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Imagining possible selves across time: Characteristics of self-images and episodic thoughts

Hamilton, J. & Cole, S. N.

Department of Psychology, York St. John University, York, United Kingdom.

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Correspondence should be sent to:

Dr. Scott Cole

Lecturer, Psychology,
School of Psychological and Social Sciences
York St John University
York, YO31 7EX
Email: cole.s.n80@gmail.com
Office Phone: 01904 876680

ABSTRACT

Thinking about our possible selves can entail thinking about self-related imagined future events. When remembering and imagining, individuals can use both 1st person (field) and 3rd person (observer) perspectives. There is currently a paucity of research examining the visual perspectives of episodic future thoughts that represent possible selves. We hypothesised that temporally distant self-images would elicit more observer perspectives in episodic thoughts than temporally near self-images and current self-images. Utilising a repeated measures design, sixty-eight undergraduate students completed IAM, I Will Be near and I Will Be far conditions (Rathbone et al., 2011) to generate self-images and their related episodic thoughts. It was found that episodic qualities were reliably affected by different self-images. Specifically, observer perspective predilections increased with future temporal distance. Findings are discussed in relation to self-continuity with recommended practical applications of visual perspective utilisation for wellbeing.

INTRODUCTION

Our autobiographical memories have been proposed as intrinsically related to the self (Self Memory System, Conway & Pleydell-Pearce, 2000), playing an important role in how we develop and maintain our personal identity (Wilson & Ross, 2003). In particular, spatio-temporally specific episodic memories, with their intimate sense of re-experiencing the past may have a unique relationship with our sense of self (Conway, 2005, 2009; Klein & Nichols, 2012; Rathbone, Moulin & Conway, 2008; Tulving, 1972, 2002; Wheeler, Stuss & Tulving, 1997). Recent studies have highlighted how the episodic memory system enables humans to generate episodic future thoughts (EFTs) - mentally imagining events that may occur in one's personal future (Atance & O'Neill, 2001; see also 2016 Special Issue in *Quarterly Journal of Experimental Psychology*). Although much research has focussed on episodic and mnemonic characteristics of future thought (e.g., Berntsen & Bohn, 2010; D'Argembeau & Van der Linden, 2006), with rare exceptions (Chessel, Rathbone, Souchay et al., 2014; Rathbone, Salgado, Akan et al., 2016) researchers have seldom made conceptual or empirical links with the concept; *possible selves*. This study extends this small set of studies by, for the first time, manipulating the temporal distance of possible selves. Herein we explore a novel question: Is visual perspective of the future affected by how temporally distant a future self is from the present?

Markus and Nurius (1986) introduced the concept of possible selves; a self-knowledge structure that specifies an individual's future self. In brief, possible selves can be ideal (e.g., admired self, professional self) or feared (e.g., unwanted self, unsuccessful self), and arise from an individual's past and present self-view. Not only are possible selves argued to affect emotion, attention and memory (see Markus & Nurius for a review), they have also been found to affect self-regulatory behaviours (e.g., *physical activity*, see Murru & Martin Ginis, 2010). How might possible selves be mentally represented? We argue that one plausible candidate is episodic future thoughts. Fundamentally, when envisioning ourselves across time, we can use our own, 1st person (field) perspective, or a 3rd person (observer) perspective during episodic constructions (Nigro & Neisser, 1983). Field perspectives involve looking through one's own eyes, whilst observer perspectives involve looking at oneself 'from the outside' (Libby & Eibach, 2002). The aim of the current investigation was to examine the relation between visual perspectives of episodic thoughts that are bound to possible selves.

The current investigation develops this line of research in two important ways: (1) It is the first study to use a paradigm eliciting two temporally-defined future selves; those in the near and far temporal distance. This departs from previous studies which did not manipulate the temporal distance of future selves (Rathbone et al., 2011) or only manipulated temporal distance at the event level (D'Argembeau & Van der Linden, 2004). (2) It uses these near and far possible selves to cue episodic scenarios that are thought to represent those self-images. This differs from Rathbone and colleagues' (2011) study in which the temporal distance of both self-images and events were allowed to vary (i.e., not manipulated). By investigating the visual perspective (and some other relevant characteristics) of self-related events, we aim to make theoretical links between the self and personally-relevant future scenarios. We start from a general assumption that EFTs are important for simulating possible representations of what we may become in the future, and in the next sections we make links with relevant theoretical frameworks to inform our specific experimental hypotheses.

1.1. The Relation between the Episodic Memory System and the Self

To expand our initial proposition, if constructing episodic memories assists in representing the current self, then logically, EFTs (Atance & O'Neill, 2001) should assist in representing possible selves. Whilst most future thinking aids everyday problem solving and action planning (Stawarczyk, Majerus, Maj, Van der Linden & D'Argembeau, 2011), it also enables humans to imagine themselves or 'play out' novel events that might plausibly occur (Berntsen & Bohn, 2010; Suddendorf and Corballis, 2007). Mentally simulating such future scenarios of a possible self might reinforce the effects of possible selves and aid self-knowledge of one's future in relation to one's current and past self.

Episodic past and future thinking could be distinguished by involving the distinct systems of memory and imagination, respectively. The reality, however, is more nuanced. In actuality, remembering the past and imagining the future abilities both develop around three to four years of age and have common underlying cerebral bases (Suddendorf & Busby, 2005; see Schacter, Addis, et al., 2012 for a review). Moreover, it has been demonstrated that individuals who have greater visual imagery abilities have more detailed and vivid episodic memories and EFTs (D'Argembeau & Van der Linden, 2006), and those with trouble recalling their past typically exhibit deficits in future thinking (e.g., Cole, Morrison, Ohr, Pauly-Takacs & Conway, 2016; Hassabis, Kumaran, Vann & Maguire., 2007; Klein & Loftus & Kihlstrom, 2002).

The ability to engage in both past and future episodic thought is known as mental time travel (MTT; Suddendorf & Corballis, 1997; Wheeler et al., 1997). MTT is associated with a sense of subjective time (Wheeler et al., 1997), and has been conveyed as being inherently related to one's sense of self (Prebble, Addis & Tippett, 2013). MTT is cognitively constructive and flexible in nature, indicating that the term 'remembering-imagining system' is appropriate (see Conway, Loveday & Cole, 2016). These characteristics of episodic thought are emphasised by the constructive episodic simulation hypothesis (CESH, Schacter & Addis, 2007), which postulates that the episodic memory system is intrinsically constructive, allowing recombination of memory elements (e.g., people, places, objects) to enable EFT. Therefore, one of MTT's central functions could be revisiting one's past self, and envisioning one's future self.

In philosophy and cognitive science, it has been argued that one's sense of self is, in part, a by-product of the episodic memory system (see Klein & Nichols, 2012 for a review and Prebble, Addis & Tippett, 2013 for a recent model): An individual may remind themselves of how determined they *are*, and *have been*, by recollecting their graduation day. The self, however, not only relies on contributions from episodic memory but also derives from semantic memory, trait self-knowledge being an example of the latter (Markus, 1977; Klein & Nichols, 2012; Rathbone et al., 2008).

In Prebble, Addis & Tippett's (2013) recent two-dimension model of sense of self, subjective (I-self) self-awareness and objective (me-self) self-knowledge are largely aligned with episodic and semantic memory respectively. The two types of self-knowledge have been known since James (1890): The I-self is known by virtue of a person's feelings or sensations whereas the Me-self is known by virtue of one's abstracted declarative knowledge. Similarities can be drawn with Klein's (2013) theorizing on the link between the self and temporality, whereby the subjective experiencing associated with the I-self can be aligned with 'lived time' whereas the semanticised Me-self can be aligned with 'known time'. Highly related, also, are the neuropsychological investigations by Coste and colleagues (e.g., Coste, Navarro, Vallat-Azouvi, Brami et al., 2015) evidencing the interconnectedness between (past and future) self-images and episodes. The second dimension distinguishes between the present and temporally-extended conception of self. Of the four quadrants of this model, our study focuses upon; *objective-present self, objective temporally-extended self* and *subjective temporally-extended self* (It is beyond the scope of this paper to investigate the more intractable *subjective present self*). Regarding the objective self, one can specify a 'present' self-image (e.g., 'I am a doctoral student') and a temporally-extended future self-image (e.g., 'I will be a lecturer', see Rathbone et al., 2011). In the current investigation, we envisaged that the temporally-extended future selves would incorporate two levels or representations; episodic possible futures (e.g., 'In the first day of a new lecturing job I will see and hear the new department, whilst feeling equally nervous and excited') involving the subjectively-experienced future self, and also objectively known future self-images (e.g., 'I will be ambitious'). Consistent with the model and the link between the objective and subjective self, one study demonstrated that generating future self-images led to an activation of possible EFTs centred on those images (Rathbone et al., 2011). Relatedly, other studies have illustrated that individual tendencies (e.g., the predisposition to extract meaning from events) are related to a set of frequently thought about, self-defining memories (Singer & Blagov, 2004) and future projections (e.g. D'Argembeau et al., 2012). Theoretical and empirical work thus indicates that important episodic representations, held within a constructive memory

system, are related to, and help represent, current and possible future self-images, which are likely underwritten by semantic memory (Prebble et al., 2013). Theoretical contributions from Klein (2013) also indicate that past and future self-projections can be dissociated from non-personal past and future projections (e.g., what the world was like, and will be like), thus emphasising the focal nature of the self in its relation with past and future projection.

Especially relevant to this work is a recent neurocognitive model – the TEDIFT model - put forward by La Corte and Piolino (2016). In this model, the authors consider the role of both semantic and episodic aspects of self-continuity, concluding that semanticised representations of oneself in the future (cf. objective self) are more likely to occur in far versus near temporal distances. The opposite is hypothesised for more subjectively-experienced episodic representations (cf. subjective self). Our hypotheses are in line with those outlined by La Corte and Piolino, although throughout this paper we make links with models that are more generally about the self, visual perspective and temporality with a synergistic approach.

1.2. *The phenomenological characteristics of MTT*

Although past and future MTT share neurocognitive processes, their phenomenological characteristics can differ depending on whether MTT is directed to the past or future. For example, memories have been demonstrated to typically have greater vividness than EFTs (e.g., Berntsen & Bohn, 2010; Cole & Berntsen, 2016), and the future is more often perceived as more emotionally positive (e.g., Rasmussen & Berntsen, 2013). As mentioned, one meaningful aspect of the self in MTT is visual perspective, as MTT functions in allowing events to be viewed from perspectives impossible to lived experience (Szpunar & Radvansky, 2016). Moreover, visual perspective is malleable in MTT (Libby, 2003): For example, people can experience events from both field and observer perspectives, and alter their perspective at will (Rice & Rubin, 2009).

Evidence has demonstrated that field memories are commonly accompanied by more vivid imagery, emotional intensity (regardless of valence), sensory detail, and a greater ability to understand and describe one's internal state (e.g. Berntsen & Rubin, 2006; D'Argembeau et al., 2003; Nigro & Neisser, 1983; Pronin & Ross, 2006; Sutin & Robins, 2010). Rice and Rubin (2009) provided evidence indicating that field perspectives are associated with more vivid memories, indicating a potential reason why field perspectives are more regularly associated with 'remember' responses than observer perspectives (Piolino et al., 2006) and are less likely to occur in EFT (Rathbone et al., 2011). Based on this behavioural evidence from the mental time travel literature, we predicted that event representations of the future should typically be less vivid and less emotionally intense than experienced (past) event representations.

1.3. *The Link between temporal distance and visual perspective*

One variable of MTT, temporal distance, is known to reliably alter the phenomenological details of past and future MTT (D'Argembeau & Van der Linden, 2004). Recently-experienced past events are usually more vivid, and whether past or future oriented, temporally closer events typically include greater phenomenological detail than distant events (D'Argembeau & Van der Linden, 2004; Gamboz et al., 2010; Semin & Smith, 1999). In contrast, a decrease in vividness and an increase in observer perspectives are found in temporally distant memories (Rice & Rubin, 2009). One tentative explanation why these effects might be mirrored in future thinking is due to goal-relatedness. Specifically, as temporally close future events are more likely to be current-goal-related (Cole & Berntsen, 2016; Oyserman & James, 2011), they are more likely to be rehearsed (Cole & Berntsen, 2016), increasing their sensory-perceptual vividness compared with distant future events. Consequently, we predict that temporally closer EFTs should contain greater phenomenological detail, and will be more frequently imagined from a field perspective.

Empirical research has shown that more temporally distant memories typically include more observer perspectives (Rice and Rubin, 2009; Robinson & Swanson, 1993). Libby et al. (2005) provided evidence showing that this tendency exists because observer perspectives are superior for

abstracting knowledge about the self (whether perceiving continuity or change). More generally, Libby and Eibach (2011) developed a model in which observer perspectives are well-suited to inform 'top-down' abstractions rather than field perspectives, the latter being more concrete and 'bottom-up' in nature. Based on this view (and the similarity between past and future MTT), with increasing *future* temporal distance, event representations of possible selves should be more abstractly experienced through the use of observer perspectives. This is in line with construal-level theory (Trope & Liberman, 2003, 2010) which posits that temporally near scenarios are more concrete and content-rich, whereas distant events lend themselves to abstract reasoning and meaning-making.

1.4. *The current research*

Examining possible selves by examining both self-images *and* their related event representations has two purposes. (1) With significance for human socio-cognitive processing and future behaviour (Markus & Nurius, 1986), it may reveal new directions in applied research concerning self-regulation strategies. (2) It is also an important step in understanding the self as recently conceptualised (Prebble, Addis & Tippett, 2013) and builds upon recent theories predicting commonalities between past and future thought (Conway, Loveday & Cole, 2016; Schacter & Addis, 2007).

In the current study, to operationalise and measure current and future identities, we used a paradigm developed by Rathbone, Conway & Moulin (2011; see also Rathbone et al., 2008). In brief, participants complete a series of 'I am' and 'I will be' sentences (e.g., I am a mother, I will be a grandmother). These are then used to cue past or future events. Rathbone and colleagues (2011) demonstrated how MTT is temporally organised around stable (current and future) self-images, and, additionally, that observer perspectives were significantly more common for future than past events (see also Chessell et al., 2014). Although this novel cuing procedure produced important findings concerning the relation between self-images and MTT, the authors of these other studies did not differentiate events that represent near and distant future selves. Including both near future and far future conditions allows us to elucidate the proposed relationship between visual perspectives and future temporal distance, which has thus far remained underexplored.

Specifically, previous research such as that by D'Argembeau and colleagues (2004) has shown differences in phenomenology depending upon the temporal distance of future events. Although distant events may link to distant self-images, only in this study were we able to precisely identify and investigate the effects of temporal distances of the future *self-images*. Additionally, a recent study from Macrae *et al.* (2015) tested the hypothesised association between temporal distance and visual perspective related to self-focused future events. However, predominant perspective taking was inferred through a simple letter-drawing task. Participants engaged in only one, experimenter-provided, episodic event, for which the letter-drawing task was appropriate. However, as participants in the current study were to engage in up to eighteen episodes of varying content, the letter-drawing task would be easily subject to practice effects. Therefore, the current study directly measured subjective visual perspective tendencies across the events generated in each condition, to measure the average visual perspective representing near and distant future selves.

The following is our primary hypothesis: Event representations cued by distant self-images will elicit more observer perspectives than those cued by near future self-images. We also hypothesised that events cued by distant versus near future self-images would be less vivid and emotionally intense.

Finally, thinking about possible future selves inescapably entails comparisons with the current self (Markus & Nurius, 1986). Therefore, it was also of interest to compare the self-statements and related events in the current investigation. In terms of MTT, it was predicted that past MTT will elicit more field perspectives than future MTT (e.g., Rathbone et al., 2011). Additionally, based on previous findings (see section 1.2), it was predicted that past MTT will be more vivid and emotionally intense than future MTT. Finally, as an exploratory measure, we also assessed whether,

due to having the least continuity with current selves, distant future self-images will be perceived as least likely to exist in the future.

2. METHODS

2.1. Participants

Participants were a sample of undergraduates attending a university in Yorkshire, England. Of the 84 participants who took part, 15 were removed due to insufficient data and one for not conforming to the instructions. The final number of participants included in analysis was 68 (Mean age=22.60, SD=6.65, Range-18-52). There were 53 females and 15 males.

2.2. Design

The University Ethics Committee approved this study. Because the aim was to compare how individuals perceived their sense of self at three different points in time, a repeated measures design was utilised in order to compare individuals' current, near future and distant future self-representations.

2.3. Materials and Procedure

Web links to the tasks were circulated through student email and noticeboards, alongside a short description of the study. Participants completed an information and consent page online, ensuring them of their anonymity and confidentiality of data. This page also included background information and explained 1st and 3rd person perspectives, using descriptions from Libby et al. (2005). To not potentially bias the results, participants were not aware of any hypotheses prior to completion. Participation was voluntary and no incentives were provided.

The main instrument used in this study was based on the 'IAM' and 'I Will Be' (IWB) tasks developed by Rathbone et al. (2008, 2011), consisting of three stages. In stage one, participants generated a self-image that reflected an enduring aspect of their sense of self by completing the given statement (e.g., I am a sister, I will be determined). The IAM task asked participants for two images that reflected enduring aspects of their current self, and two ideal self-images per IWB condition (IWB-near, IWB-far). IWB conditions necessitated images pertaining to an ideal-self that participants would like to be in the future. Thus each participant generated a total of up to six self-images. As the focus was on changes between selves, it was specified to participants that future selves should be different to current selves. As a manipulation check, each self-image statement was rated on a 1-7 likert-scale for how much it represented a stable part of the self in question (1 = not at all, 7 = very much so), and also how likely it was expected to exist in the future (1 = very unlikely, 7 = very likely).

Stage two consisted of using each of the generated self-images to cue three episodes, which required participants to provide short event descriptions. For the IAM condition, participants were asked for specific events from the emergence of the self-image. Although memories that represented the current self (IAM self-images) could be from any prior time, as demonstrated by the 'clustering' effect in Rathbone et al. (2011), they would likely be fairly recent (e.g., the self-image 'I am a student' represented by the recent event 'getting positive feedback for an essay'). For the IWB-near and IWB-far conditions, predetermined temporal windows were presented within the instructions (1-5 and 10-20 years for the near and far conditions respectively). This eliminated temporal overlap and ensured that future selves were consistently different between near and far conditions and consisted of specific events pertaining to the self-images. Thus each participant could potentially generate eighteen total event representations. Following generation of each event, participants specified whether the event was viewed from a predominantly 1st or 3rd person perspective. In stage three, participants rated the vividness and emotional intensity of events on a 1-7 likert-scale (1 = not at all, 7 = very much so). After all three stages had been completed, participants would return to stage one

to generate a second self-image for that condition. See Figure 1 for a schematic of this process. The tasks were presented on an online format utilising SelectSurvey software (https://selectsurvey.net/).

Counterbalancing the order of conditions was considered. However, as people first consider the present in order to appraise self-change (Ross, 1989), all participants completed the IAM condition before the IWB conditions. The order of IWB conditions was counterbalanced: Half of the participants completed IWB-near followed by IWB-far (n=33) and half completed them in the reverse order (n=35). There was some normal variation in completion time, approximately averaging 20 minutes. Finally, a debrief page explained the aims and hypotheses of the study. To ensure sufficient data for analysis, a conservative inclusion rule of a minimum of four events per condition (with all related ratings) was applied. Participants with < four events for any condition were discarded from analysis. Data were analysed using SPSS Version 20.

INSERT FIGURE 1 ABOUT HERE

3. RESULTS

3.1. Characteristics of event representations

3.1.1. Length of Event Representations

The number of words used to describe events was greater in the IAM (M=11.43, SD=5.83) than IWB-near (M=7.80, SD=4.48), and IWB-far (M=8.10, SD=4.96) conditions. An ANOVA showed these were significantly different, $F(2, 134)=37.63$, $p<0.001$, partial $\eta^2=0.36$. Bonferroni comparisons showed significant differences between IAM and IWB-near, $p<0.001$, and IAM and IWB-far, $p<0.001$, but no difference between the two IWB conditions, $p>0.05$, demonstrating more descriptive elaboration for memories than for future events[1]. However, as this study was online, we are aware that participants may have taken different amounts of time to describe the events, irrespective of text length.

3.1.2. Visual perspective

Perspectives were classified as 0 for field and 1 for observer. The percentage of observer perspectives was calculated for each participant per condition. Observer perspectives were more frequently adopted for both IWB conditions (greater for IWB-far versus IWB-near) than the IAM condition (see Table 1). As predicted, a repeated measures ANOVA showed significant differences in visual perspective between the three conditions, $F(2, 134)=10.82$, $p<0.001$, partial $\eta^2=0.14$, with simple comparisons (not corrected for multiple comparisons) showing a significant difference between IAM and IWB-near, $p<0.005$, IAM and IWB-far, $p<0.001$, both replicating Rathbone et al. (2011), and IWB-near and IWB-far, $p<0.05$. The comparison of the IWB conditions did not survive Bonferroni corrections (p=0.126), however, this is a conservative adjustment, and it should be noted that all visual perspective effects were in line with our hypotheses. Pearson correlations showed that visual perspective was also significantly positively correlated across all conditions, IAM and IWB-near, $r(68)=.39$, $p<0.01$, IAM and IWB-far, $r(68)=.26$, $p<0.05$, IWB-near and IWB-far, $r(68)=.66$, $p<0.01$. This demonstrates significant individual differences were exhibited in regards to visual perspective preferences.

INSERT TABLE 1 ABOUT HERE

3.1.3. Vividness

Vividness was highest in the IAM condition and lowest in the IWB-far condition, a repeated measures ANOVA demonstrating significant differences, $F(2, 134)=13.40$, $p<0.001$, partial $\eta^2=0.17$. All conditions had significantly different vividness ratings and survived Bonferroni corrections: IAM

and IWB-near, $p<0.01$, IAM and IWB-far, $p<0.0005$, IWB-near and IWB-far, $p<0.05$. Thus, vividness was greater for past MTT, and the vividness of future MTT significantly declined with temporal distance (See Figure 2). It is noteworthy that general vividness levels were high (all above mid-point) attesting to the fidelity of the online paradigm to elicit subjectively rich episodes.

3.1.4. Relation between vividness and visual perspective

Considering that we demonstrated that temporal distance determines the visual perspective of future events, it was an open question as to the association between visual perspective and subjective event vividness. Exploratory analysis was therefore carried out to determine whether vividness was associated with visual perspective for future events. A point biserial correlation was carried out between vividness and visual perspective at an event level. Vividness was indeed found to be significantly associated with visual perspective, $r_{pb}=-.15$, $N=802$, $p<0.001$. Specifically, events in a first-person perspective ($N=488$, $M=5.32$, $SD=1.45$) had higher vividness ratings than those from a third-person perspective ($N=314$, $M=4.83$, $SD=1.66$).

INSERT FIGURE 2 ABOUT HERE

3.1.5. Emotional intensity

In contrast to predictions, there were no significant differences in emotional intensity ratings across conditions, $F(2, 134)=0.21$, $p>0.05$. As field perspectives are typically associated with greater emotional intensity (e.g. D'Argembeau et al., 2003; Nigro & Neisser, 1983), independent t-tests were used to compare the emotional intensity of field versus observer perspectives within each condition. The emotional intensity of field perspectives versus observer perspectives was significant for both future conditions; IWB-near, $t(396)=2.18$, $p<0.05$, d=0.07 (field, $M=5.21$, $SD=1.69$, observer, $M=5.09$, $SD=1.78$), and IWB-far, $t(400)=2.37$, $p<0.05$, $d=0.23$ (field, $M=5.43$, $SD=1.67$, observer, $M=5.02$, $SD=1.83$); IAM, $t(400)=0.56$, $p=0.58$, $d=0.07$ (field, $M=5.21$, $SD=1.69$, observer, $M=5.09$, $SD=1.78$). This demonstrates that greater emotional intensity was found for field versus observer perspectives only for imagined events and not memories.

3.2. Characteristics of self-images

The stability check of self-image ratings ensured that participants were imagining their current and ideal selves respectively and these were expected to be high on a 1-7 scale (see Method). The means for each condition were indeed well above the midpoint: IAM, (M=5.97, SD=0.87), IWB-near, (M=6.29, SD=0.66), IWB-far, (M=6.10, SD=0.94).

3.2.1. Content of self-images generated

To assess the content of the self-images, they were all categorised and tallied, following similar methods employed in Rathbone et al (2011). The first author independently categorised the self-images of each condition. A subset of self-images (20%; N=81) was also categorised by the second author with six discrepancies. After discussion, full agreement was reached. There were few specific commonalities for IAM self-images, with most referring to individual attributes (e.g., 'strong', 'genuine', 'forgetful'). The most common were broadly family-member related (15%) (e.g., 'sister', 'son', 'family member'), with all other categories fewer than five percent (e.g., student 4%, girlfriend 4%). The most common IWB-near self-images were related to career/work (18%), general happiness (10%), and education (8%). The most common IWB-far self-images related to becoming a parent (15%), career/work (14%), marriage (9%) and successful (7%). See Appendix A for examples. The IWB-far self-images are noticeably similar to the IWBs of Rathbone et al. (2011), in which parent, career, and marriage were also the three most common.

3.2.2. Types of Self-images: Roles vs. attributes

As an exploratory measure, related to specific and abstract selves (e.g., Rathbone et al., 2016), we looked at roles versus attributes for self-images. Each self-image was allocated either a 1 or 0 to indicate whether it was role-related or attribute-related, with full agreement between the two authors for these allocations in a subset (20%; N=81) of responses (See Appendix B for examples). The two self-images for each condition were averaged, which gave a proportion for the amount of role-related allocations per condition. The proportion of role-related self-images was lowest in the IAM condition and highest in the IWB-far condition (See Table 1). A repeated measures ANOVA showed that the differences in role allocation between conditions was significant, $F(2, 134)=5.89$, $p<0.005$, partial $\eta^2=0.08$. Post-hoc comparisons showed there was no significant difference between IAM and IWB-near, $p>0.05$. There were significant differences between IAM and IWB-far, $p<0.001$, and IWB-near and IWB-far, $p<0.05$, although the latter of these did not survive the conservative Bonferroni corrections ($p=0.13$). These results demonstrate that distant future self-images were more often specified as role-related than current self-images and near future self-images.

3.2.3. Perceived likelihood of self-images

Related to self-continuity across temporal distance, we assessed the perceived likelihood of self-images existing in the future. As Table 1 shows, IWB-far self-images were rated as the least likely to exist in the future, and IAMs the most likely. An ANOVA revealed significant differences in perceived likelihood ratings between conditions, $F(2, 134)=6.82$, $p<0.005$, partial $\eta^2=0.09$. There was no difference between the IWB conditions, $p>0.05$. However, IAMs were rated significantly higher than both IWB-near, $p<0.05$, and IWB-far self-images, $p<0.005$ (with Bonferroni corrections). This demonstrates that participants perceived their current self-images as more likely to exist in the future than near and distant self-images.

3.2.4. Order of IWB conditions

As the order of IWB conditions was counterbalanced, mixed ANOVAs for the IWB conditions (using order of conditions as a between-subjects IV) were carried out for all phenomenological ratings. These were non-significant for events' visual perspective, vividness, emotional intensity, and self-images' role-relatedness (all $p>0.05$). Interestingly, the order of IWB conditions did have an effect on future self-images' perceived likelihood. $F(1, 66)=5.75$. $p<0.05$, partial $\eta^2=0.08$, with a significant interaction between the order of conditions and type of condition, $F(1, 66)=6.63$, $p<0.05$, partial $\eta^2=0.09$. The likelihood means were: IWB-near, chronological order ($M=5.12$, $SD=1.00$), reverse order ($M=5.90$, $SD=0.94$); IWB-far, chronological order, ($M=5.35$, $SD=1.01$), reverse order ($M=5.56$, $SD=0.91$). Independent t-tests showed that these differences were only significant for IWB-near, $t(66)=3.314$, $p<0.001$, d=0.80; IWB-far, $p=0.37$. These results demonstrate that when participants first completed the IWB-far condition, subsequent likelihood ratings for IWB-near were significantly greater than if IWB-near was first completed.

4. DISCUSSION

In this study, we principally investigated the effect of manipulating the temporal distance of possible selves upon the visual perspective, vividness and emotional intensity of related episodic thoughts. The results of this study replicated findings of Rathbone and colleagues (2011) regarding the differences in visual perspective between past and future MTT, and extend their scope to possible selves (Markus & Nurius, 1986). Consistent with the proposition that increasing temporal distance increases abstract 'top-down' cognitive processing (Libby & Eibach., 2011; Trope & Liberman, 2010), observer perspectives were the predominant perspective for event representations of possible selves in the distant versus near future. As a corollary to the core result, the past-future prediction was found for vividness but not emotional intensity, although emotion *was* affected by the visual perspective of the event in future MTT. In an exploratory analysis of self-statements, we also

replicated the types of self-images generated for future selves (i.e., roles versus attributes) found previously (Rathbone et al., 2011; 2016).

4.1. Main findings

Consistent with construal-level theory (Trope & Liberman, 2010, i.e., that more distant objects are perceived as more abstract) and the TEDIFT model (La Corte & Piolino, 2016), temporally distant future MTT was less frequently experienced from a field perspective and was less vivid than near future MTT. An explanation for this may relate to the frequency of mental simulation. For example, it has been demonstrated that repeated retrieval of memories from a field versus observer perspective enhances event vividness (e.g. Butler et al., 2016); a similar process of rehearsal might be happening for temporally near future events, as they are more likely to be represented from a field perspective (cf, Cole & Berntsen, 2016 for results suggesting that goal-related future events are temporally closer and more frequently rehearsed). In addition, the current study demonstrated that field perspectives were associated with increased vividness in future MTT. This is consistent with what has been found in studies of memory (e.g., Nigro & Neisser, 1983).

Future event representations indexed to possible self-images had less elaborate descriptions, and were also rated as less vivid than memories indexed to current self-images, independently of future temporal distance. This builds upon previous research, in which future MTT is consistently less vivid than past MTT (e.g., Berntsen & Bohn, 2010; Cole & Berntsen, 2016). Although the remembering-imagining system and the CESH emphasise the similarities between remembering the past and imagining the future (Conway et al., 2016; Schacter & Addis, 2007), the findings here do not contradict the perspectives emphasising continuity between past and future thought (see Michaelian, 2016 for a more thorough philosophical treatment). Furthermore, this study demonstrated that observer perspectives increase with temporal distance in future MTT, as they do for past MTT (e.g., Rice & Rubin, 2009; Robinson & Swanson, 1993), indicating a possible 'mirroring' of past and future, predicted by the remembering-imagining system (Conway et al., 2016). However, clearly, a study would have to include a near and far IAM or IWAS conditions (see Coste et al., 2015; Rathbone et al., 2008) in addition to an IWB-near and IWB-far condition to fully test this hypothesis in one study.

4.2. The content of Self-images

The most common distant future self-images in the present study, and the future self-images in Rathbone et al. (2011), related to 'becoming a parent', 'career', and 'marriage', produced in the same rank order of frequency in both studies. The relevant distinction is that in Rathbone et al. (2011) the selves were open-ended, whereas the present study examined ideal selves. This finding represents a well-founded natural positivity bias for future thinking (e.g., MacLeod & Conway, 2007, Rasmussen & Berntsen, 2013) and appears independent of whether participants are specifically asked for positive self-images. One open question is the relation between the possible selves that individuals would like to be ('ideal'), and the possible selves individuals feel they should be ('ought') (Higgins, 1987). Future studies could uncover any commonalities between these.

The life script hypothesis (Berntsen & Rubin, 2002), considering autobiographical memory to be organised by semantic knowledge of culturally shared life events, can further explain these self-images. Cultural life script events are (generally) positive events that are expected to occur at given times during one's lifetime within a specific cultural context (Berntsen & Rubin, 2004), and have been shown to structure past and future thinking (Berntsen & Rubin, 2004; Berntsen & Bohn, 2010; Berntsen & Jacobsen, 2008; Bohn & Berntsen, 2011). Because participants in both the current study and Rathbone et al. (2011) have likely not experienced their culturally expected events, the basis for their future self-images are probably culturally-expected (cf. Table 3, Berntsen & Rubin, 2004). Hence, due to commonalities in future self-images, it is suggested that both the standard I Will Be task developed by Rathbone and colleagues (e.g., Chessel et al., 2014; Di Simplicio et al., 2015; Rathbone et al., 2011, 2016) and the modified task used in the present study, tap positive culturally-

expected life events. This suggests that future studies can flexibly probe ideal selves within the IWB task by using it as an independent variable (i.e., comparing with IAMs) or dependent variable (i.e., measuring its schematic content). It is noteworthy that where future events can map on to actual experience (e.g., ordering a pizza), scripts and schemas might still be relevant for future scenarios, as future versus past scenarios tend to be more prototypical (Kane, Van Boven & McGraw, 2012).

In a recent study, Rathbone et al. (2016) demonstrated that specific (versus abstract) possible self-images were dated as emerging in the more distant (versus near) future. Our results are consistent with this, in that we found fewer attributes (cf. abstract self-images) and greater roles (cf. specific self-images) generated for distant versus near future self-images when they were explicitly manipulated. Rathbone et al. (2016) explained that, although this appears counter to construal-level theory (Trope & Liberman, 2010), it can be explained by distant self-images mapping on to cultural life scripts; replicated herein. Additionally, it is possible that when thinking of the near future, participants draw upon already present aspects of self, such as ubiquitous attributes (e.g., being caring, which can be present across multiple aspects of self; see Donahue et al., 1993; McConnell, 2010).

4.3. The relation between visual perspective and theories pertaining to the self

Research has implicated observer perspectives as a potential disconnecting mechanism between the current self and other selves (e.g., McIsaac & Eich, 2002; McNamara et al., 2005; see the *dispassionate observer hypothesis*, Sutin & Robins, 2008). This might apply when visual perspective is manipulated, or during traumatic memory recall (e.g., McIsaac & Eich, 2004). In contrast, field perspectives might function in *connecting* current and possible future selves using a more subjective self-awareness (see Prebble et al., 2013 and Introduction). According to Libby and Eibach (2011), of greater influence is whether one's focus is on experiencing the details of the event (preference for field), or on coherence with one's self-concept (preference for observer). Nevertheless, observer perspectives are indeed superior for assessing self-change (Libby et al., 2005). Thus, in the context of the present findings, the near and far future selves lent themselves to different visual perspectives: There was a greater focus on subjective event 'experiencing' for near possible selves via a field perspective, but when cued by temporally differentiated future selves, a greater change is implied between one's current and future self which led to more role-based self-images, leading to an observer perspective. Our results are therefore broadly consistent with proposals by Libby and Eibach (2011) and the *dispassionate observer hypothesis* (Sutin & Robins, 2008); that temporally distant, but not temporally near future scenarios, are subjectively distanced from our current self using an observer perspective.

As stated previously, herein we studied *objective-present self* and *objective temporally-extended self* via IAMs and I Will Be cues respectively, and the *subjective temporally-extended self* was probed in the EFT task. In mapping Libby & Eibach's (2011) model onto the sense of self model (Prebble et al., 2013) one could hypothesise that the field perspective aids subjective self-awareness, whereas the observer perspective aids objective self-knowledge (e.g., personal semantics, see La Corte & Piolino, 2016). One might also suspect that one's on-going subjective experience *(subjective present self)* - altered in disorders such as Schizophrenia - may affect the vantage perspectives adopted for one's current and future selves. These are intriguing hypotheses, which can be explored in future work.

4.4. Perceived likelihood: Order effects

Although distant possible selves logically have the least continuity with current selves, there was no difference between the perceived likelihood of self-images existing in the future between the two future conditions[2]. As mentioned, distant self-images were highly related to cultural life scripts, thus their perceived future likelihood may be inherently greater as they are culturally expected to be

attained. It is important, however, to mention the order effect that impacted the perceived likelihood of near future self-images; when individuals first imagined distant possible selves, near possible selves had greater perceived likelihood than the opposite order. We suggest that this order effect is due to a broader cognitive contrast effect (e.g., Cogan et al., 2013; Thornton & Moore, 1993): For instance, if one was to imagine a distant future goal (e.g., completing a marathon), the subsequent imagining of a near future goal (e.g., running a few miles on a weekend), may seem more feasible by comparison[3]. Additionally, the future condition order had no effect on any other phenomenological measure. This may be useful for future interventions. For instance, several studies have examined the effect of imagining a desired possible self upon present behaviour (e.g., Epstein, 1980; Hagger et al., 2012; Leondari et al., 1998; Oyserman et al., 2006, 2007). Perhaps future investigations could explore the order effect of near and far ideal self-images upon positive health behaviours, such as reducing alcohol intake, or giving up smoking.

4.5. Future directions

Although emotional memories are more frequently accompanied by field perspectives (e.g., D'Argembeau et al., 2003), in the present study, field perspectives were only accompanied by increased emotional intensity when MTT was future-directed. However, the present study did not limit or manipulate valence of episodic memories (plus all mean emotional intensity ratings were positive). One tentative hypothesis is that field perspectives act as a mechanism for (emotionally) connecting current selves to possible selves. Therefore, prompting to use a field perspective in IWB tasks might be especially useful for identifying, and connecting to, ideal-selves.

Virtual reality might provide further assistance to this potential line of research. For example, people with a larger actual-ideal self-discrepancy are more motivated to play immersive video games with ideal-self-related experiences (Przybylski et al., 2011), and self-related future avatars can elicit positive attitudes toward behavioural change (Kim & Sundar, 2012; Song et al. 2013). Future thoughts are inherently more constructive than memories (Conway et al., 2016). Thus, synthetically experiencing ideal-self event representations, with increased immersion in virtual reality using a field perspective, may increase ideal self-image feasibility; or at least reduce actual-ideal self-discrepancy, which could promote wellbeing (Higgins, 1987). Nevertheless, the question of whether field or observer perspectives are more effective in virtual reality remains an empirical question.

Additionally, in order to compare more diverse possible selves across time, future studies could utilise both between-groups and repeated measures designs. Including a possible self that opposes the ideal-self, an undesired/feared-self (Markus & Nurius, 1986), would potentially further illuminate the role of possible selves in MTT, and how MTT is temporally organised around more abstract and stable (past and future) self-images (e.g. Chessel et al., 2014; Rathbone et al., 2008, 2011, 2016). Finally, it is worthy of note that our study was entirely administered online, which arguably lacks experimental control when compared with laboratory-based studies. However, key studies using the self-images task (Rathbone et al., 2008; 2016) were also administered online, with others administered using questionnaires with presumably little or no experimenter prompting, similar to an online administration (Rathbone et al., 2011).

4.6. Conclusions

The primary question of the current study was whether the visual perspective of event representations bound to possible selves was related to their temporal distance. With increasing temporal distance, future events more often involved an observer perspective. Theoretically, the current study integrated these findings within a diverse literature on visual perspective (Libby & Eibach, 2011), temporal distance (Trope & Liberman, 2010) and broader models of future thinking (La Corte & Piolino, 2016) and sense of self (Prebble, Addis & Tippett, 2013). The latter model encapsulated well the levels of knowledge used within the modified IWB task used in the current study, illustrating the relevance of these findings to current theoretical frameworks. The current study has demonstrated clearly that the possible self is a useful and testable aspect of human psychology that relates to self-salient, culturally-influenced, future events. Finally, the possible pragmatic utility

of visual perspectives in increasing positive behaviour and wellbeing is highlighted as a fruitful area for future investigation.

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Footnotes

1. The data were not normally distributed across all measures. Non-parametric equivalents were also carried out, which yielded the same results.
2. For a potential explanation of why near and distant possible self-images were both perceived as less likely to exist in the future in contrast to current selves, see the *end of history illusion* (Quoidbach et al., 2013).
3. Although the likelihood ratings for IWB-far demonstrated the opposite result (lower likelihood ratings when imagined in chronological order), this did not reach significance.

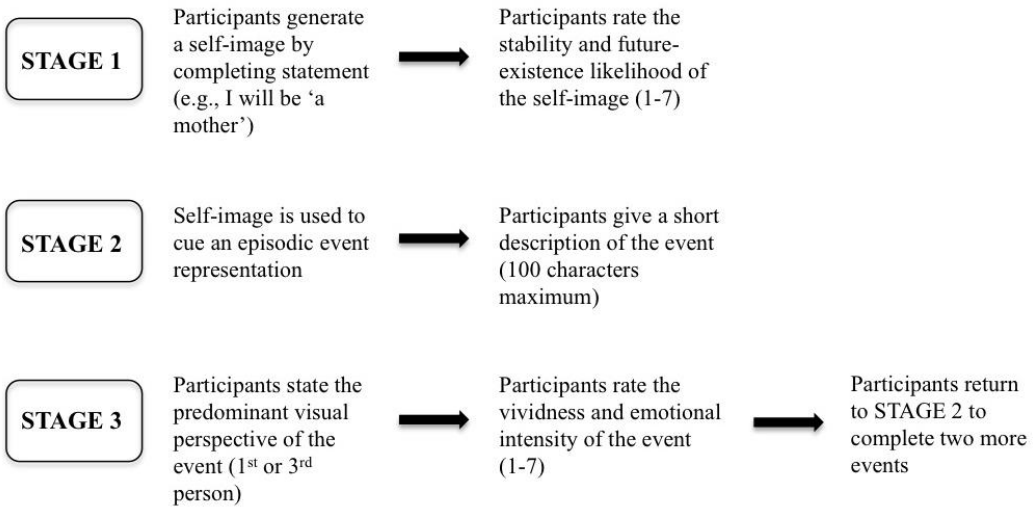
Figure Captions

Figure 1. Schematic of the different stages involved in completing IAM and IWB self-images

Figure 2. Participants' mean vividness ratings as a function of self-image condition. Error bars represent standard error of the mean.

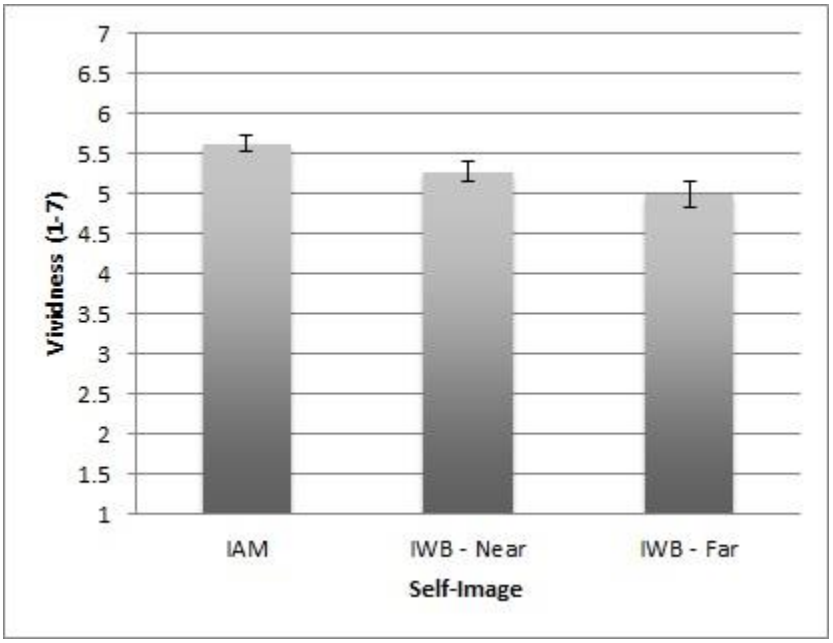
Figures

Figure 1.



This process was completed twice for each condition

Figure 2.


7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
Vividness (1-7)
IAM
IWB - Near
IWB - Far
Self-Image

Tables

Table 1.

Means (standard deviations) of phenomenological characteristics as a function of self-image condition

Phenomenological characteristics	*I am*	*I Will Be (Near)*	*I Will Be (Far)*
Event Representations			
Observer Perspectives (%)	24.02 (26.92)^	35.66 (31.46)^*	42.75 (36.22)^*
Vividness (1-7)	5.63 (0.89)^	5.28 (1.08)^*	5.00 (1.29)^*
Emotional Intensity (1-7)	5.18 (1.09)	5.19 (1.30)	5.26 (1.27)
Self-Images			
Perceived likelihood (1-7)	5.93 (1.17)^	5.52 (1.03)^	5.46 (0.96)^
Role allocations (%)	28.68 (37.97)^	36.03 (38.48)*	46.32 (41.71)^*

^ indicates a significant difference between the I am and one or both of the I Will Be conditions (at the .05 level)

*indicates a significant difference between the I Will Be near and far conditions (at the .05 level)

Appendices

Appendix A. Example self-images and event representations

Condition	Self-image	Related event representations
IAM	(Family member) - I am a sister	1. Visiting my sister on her birthdays and giving her gifts 2. Spending my free time with her and helping her with tidying 3. Arguments with my sister 4. helping my little sister with her homework 5. Me and my brother got matching tattoos for my 21st birthday
IWB-near	(Happy) - I will be happy	1. Meeting someone romantically 2. I have helped a friend with their issues 3. I will have my friends and family around me 4. Buying my own house 5. I will go on holiday
IWB-far	(Becoming a parent) - I will be a mother	1. Giving birth 2. When I see my child for the first time 3. Holding my own baby 4. Smiling and teaching the baby 5. My partner playing sports with the child

Appendix B. Prototypical examples of roles and attributes for self-images

Condition	Roles	Attributes
IAM	A sister A student A girlfriend A daughter A friend	Struggling Determined Positive Beautiful Intelligent
IWB-near	In a job I love A qualified accountant A doctor A university graduate An Occupational Therapist	Organised Happy Calm Optimistic Content
IWB-far	Married A mother A professor A teacher A father	Wiser Sociable Successful Charitable Relaxed