and *resurrection*.

We employed this new coding scheme with 19 categories for categorizing the afterlife events. The same second coder who took part in the coding in Study 1 also coded the responses in this study. The agreement percentages were calculated individually for each category and ranged from

Table 4 Frequencies and percentages of personal afterlife event categories broken down by belief in the afterlife

Category	Study 1					Study 2				
	Percentage	Frequency (n = 141)	Afterlife belief			Percentage	Frequency (n = 146)	Afterlife belief		
			Exist (n = 44)	Uncertain (n = 65)	Not exist (n = 32)			Exist (n = 75)	Uncertain (n = 41)	Not exist (n = 30)
Visiting a place or a person	19.15%	27	10	16	1	2.05%	3	1	2	0
Going to another realm	19.15%	27	15	11	1	10.27%	15	11	4	0
Watching, interacting, or trying to interact with living people	18.44%	26	8	16	2	5.48%	8	5	2	1
Realizing a new form (being a spirit)	17.02%	24	6	16	2	6.16%	9	3	4	2
Disembodiment of the spirit, floating	17.02%	24	7	13	4	8.22%	12	7	3	2
Emptiness	15.60%	22	4	7	11	4.79%	7	0	4	3
Shutting down the mind and body	13.48%	19	3	5	11	9.59%	14	1	5	8
Others' action	12.06%	17	6	7	4	10.27%	15	3	6	6
Clinging to unsettling matters	6.38%	9	4	5	0	2.05%	3	1	1	1
Finding happiness and peace	6.38%	9	4	5	0	16.44%	24	13	8	3
Meeting dead ones	6.38%	9	4	4	1	28.77%	42	27	10	5
Thinking about the past before death	6.38%	9	3	4	2	4.79%	7	6	1	0
Paying karma	3.55%	5	2	2	1	-	-	-	-	-
Rejection of the afterlife	3.55%	5	0	0	5	5.48%	8	0	1	7
Going to heaven	3.55%	5	3	2	0	26.03%	38	25	10	3
Meeting and interacting with God	1.42%	2	0	1	1	17.81%	26	23	2	1
The world goes on	1.42%	2	1	1	0	2.05%	3	0	0	3
Becoming one with the universe	-	-	-	-	-	4.11%	6	3	2	1
Resurrection	-	-	-	-	-	1.37%	2	1	0	1

Table 5 Time estimate of the personal afterlife events

Estimated time after death	Study 1			Study 2		
	Percentage	Cumulative percentage	Frequency	Percentage	Cumulative percentage	Frequency
Immediately	28.4	28.4	40	19.2	19.2	28
Within 1 hour	25.5	53.9	36	33.6	52.7	49
Within 1 day	10.6	64.5	15	15.1	67.8	22
Within 1 week	14.2	78.7	20	6.2	74.0	9
Within 1 month	2.1	80.9	3	0.7	74.7	1
Over 1 month	8.5	89.4	12	12.3	87.0	18
N/A	10.6	100.0	15	13.0	100.0	19
Total	100.0	100.0	141	100.0	100.0	146

The N/A category is for events expected to take place at a specific time or under a specific condition

87.67% to 98.63%. Both coders reviewed the categories together and resolved the discrepancies by discussion.

Results

In this study, the participants were also grouped based on their answers regarding the belief in the existence of the afterlife. In total, 75 participants believed the afterlife certainly exists, 41 participants were uncertain about its existence, and 30 participants did not believe the afterlife exists.

Perspectives on the afterlife and participant characteristics

The lower part of Table 1 displays means and standard deviations of the characteristics of the participants in Study 2, including age, education year, religiosity score, and death anxiety. We also examined whether the three groups reflecting different beliefs in the afterlife also differed on these measures. We found no significant differences in age, education year, or death anxiety scores. There was a significant difference in religiosity scores between the belief groups ($F(2, 145) = 72.55$, $p < .001$, $\eta^2 = 0.50$). Tukey post hoc comparisons showed the participants who believed the afterlife exists scored significantly higher on the religiosity scale than participants in the other groups.

The effects of event type and afterlife belief on phenomenological and functional characteristics

Figure 3 displays the means of the phenomenological characteristics of the past, future, and afterlife events, broken down by the three afterlife belief groups of the sample (for the numerical values of the means and standard deviations, see OSM Table 2). Figure 2, right panel, illustrates the functional characteristics of the remembered and imagined events. We conducted a series of 3 (event type: past, future, afterlife) × 3 (afterlife belief: exist, uncertain, not exist) ANOVAs to test the effects of event type and belief in the afterlife. Table 3 shows the F values, p values, and effect sizes of the main effects and interactions. Significant main effects of event type with moderate to large effect sizes (all ps $< .001$, η_p^2s ranged from 0.055 to 0.373) were found on every characteristic. Belief in the afterlife had significant main effects on the ratings of importance, vividness, valence, intensity, realness, probability, directive function, and self function. Interaction effects were significant for every characteristic except for social function.

Pairwise comparisons with Bonferroni correction of the main effects of event type showed that imagined afterlife events generally received lower ratings than the other two types of events. Afterlife events were rated as the least vivid, least intense, least specific, least real, least easy to think about, and least seen from a first-person perspective, followed by future events, and finally past events. Afterlife events were considered less important and less rehearsed than past and future events. Afterlife events were regarded as less likely to happen than future events. Afterlife and past events were rated as less positive than future events. Lastly, afterlife events also had lower ratings than the other event types in every functional characteristic. The significant main effects of belief in the afterlife generally leaned in the direction of participants who believed in the existence of the afterlife rating the event characteristics higher than participants in the other belief groups.

As shown in Fig. 2, interaction effects between event type and belief in the afterlife that were found in nearly every characteristic seemingly had a clear pattern; the ratings of the past and future event characteristics across belief groups mostly overlapped, whereas the ratings of the afterlife event characteristics across belief groups suggested differences between groups. Thus, we ran a series of one-way ANOVAs to test the simple main effects of belief in the afterlife on the

characteristics of the three event types. We found no significant effect of belief in the afterlife on any characteristic of past and future events, except for vividness of future events (in that participants who believed in the afterlife rated future events as more vivid than participants who were uncertain about the afterlife; *Welch's* $F(2,52.53) = 5.58$, $p = .006$; Games-Howell post hoc test, p = .020). On the other hand, belief in the afterlife showed significant effects on every characteristic of afterlife events (all ps < .001, except for $p_{\text{visual perspective}} = .029$, $p_{\text{rehearsal}} = .004$, and $p_{\text{specificity}} = .001$). In general, participants who believed the afterlife exists rated the afterlife event characteristics higher than participants in the other belief groups. Remarkably, we found that participants who believed in the afterlife rated their afterlife events to be equally as important and intense as their past and future events (ps ≥ .05). Their afterlife events also served directive and self functions to the same degree as past and future events (ps ≥ .05).

Frequencies and percentages of personal afterlife event categories

The frequencies of the afterlife events in Study 2 are displayed in the right columns of Table 4. As in Study 1, we found substantial overlap between the imagined content of the generated afterlife events, but this content differed from the content observed in Study 1. The most frequently mentioned category was *meeting dead ones* (28.77%). The dead ones whom participants mentioned included their previously deceased family members, friends, and pets. For example, "[w]hen I die my soul will leave my body, and I'll see family and friends that I lost over the years. I imagine being in a big field with the sun shining, and my cat will run up to me and try to play with me." According to the biblical narrative of the afterlife, the dead will reunite with God in Heaven and live an eternal life there (such as in Revelation 21:1-4). Categories that follow such a narrative, such as *going to heaven* (26.03%), *meeting with God* (17.81%), and *finding happiness and peace* (16.44%), were also frequently mentioned by the participants. Several participants who did not believe in the afterlife described their afterlife events as a dying process (eight out of 30). Some also stated outright they did not think that the afterlife exists (seven out of 30; for instance, "I do not believe in the afterlife, I think we simply die and our consciousness shuts off like a computer").

Time estimate of recalled and imagined events

To examine the tendency for remembered past and imagined future events to be dated close to the present (e.g., Spreng & Levine, 2006), the time estimates of the past and future events were binned into 5-year intervals based on temporal distance from the present. Most events both in the past and in future conditions took place or were anticipated to take place within the first 5-year interval (40.97% of the past events and 71.88% of the future events) of the temporal distributions, consistent with previous findings (e.g., Rasmussen & Berntsen, 2013; Spreng & Levine, 2006).

As in Study 1, we wanted to examine whether this tendency for generating events close to the starting point (death for the afterlife condition) would also be found for the afterlife condition. As shown in Table 5, as in Study 1, a large number of personal afterlife events were expected to take place very soon after death. Most participants estimated their afterlife events would occur within 1 hour after death (33.6%), but not immediately. Approximately two-thirds of the participants expected that their afterlife events would take place within 1 day after they had passed away.

Discussion

Study 2 replicated and extended the findings from Study 1, in that people readily produce imaginations of afterlife events, but also that the characteristics of afterlife events were rated as inferior to the other event types, except by believers in the afterlife. The interactions between event type and belief in the afterlife further revealed that participants who believed in the afterlife rated the characteristics of the afterlife events higher than participants in the other belief groups. This pattern of interaction appeared more pronounced in Study 2 than in Study 1. Similarly, the main effects of belief in the afterlife appeared more pronounced in Study 2 than in Study 1. The main effects of belief in the afterlife were significant for only four out of 13 event characteristics in Study 1, but for eight out of 13 event characteristics in Study 2. In both studies, the belief in the afterlife group scored higher than one or both of the two other groups. In Study 1, we found that the differences occurred mainly between participants in the exist group and the uncertain group, while in Study 2, differences were found between participants in the exist group and both of the other two groups. As for the interaction effects, the findings of Study 1 showed only two significant effects with small effect sizes (η_p^2s = 0.056 and 0.086). In contrast, the findings of Study 2 showed that the interaction effects were significant for almost every characteristic, with relatively large effect sizes (η_p^2s ranged from 0.035 to 0.221). They generally reflected higher ratings in the exist group.

While the Thai participants in Study 1 mostly focused on the process of being a spirit and their interactions, as a spiritual entity, with the living world, the American participants in the present study emphasized events in the spiritual world, especially a reunion with God and their loved ones in Heaven. These findings are consistent with previous large-scale survey studies (Bibby, 2017), as they found that people in major Christian countries (the USA, Canada, and Britain)

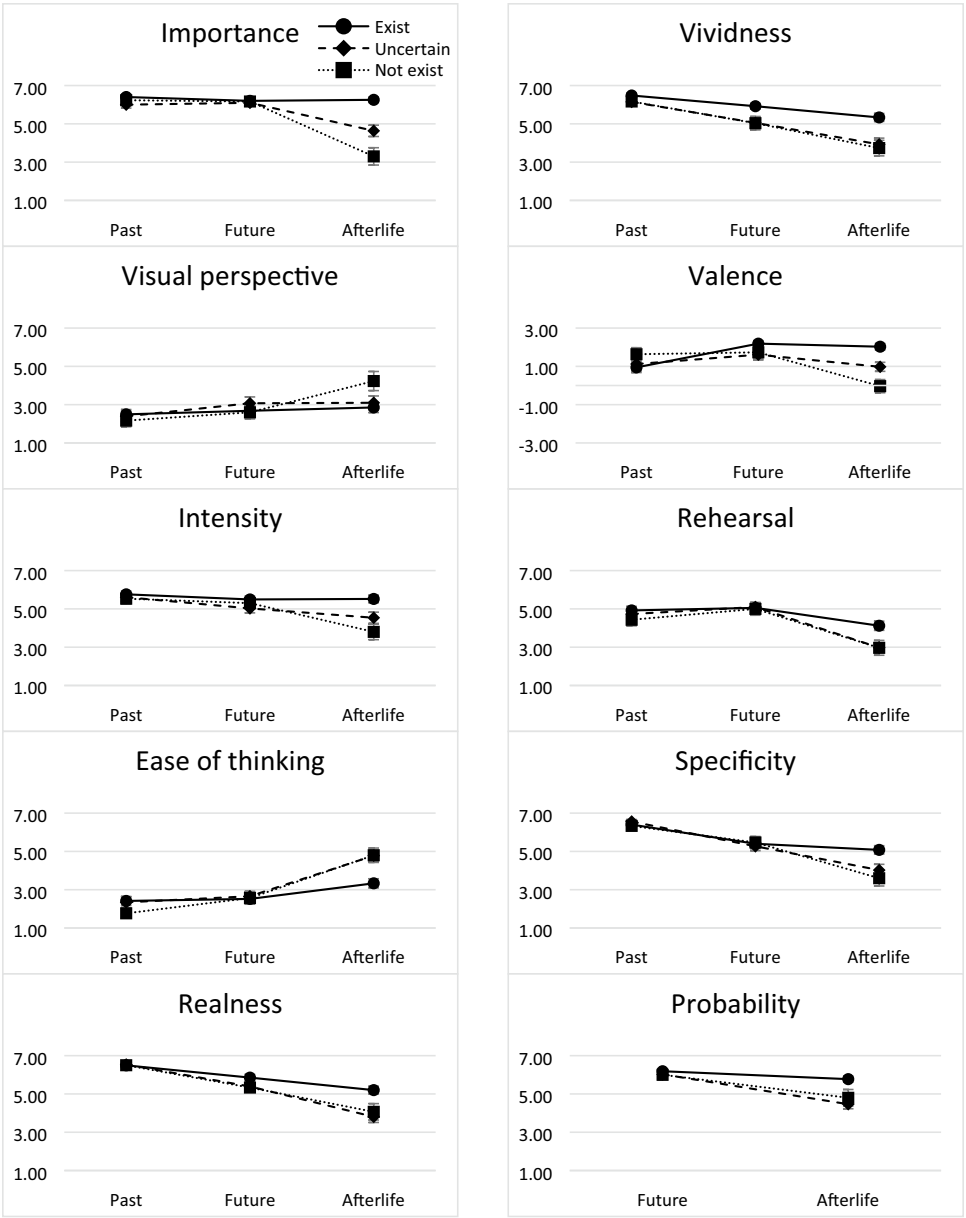

Fig. 3 Mean plot by event type and afterlife belief for the event phenomenological characteristics of the American (MTurk) sample in Study 2 (error bars represent ±1 standard error)

mentioned they would see dead ones again and would go to heaven or another desirable place after they pass away. As with Study 1, about three-quarters (74.0%) of the participants in Study 2 believed their events would occur within 1 week after death.

General discussion

Research on episodic future thinking has shown that two modes of MTT, backward to the past and forward to the future, share many comparable similarities (e.g., D'Argembeau & Van der Linden, 2004; Schacter et al., 2017). Here, we proposed that MTT can go even further – namely to beyond death, the seeming end of life. Our findings show that imagined afterlife events possess phenomenological qualities that are comparable with those of remembered past and imagined future events. Imagined afterlife events were perceived as important, vivid, positive, intense, specific, real, and likely to take place, although generally to a lesser extent when compared with memories and future events. The present work also adds to the literature on the cognitive science of religion by examining afterlife imagination as a function of their religious belief. Our findings

demonstrate the relation between MTT and afterlife schemata. Afterlife imaginations elicited by participants from different cultures and belief groups varied in ways that agreed with participants' cultures as well as their levels of afterlife belief.

Should imagined afterlife events simply be viewed as imagined future events that extend beyond the conventional concept of life span? Previous studies (e.g., Berntsen & Bohn, 2010; Grysman et al., 2013; Özbek et al., 2017) revealed that temporal distance is linked to a reduction in certain characteristics associated with concrete and rich imagery (e.g., specificity, sensory imagery, and ease of thinking), and an increase of characteristics associated with perceived self-relevance and positive emotion (e.g., importance, event centrality, and positive valence). However, afterlife future events, which extend beyond any other future events, did not rigorously follow these relationships, but rather showed important interactions with participants' beliefs in the afterlife and their religious orientation. Belief in the existence of the afterlife showed interactions with the effects of event type in some event characteristics, especially in Study 2, where those who believed in the afterlife rated the characteristics of afterlife events higher than those in the other groups. Furthermore, the believers also considered afterlife events to be just as important and intense as the other types of events, and thus may be viewed as a distinct category of MTT. These results indicate that afterlife events were influenced by belief in the afterlife more than past memories and future events. The impact of belief in the afterlife on the qualities of imagination are in line with research on belief, in that beliefs (not specific to afterlife) can affect perception and behavior (e.g., Dagnall et al., 2015; Drinkwater et al., 2019; Gervais, 2013).

Afterlife events were generally rated as less important and less positive than future events. The positivity bias typically seen in episodic future thinking, and also observable in the present studies when comparing just past and future events (cf. Figs. 1 and 3), was not clearly observed in afterlife future thinking without taking into account religion. In Study 2, Christian participants who believed the afterlife exists expected their afterlife events to be highly positive, whereas the Buddhist counterparts in Study 1 did not do so. This difference may result from the content of afterlife events that matches the afterlife schemata in these religions. In Christianity, believers of God will be accepted into Heaven and spend eternity joyfully. In Buddhism, death leads to rebirth. Individuals will be born into a realm that depends on the deeds they performed in their previous lives. Thus, it is unknown whether their next lives will be positive or not.

High levels of similarity between the contents of imagined afterlife events within religions imply that participants from the same religious backgrounds were most likely to draw upon similar, culturally shared afterlife schemata in guiding their imagined afterlives. In contrast, a large discrepancy between the percentages of the afterlife event themes in the Thai and American samples suggests that the participants in these two groups employed different afterlife schemata for creating afterlife imaginations. For participants who did not believe in the afterlife, we found that, in both samples, they seemed to mention similar concepts of afterlife events, including shutting down the mind and body, rejection of the afterlife, and others' action. This finding highlights the role of schematized knowledge, personal belief, and cultural reference in guiding afterlife future thinking, consistent with findings from episodic future thinking research (D'Argembeau & Mathy, 2011; Irish & Piguet, 2013; Irish et al., 2012; Renoult et al., 2012; Rubin, 2014). Furthermore, our findings suggest that some afterlife thoughts can be seen as collective future thoughts (Szpunar & Szpunar, 2016), as they were described as taking place together with significant others and/or others who shared the same beliefs, for example, reunions with significant others, living in heaven with others who share the same faith, or events at their funerals, where they would meet their loved one for the last time. In addition, some of these afterlife imaginations resemble intimate scenes described by Cyr and Hirst (2019) when the participants were asked to bring a memory into the afterlife. This similarity suggests that thinking about death also elicits self-relevant imaginations as much as memories.

Regarding the functions of afterlife imaginations, we found that afterlife imaginations served functions similar to autobiographical memories, though to a lesser extent in general. Afterlife imaginations are used for guiding behaviors and attitudes, as well as maintaining personal identity, particularly for the believers of the afterlife. This was clearly evidenced in Study 2, where afterlife believers regarded afterlife events as equivalent to future events in the directive function, and as equivalent to past and future events in the self function.

When participants are allowed to freely recall or imagine autobiographical events at any point of time in their life, a majority of the events have been found to be close to the present (e.g., Berntsen & Jacobsen, 2008; Rasmussen & Berntsen, 2013; Spreng & Levine, 2006). We extended this temporal bias to afterlife events. Around two-thirds of the participants in both studies expected their afterlife events to take place just within a day after death despite the fact the question about time estimate was formulated differently from the questions about past and future events (i.e., there was no constraint in time unit, and participants could write what they deemed appropriate). Furthermore, a comparison between Study 1 and Study 2 revealed no significant difference between the two samples in terms of the distribution of the frequencies among time ranges ($\chi^2(6, N = 287) = 12.19$, $p = .058$). This tendency to imagine events closer in time (or closer to the starting point) underscores the similarity between afterlife event imaginations and other types of MTT.

Future directions

The results of Study 1 and Study 2 differed in some key respects, especially the content of afterlife events and the influence of participants' belief in the afterlife on the event characteristics. These differences likely spring from the disparities between the samples, specifically religious belief that governs how people conceive the afterlife. Therefore, future research should further examine these factors, and thus extend the present work to other populations.

To gain a better understanding of the effects of temporal distance on afterlife events in comparison with future events, future studies might take into account when in the life span death is expected, and whether different views related to this question affect how personal afterlife events are portrayed. Another strategy would be to ask for multiple afterlife events and examine whether events closer to the point of death would still dominate.

Semantic knowledge (e.g., schematized collective expectations) about the afterlife, including its timing and content – similar to cultural life script – remains to be examined. The large amount of overlapping content in the afterlife event descriptions within each sample suggests the influence of collectively shared schematic knowledge shaping the individual afterlife imaginations, akin to the ways cultural life scripts have been found to influence episodic future thinking (Bohn & Berntsen, 2011; Ottsen & Berntsen, 2015). Moreover, it is also relevant to examine how personal afterlife events are visualized in terms of specific details, that is what people think they will look like physically in the afterlife, what mental states they can experience, and to what extent their memory and intellectual abilities carry on after death. Our realness and probability scales, which overlapped with scales measuring metacognitive appraisals of recalled and imagined events (see Ernst & D'Argembeau, 2017), indicated that participants believed their events would happen more or less the way they imagined. Future research should look into factors that justify these subjective feelings; it might further our understanding of the role of afterlife belief and other sources of justification in imagining personal afterlife events.

Conclusion

Here, we examined personal afterlife imaginations, as a kind of future thinking, and compared it with autobiographical memories and imagined future events. Overall, our findings revealed that afterlife future thinking exists and shows phenomenological characteristics comparable to memories and episodic future thoughts, but the findings also revealed that afterlife future thinking was rated lower than remembering and future thinking in its event characteristics, except for participants with strong belief in its existence. The interactions between event type and belief in the afterlife were found to be significant for several event characteristics, intimating that participants who believed in the afterlife rated characteristics of their imagined afterlife events higher than those who did not believe or remained uncertain. The content of the afterlife events resonated well with religious narratives describing what happens after death.

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Code availability Not applicable.

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Declarations

Conflicts of interest The authors have no conflicts of interest to declare that are relevant to the content of this article.

Ethics approval The project was reviewed by the local ethics committee at the Center on Autobiographical Research (CON AMORE), and they did not find any research-ethical issues speaking against the implementation of the project.

Consent to participate Informed consent was obtained from all individual participants included in the study.

Consent for publication All participants signed informed consent regarding publishing specific quotations from their answers in anonymized forms.

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