

# Mapping Out Past and Future Minds: The Perceived Trajectory of Rationality Versus Emotionality Over Time

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Who do we see when envisioning our “past self” and “future self”? Extant research finds a motivation to perceive improvement over time, such that past selves are seen as worse versions, and future selves as better versions, of current selves. However, the broader components comprising “worse” or “better” beyond domain-specific achievement (e.g., “Last year I failed at dieting, but next year I’ll succeed”) are less well understood. Are there more general qualities ascribed to the person we recall versus imagine being? Six studies suggest so, extending the 2-dimensional mind perception framework to the self: Past selves seem to possess highly emotional but not very rational minds, whereas future selves seem to possess highly rational but not very emotional minds (Studies 1a, 1b, 1c). Consistent with motivated improvement, this asymmetry does not emerge in evaluating others and applies uniquely to self-judgment (Study 2). Thus, our pervasive belief in changing for the “better” specifically means becoming more rational types of people. This observation has asymmetric consequences. Participants who brought to mind future selves sought intellectual enrichment (Study 3) and performed better on a self-control task (Study 4); however, participants who brought to mind past selves sought emotional enrichment and performed better on the same task when allegedly measuring enjoyment. These findings build a bridge between mind perception and intertemporal dynamics, raising novel implications for the present. Thinking about the future may not uniformly “improve” decisions and behaviors; rather, it mostly facilitates rational-related pursuits, whereas thinking about the past may enhance feeling-related experiences.

**Keywords:** mind perception, change, mental time travel, emotions, rationality

People regularly ascribe mental capacities to friends, pets, and spirits despite the fact that mental states beyond one’s own immediate experience cannot be seen or felt in any tangible sense. Others’ intentions, thoughts, and feelings are necessarily *perceived*, and people’s penchant for perceiving other minds is one of nature’s finest and most frequently utilized gifts (Epley, Waytz, Akalis, & Cacioppo, 2008; K. Gray, Young, & Waytz, 2012). Less well understood, however, is how people might perceive *their own* minds beyond the here and now, namely, in the past and future. To

the extent that mental representations of past and future selves bear resemblance to other people (Pronin & Ross, 2006), similar processes underlying mental inference across space (from “me” to “you”) might extend across time and tense (e.g., from “me today” to “me next year”).

The goal of the current article is to help fill this gap by exploring how people perceive changes in themselves along various attributes, in an attempt to paint a portrait of what our past and future selves “look like” compared with our current self. Specifically, this research builds on a classic distinction in the attributes by which people evaluate others. First, people tend to judge others along an emotion-related dimension: We attempt to get a sense of their warmth and sensitivity, and how intensely they feel, react, and experience sensations. At the same time, people also judge others along a rational-related dimension: We size up their competence and cognitive skills, and how well they reason, make plans, and actively exert control. Six studies extended this other-oriented framework to the self, and revealed a robust temporal asymmetry: How much emotionality and rationality we see in ourselves depends on whether we look back to the past or ahead to the future.

## Perceiving Other Minds

Psychological science enjoys a rich tradition of exploring the mental processes and intergroup dynamics that underlie how people interpret others’ thoughts and actions (Gilbert & Malone, 1995; Jones & Harris, 1967; L. Ross & Nisbett, 1991; Swann, 1984). This diverse literature has recently been integrated under the scope of mind perception. *Mind perception* refers to the basic psycho-

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logical process of attributing, inferring, and interpreting others' internal states that otherwise cannot be observed or accessed directly with one's own senses, such as others' thoughts, feelings, intentions, goals, desires, and consciousness itself (e.g., Baron-Cohen, 1994; Morewedge, Preston, & Wegner, 2007; Premack & Woodruff, 1978). Despite obvious difficulty in establishing proof that such states objectively exist, people's tendency to perceive minds in the world is nonetheless pervasive and well documented (see Epley & Waytz, 2009, for a comprehensive review).

Most relevant here, studies on mind perception have consistently shown that people perceive other minds along two distinct dimensions. These dimensions might be most succinctly labeled as emotionality versus rationality, and for sake of simplicity, only these terms will be used throughout the current article. *Emotionality* captures a "feeling" side of others, by which we appraise others' affective sensitivities, capacities to feel pain and joy, reliance on gut impulses, and passive reactions ("heart," see Fetterman & Robinson, 2013; "experience," see H. M. Gray, Gray, & Wegner, 2007; "warmth," see Fiske, Cuddy, & Glick, 2007; "warm," see Asch, 1946; "nurturance," see Wiggins & Broughton, 1991; "reactive," see Schneider, Hastorf, & Ellsworth, 1979). In contrast, *rationality* captures a "thinking" side of others, by which we appraise others' cognitive abilities, capacities to think and reflect, reliance on reason, and their active control over an event ("head"; "agency"; "competence"; "cold"; "dominance"; "proactive"). Some targets are ascribed high rationality and low emotionality (e.g., gods), others high emotionality and low rationality (e.g., pets), and still others are perceived as high (e.g., healthy adults) or low (e.g., cadavers) on both.

### The Self as an Other

Until this point, mind perception has been discussed in terms of people's tendency to attribute rationality and emotionality to *other* people, objects, and entities. However, because the assumed process is generally rooted in how people come to understand the world beyond the immediate senses, it seems reasonable to examine how people might perceive *their own* minds over time. Indeed, present moments are strikingly brief. As Kahneman and Riis (2005) poignantly note, "The experiencing self that lives each of these moments barely has time to exist" (p. 285). Thus, like the internal states of others, our own lives before and after that vanishing window of experience lack any tangible qualities and thus are necessarily perceived and inferred (Robinson & Clore, 2002).

Interestingly, prior research suggests that people often perceive their past and future selves from a third-person perspective, as if they were looking at someone else (Cohen & Gunz, 2002; M. G. Frank & Gilovich, 1989; Libby & Eibach, 2002; Lorenz & Neisser, 1985; Nigro & Neisser, 1983; Pronin, Olivola, & Kennedy, 2008; Pronin & Ross, 2006). Moreover, people seem to treat their past and future selves as if they were other people (Liberman, Trope, & Stephan, 2007), in that they choose smaller immediate rewards instead of larger rewards in the future (Frederick, Loewenstein, & O'Donoghue, 2003), delay undesirable experiences now at the expense of doing them later (Ainslie & Haslam, 1992), and assign the same amounts of rewards and punishments to future selves as they assign to present others (Pronin et al., 2008). Even at a neuropsychological level, thinking about one's own experiences

across time (retrospection, prospection) and about others' experiences across space (theory of mind, perspective taking) is believed to activate a shared brain network, which may suggest that people process and represent their past and future selves as if those selves were literally other people (Buckner & Carroll, 2007; Ochsner et al., 2004; Pronin, 2008; Saxe & Kanwisher, 2003).

Thus, people's perceptions of their own mental states over time might closely parallel their perceptions of mental states in others. Given the predominant two-dimensional model of perceiving others' minds, one intriguing but yet untested question is how people ascribe emotionality and rationality to their own past and future selves.

### Minds in Time

How might people perceive their past and future minds? To gain insight into this question, it helps to first assess how people more generally perceive the past and future.

Perhaps the most robust difference across perceptions of tense relates to valence: Tomorrow perennially seems better than yesterday and today. People construct idealized versions of their futures (Higgins, 1987), which maintains self-esteem (Maslow, 1970), fosters confidence (Sedikides & Skowronski, 2000), subdues negative moods (Taylor & Brown, 1988), and impels action (Markus & Nurius, 1986; Taylor & Gollwitzer, 1995). The very narratives that guide daily life are imbued with optimism: People believe their lives move *toward* something, that they are learning and growing from their experiences over time (Heckhausen & Krueger, 1993; Markus & Ruvolo, 1989; McAdams, 2006; Sedikides & Hepper, 2009). And when people are asked to directly gauge how their skills and abilities have changed, they typically denigrate past selves in ways that bolster the present and future (e.g., "I used to lack brains, but now I'm much smarter and headed in the right direction")—even if this criticism is unwarranted (e.g., when past and present intelligence scores do not objectively differ; M. Ross, 1989; Wilson & Ross, 2001). Hence, at this fundamental level, it follows that future minds should seem generally "better" and past minds generally "worse" than how people perceive their current mental capacities.

But what do "better" and "worse" actually mean for the mind perception of self? How might they translate into broader dimensions of rationality and emotionality? There is ample evidence to suggest that rationality should be viewed as better than emotionality, thereby leading to an asymmetric perception of "emotional pasts" and "rational futures." Classical Greek philosophers from Plato onward espoused the superiority of reason and bemoaned the "disruptive" nature of emotions. In a famous treatise, Aristotle (350 BCE) defined mind by "the part of the soul by which it knows and understands," and argued that people's ability to reason was the defining feature of mental experience (*De Anima*, 429a9–10). This emphasis has come to shape many modern domains of life. For example, foundational pillars of economics deem reasoned behaviors as normative and impulsive behaviors as deviant; ontogenies tend to be marked along cognitive (rather than affective) progressions; and education systems have historically overlooked emotional enrichment, treating learning as an isolated, analytic practice (Haidt, 2001; Ritzer, 2005; Stanovich & West, 1998; Zins, Bloodworth, Weissberg, & Walberg, 2004). Many scholars recog-

nize a vast cultural dominance of rationality over emotionality, particularly in Western thought.

Of course, contemporary psychologists are not as dismissive, and the past 20 or so years have seen a surge of findings in favor of feelings and impulses (e.g., Clore, 2005; Damasio, 1994; Dijksterhuis, 2004; R. H. Frank, 1988; Haidt, 2001; Loewenstein, 2000; Pham, 2007; Salovey & Mayer, 1990). But these findings are noteworthy precisely because they are counterintuitive; as acknowledged as a premise and motivation in much of this work, many everyday people assume otherwise. To this point, a number of studies show that people prefer being seen by others as someone who is proactive rather than reactive; as slow and deliberate rather than quick and impulsive; as competent rather than warm; and as informed by logic rather than informed by feelings (Abele & Wojciszke, 2007; Bakan, 1966; Diekmann & Eagly, 2000; Kunda, 1999; Schwartz, 2000; Wojciszke, Baryla, Parzuchowski, Szymkow, & Abele, 2011).

### The Present Research

Given these distinct literatures—which find that people perceive themselves as changing for the better, and that rationality is regarded as superior to emotionality—six studies were designed to explore the mind perception of self over time. It was predicted that people may perceive changes in mental capacities accordingly—that (inferior) past selves seem to possess highly emotional but not very rational minds, whereas (superior) future selves seem to possess highly rational but not very emotional minds.

Studies 1a through 1c establish these asymmetric patterns by assessing how people perceive past and future minds across a wide range of measures and parameters. In turn, Study 2 provides evidence for a self-improvement mechanism by testing whether the patterns emerge only when thinking about one's own change over time (i.e., when self-enhancement motives are relevant) as opposed to someone else's change over the same period. The final studies go beyond direct ratings to highlight asymmetric consequences for how people actually think (Study 3) and behave (Study 4) in the present.

Together, this article seeks to make theoretical as well as practical contributions, to be discussed at length in the General Discussion. At a theoretical level, it represents the first exploration of how the interpersonal rationality–emotionality paradigm extends to the intrapersonal domain, mapping out the more general “actor” involved in our remembered and predicted experiences (Studies 1 and 2). Doing so establishes a broader framework that integrates and extends many existing past–future differences, from the optimism literature to basic intertemporal processes. At a practical level, these mappings shed novel insight into how feeling connected to past or future selves may differentially influence pursuits, preference, and performance in the here and now—for better and for worse (Studies 3 and 4).

### Study 1: The Mind Perception of Self

In Study 1, participants were randomly assigned to recall the person they used to be or imagine the person they might become. A wide variety of methods were used across three independent studies, so as to best test for converging patterns in how people perceive their past and future mental states. Study 1a avoided

demand by asking participants to simply describe their past and future selves in a free-writing session. In this way, people's spontaneous depictions of past and future minds could be evaluated. Studies 1b and 1c then assessed direct ratings across a variety of measures. The studies each employed different types of samples, methods, and dependent variables to help establish general patterns of emotionality and rationality, beyond any single phrasing or methodological nuance.

### Study 1a: Open-Ended Reports

**Method.** This study was broken into two parts. In Part 1, participants were recruited to generate essays in which they described their past or future selves. In Part 2, a new sample rated these essays in terms of how emotional and rational the target seemed.

#### Part 1: Essay generation.

**Participants.** Forty people (42.5% women; 77.5% White;  $M_{\text{age}} = 32.88$ ,  $SD_{\text{age}} = 11.43$ ) were recruited for \$0.25 via Amazon's Mechanical Turk.

**Procedure.** Participants completed an open-ended essay task in a study about how people describe themselves. They were asked to write about what traits, characteristics, and tendencies come to mind when they think about their “past self” or “future self.” They were asked to write at least five full sentences and were not given any other specific details or instructions. Condition was randomly assigned such that each participant wrote one essay, creating a pool of 40 independently generated essays (20 past, 20 future).

After compiling the essays, a group of blind research assistants fixed grammar and spelling errors, and stripped away demographic details and past–future phrasing. For example, one “future” participant originally wrote: “My future self will be more mature and responsible, the kind of person who makes a commitment, no matter how small or large, and then keeps it.” This was rewritten as, “I am mature and responsible, the kind of person who makes a commitment, no matter how small or large, and then keeps it.” In other words, essays were translated in ways that made them unidentifiable as to whether the original writers had described their pasts or futures, while maintaining all descriptive language. One “past” essay and five “future” essays proved to be untranslatable, because the entire passage included descriptions of change in the abstract (e.g., “It is something that I used to do, or traits that I used to have”; “I wonder what the world in general will be like”), exclusively used age-specific descriptors (e.g., “I think of myself as grayer”), or was clearly unrelated to the task at hand (e.g., “Burning eyeball is an interesting smell”). These essays were eliminated from the pool, leaving 34 interpretable stimuli for Part 2.

#### Part 2: Main task.

**Participants.** Participants in Part 2 were drawn from the same population as the essay writers. Two hundred eleven people (37.9% women; 77.7% White;  $M_{\text{age}} = 31.64$ ,  $SD_{\text{age}} = 9.67$ ) were recruited for \$0.20 via Amazon's Mechanical Turk.

**Procedure.** These participants served as raters, and were randomly assigned to read either a “past self” or “future self” essay. Each participant rated only one essay; a large enough sample was recruited such that each essay was assigned to at least six raters.

After reading, raters were asked to think about the person who had written the essay and to rate how emotional he or she might be

(1 = *not at all of an emotional person*, to 7 = *very much an emotional person*), how rational he or she might be (1 = *not at all of a rational person*, to 7 = *very much a rational person*), and also directly compare these dimensions (1 = *this is mostly an emotional person*, to 7 = *this is mostly a rational person*). These items were presented in randomized order, one by one. Emotional was defined as, “This person has a big capacity for feeling pleasure and pain, and has strong feelings; he or she is capable of emotionally reacting and goes with his or her gut.” Rational was defined as, “This person has a big capacity for thought and planning, and has strong self-control; he or she is proactive and goes with his or her head.” The definitions were adapted from well-established descriptions of the two dimensions (H. M. Gray et al., 2007).

**Results and discussion.** The main analytical goal is to evaluate the effect of the time variable (tense of the original essay: past–future) on how writers seemed to describe their minds (the emotional, rational, and comparison dimensions). To do so, a multilevel linear model was created via generalized estimating equations (GEEs; Hanley, Negassa, Edwardes, & Forrester, 2003; Shedden, personal communication, December 5 and 6, 2014). The particular essay drawn from the pool was nested within time condition (past, future), and this factor was entered as a predictor. Dimension was also entered as a predictor (emotionality, rationality, compare), as well as the Condition  $\times$  Dimension interaction term. Finally, “participant” was entered as a repeated subject variable to account for idiosyncratic effects in rating tendencies within conditions. This model allows one to interpret traditional main effects and interactions, while controlling for the within-subject variation in making multiple ratings and specific effects of a given essay.

There was an incidental effect of time such that future selves were described as having more “mind” in general ( $M = 4.71$ ) than past selves ( $M = 4.04$ ),  $B = -1.41$ ,  $p = .001$ , Wald = 11.45. There was also an incidental effect of dimension,  $B = .75$ ,  $p < .001$ , Wald = 28.02, such that emotionality was rated more highly ( $M = 4.93$ ) than rationality ( $M = 4.44$ ),  $p = .004$ , and both were rated more highly than the comparison item ( $M = 3.64$ ),  $ps < .001$ . Importantly, these effects were qualified by a predicted interaction with the *type* of mind described,  $B = 2.31$ ,  $p < .001$ , Wald = 32.94. As predicted, past essays described more emotional people ( $M = 5.30$ ,  $SD = 1.66$ ) than future essays ( $M = 4.46$ ,  $SD = 1.68$ ),  $p < .001$ , 95% difference confidence interval (CI) [.38, 1.29], whereas future essays described more rational people ( $M = 5.21$ ,  $SD = 1.28$ ) than past essays ( $M = 3.83$ ,  $SD = 1.35$ ),  $p < .001$ , 95% difference CI [1.02, 1.73]. Likewise, for the comparison item, past essays described *mostly* emotional people ( $M = 2.99$ ,  $SD = 1.41$ ), whereas future essays described *mostly* rational people ( $M = 4.46$ ,  $SD = 1.50$ ),  $p < .001$ , 95% difference CI [1.08, 1.87].

Finally, analyses were rerun with rater age, sex, and ethnicity entered as covariates in the model. All results were essentially identical: The critical interaction remained significant,  $B = 2.31$ ,  $p < .001$ , Wald = 32.94, as did the reported contrasts for emotionality ( $p < .001$ , 95% difference CI [.42, 1.28]), rationality ( $p < .001$ , 95% difference CI [.97, 1.76]), and the comparison item ( $p < .001$ , 95% difference CI [1.04, 1.88]); neither age ( $p = .09$ ), sex ( $p = .23$ ), nor ethnicity ( $p = .17$ ) had a meaningful effect. Demographic results are consistent across all studies and are not discussed further.

These findings provide initial support for the hypothesis that people spontaneously described their past selves as emotional and their future selves as rational. These patterns emerged in a design that largely avoided demand, both for writers who were not given specific instructions or timeframes for describing their other selves, and for raters who were blind to the past–future variable and writer details. Study 1b extended these findings utilizing a different population, new methods and measures, and a specified point in time.

## Study 1b: Discrete Perceptions

### Method.

**Participants.** In individual sessions, 194 people (58.2% women; 46.9% White;  $M_{\text{age}} = 21.38$ ,  $SD_{\text{age}} = 4.12$ ) were recruited across public campus areas to complete a block of unrelated surveys in exchange for a school-logo pen. Embedded in the block was a short task in which participants were asked to reflect on changes in themselves over time.

**Procedure.** Participants were randomly assigned into a 2 (time: past self or future self)  $\times$  2 (mind DV: rate emotionality or rate rationality) between-subjects design. They were asked, “Think about your “past self” (“future self”), the type of person you used to be about one year ago (will be in about one year). What traits and characteristics come to mind?” Below, they were asked to specifically rate this other self on one dimension in particular: either emotionality ( $-3 = \text{much less emotional than me today}$ , to  $+3 = \text{much more emotional than me today}$ ) or rationality ( $-3 = \text{much less rational than me today}$ , to  $+3 = \text{much more rational than me today}$ ). Given space constraints, no definitions were provided for either term, contrary to Study 1a; participants freely interpreted the item.

**Results and discussion.** Responses were rescaled from 1 to 7. Data were submitted to a univariate MANOVA, with Time and Mind as fixed factors and rating as the dependent variable.

There was no effect of mind ( $p = .30$ ), and an incidental effect of time such that future selves were ascribed more “mind” overall ( $M = 4.33$ ) than past selves ( $M = 4.01$ ),  $F(1, 190) = 3.46$ ,  $p = .064$ ,  $\eta^2 = .02$ . Critically, this effect was qualified by a predicted interaction with mind,  $F(1, 190) = 27.00$ ,  $p < .001$ ,  $\eta^2 = .12$  (see Figure 1). Past selves were perceived as more emotional ( $M = 4.56$ ,  $SD = 1.23$ ) than future selves ( $M = 3.96$ ,  $SD = 1.25$ ),  $F(1, 190) = 5.65$ ,  $p = .018$ ,  $\eta^2 = .03$ . However, future selves were perceived as more rational ( $M = 4.71$ ,  $SD = 1.24$ ) than past selves ( $M = 3.44$ ,  $SD = 1.29$ ),  $F(1, 190) = 24.72$ ,  $p < .001$ ,  $\eta^2 = .11$ . Comparing the dimensions *within* each condition is also informative: Past selves were dominated emotions,  $F(1, 190) = 19.67$ ,  $p < .001$ ,  $\eta^2 = .09$ , whereas future selves were dominated by rationality,  $F(1, 190) = 8.61$ ,  $p = .004$ ,  $\eta^2 = .04$ .

These findings further support the hypothesis: Past selves were characterized by emotionality, whereas equidistant future selves were characterized by rationality. Of note, this design was fully between-subjects, with participants rating *either* emotionality or rationality. This feature helps rule out the possibility that participants give asymmetric ratings simply because the comparison between the two dimensions is made salient.

The next study extended these findings by assessing more diverse measures. Participants read actual scenarios related to emotionality and rationality and reported how their past or future



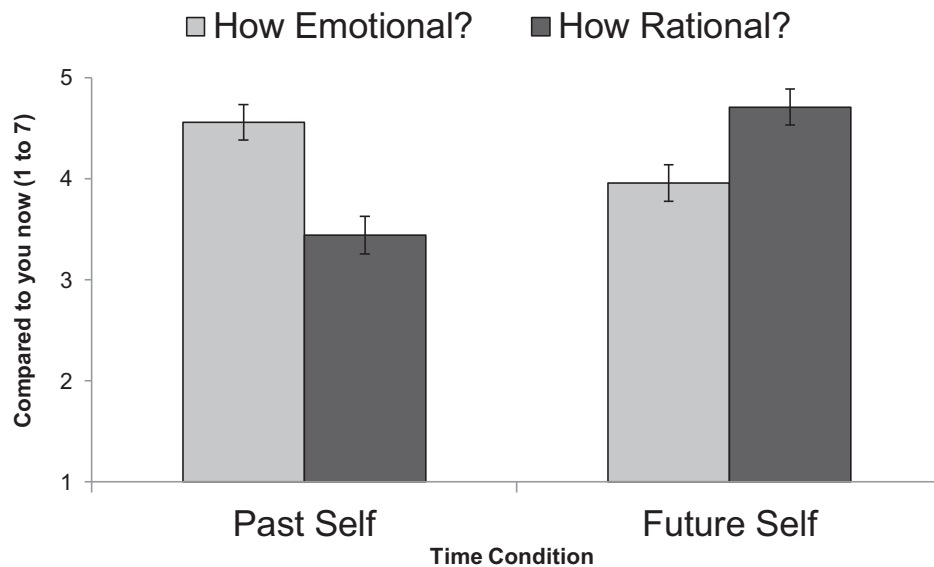


Figure 1. Results of Study 1b. Mean perceptions of emotionality and rationality within the minds of past and future selves, about one year in the distance. Error bars  $\pm 1$  SEM.

self would respond. This allowed for a richer assessment, and tapped into more tangible aspects of perceiving mind (rational dimension: *self-control, acting morally, planning, communication, memory, and thought*; emotional dimension: *feeling pain, pleasure, desire, fear, rage, and joy*; see H. M. Gray et al., 2007; K. Gray, et al. 2012). In addition, participants rated full scales of emotionality and rationality. These changes help confirm that the patterns observed so far are not driven by a specific measure or phrasing.

### Study 1c: Diverse Measures

#### Method.

**Participants.** Eighty people (55% women; 77.5% White;  $M_{\text{age}} = 29.79$ ,  $SD_{\text{age}} = 11.27$ ) were recruited to complete an online survey for \$0.15 via Amazon's Mechanical Turk.

**Procedure.** In a between-subjects design, participants were randomly assigned to think about the person they "used to be one year ago" (*past* condition) or the person they will be "in one year" (*future* condition). Dependent variables were broken into two parts (see Appendix). In one part, participants read six emotion-related scenarios and six rational-related scenarios, designed to map onto distinct domains of mind perception (e.g., one's capacities to feel pain). For each, participants estimated how intensely their past or future self would react (e.g., "You get stung by a bee and feel pain. How much pain would your past self have felt? [would your future self feel?]), from 1 (*not much*) to 7 (*a lot*). In the other part, participants assessed their past or future selves on five global measures of emotionality and five global measures of rationality (e.g., "In general, how emotional was your past self? [will your future self be?]), from 1 (*not at all*) to 7 (*very*). Measures were randomized in one of two orders. Finally, all participants rated two manipulation checks: "Did you think about your past or future?" and "How many years into the distance were you asked to think

about?" Two participants incorrectly answered the "distance" check. Excluding them does not meaningfully affect the results, so the full sample was retained.

**Results and discussion.** The emotion-related scenarios ( $\alpha = .71$ ), global emotionality measures ( $\alpha = .75$ ), rational-related scenarios ( $\alpha = .72$ ), and global rationality measures ( $\alpha = .79$ ) were each collapsed into scales. Data were submitted to repeated measures MANOVA analyses with time as the between-subjects factor and the four scales as within-subject variables.

There was no effect of time ( $p = .42$ ), and an incidental effect of scale such that rationality scales were rated more highly ( $M = 5.18$ ) than emotionality scales ( $M = 4.55$ ),  $F(3, 76) = 9.94$ ,  $p < .001$ ,  $\eta^2 = .28$ . Importantly, this effect was qualified by a predicted interaction with time,  $F(3, 76) = 10.81$ ,  $p < .001$ ,  $\eta^2 = .30$ . For scenario items, past selves were perceived as reacting with more emotion ( $M = 4.90$ ,  $SD = .91$ ) than future selves ( $M = 4.44$ ,  $SD = .96$ ),  $F(1, 78) = 4.74$ ,  $p = .032$ ,  $\eta^2 = .06$ , but future selves were perceived as exhibiting more rationality ( $M = 5.43$ ,  $SD = .84$ ) than past selves ( $M = 4.84$ ,  $SD = .89$ ),  $F(1, 78) = 9.10$ ,  $p = .003$ ,  $\eta^2 = .10$ . Likewise, for global measures, past selves were rated as more emotional ( $M = 4.72$ ,  $SD = 1.03$ ) than future selves ( $M = 4.21$ ,  $SD = .91$ ),  $F(1, 78) = 5.47$ ,  $p = .022$ ,  $\eta^2 = .07$ , but future selves were rated as more rational ( $M = 5.58$ ,  $SD = .86$ ) than past selves ( $M = 4.74$ ,  $SD = .89$ ),  $F(1, 78) = 17.90$ ,  $p < .001$ ,  $\eta^2 = .19$ .

These findings replicate the basic effect. The same pattern of "emotional pasts" and "rational futures" emerged when people made explicit ratings on diverse measures.

### Study 2: Past and Future Friends

The first three studies establish converging support for the hypothesis: Past selves are viewed in emotional terms, but future selves are viewed in rational terms. The next study extended this

effect via another design, and also provided evidence for mechanism.

It is proposed that these patterns are (largely) driven by optimistic perceptions of self-improvement: Given that people believe they are changing for the better over time (e.g., Higgins, 1987; Taylor & Brown, 1988; Wilson & Ross, 2001), and that rationality is stereotypically viewed as the better dimension (e.g., Haidt, 2001), then people should perceive their past and future minds accordingly. If this rationale is correct, the effect should *not* extend to the perception of others. People are motivated to believe their own futures will be bright, but not that other people's futures will be (Chambers & Windschitl, 2004; Schacter & Addis, 2007; Sharot, 2012; Weinstein, 1980). If the effect is grounded in a similar self-improvement motive, then the *self* should seem to be moving away from emotionality and toward rationality, but a *friend* may be placed on a different trajectory.

Such a distinction would also rule out alternate explanations about tense itself. The act of thinking about the future can differ from the act of thinking about the past in important ways (e.g., the same event can feel more hypothetical, closer to the present, and induce more arousal when imagined in the future vs. past; Caruso, Van Boven, Chin, & Ward, 2013; Pronin & Ross, 2006; Trope & Liberman, 2010; Van Boven & Ashworth, 2007). Moreover, our other selves are necessarily younger or older than us today, and they lived or will live in different state of the world. These phenomenological differences might drive the effect for any number of reasons. For example, perhaps our future selves seem more rational because we become more analytic when engaged in a future-oriented mind-set, or because we assume certain technologies will be developed that make it easier to behave rationally. Critically, such explanations predict that people should rate other targets in the same way as they rate themselves; regardless of thinking about the self or a friend, all of these distinctions remain constant so long as the same point in time is brought to mind. However, if “emotional pasts” and “rational futures” are driven by something about one's own change over time—that is, motivated beliefs about self-progress—the patterns should emerge only when thinking about changes in the self.

## Method

**Participants.** Two hundred two people (56.9% women; 75.7% White;  $M_{\text{age}} = 32.43$ ,  $SD_{\text{age}} = 11.54$ ) completed an online survey for \$0.10 via Amazon's Mechanical Turk.

**Procedure.** In a mixed measures design, participants completed a survey about how people change over time. They were randomly assigned to compare “(themselves) about one year ago” to “(themselves) about one year from now” (*self* condition), or to type the initials of a good friend whom they knew much about and to compare “(this friend) about one year ago” to “(this friend) about one year from now” (*other* condition). Then they made two judgments about the target's trajectory in counterbalanced order: their change in emotionality and change in rationality. Definitions were provided for each term similar to Study 1a. For each judgment, participants were given three forced-choice options from which to pick the most accurate answer: If the target's emotionality and rationality will *increase*, *decrease*, or *stay the same* over the given time period. In addition to the main contribution of this study (the self–friend manipulation), this forced-choice assessment

of the basic effect complements the writing measure and scale-based measures used so far.

## Results and Discussion

The main analytical goal is to compare differences in frequency: whether people choose a given trajectory at a different rate when judging emotionality versus rationality, and further, whether these differences vary when judging the self versus a friend. To do so, a multinomial cumulative logit regression model was created via GEE. Condition (self, friend), dimension (emotionality, rationality), and the Condition  $\times$  Dimension interaction term were entered as predictors. Choice (increase, decrease, or stay the same) was entered as the dependent variable. Finally, participant was entered as a repeated subject variable to account for idiosyncratic effects in choosing tendencies within self–friend conditions.

As in Study 1a, this model allows for a traditional interpretation of main effects and interactions, while controlling for within-subject variation in making multiple choices.

There was an incidental effect of condition ( $B = .57$ ,  $p = .02$ , Wald = 5.39) such that participants were more likely to see themselves as changing in general (i.e., as either increasing or decreasing) compared with their friends. There was also an incidental effect of dimension ( $B = -.89$ ,  $p < .001$ , Wald = 14.66) such that rationality was viewed as more likely to change (and, specifically, increase) than emotionality. Critically, these effects were qualified by a predicted interaction ( $B = 1.03$ ,  $p = .007$ , Wald = 7.33). In other words, the self is not perceived as changing in all directions, and rationality does not seem to increase for everyone; rather, changes occur in particular ways for particular targets.

Accordingly, the particular patterns of change are consistent with the hypothesis (see Figure 2). To statistically compare these differences within conditions, individual multinomial logistic regressions were conducted. A stepwise Holm-Bonferroni correction was used to account for multiple comparisons (see Abdi, 2010;

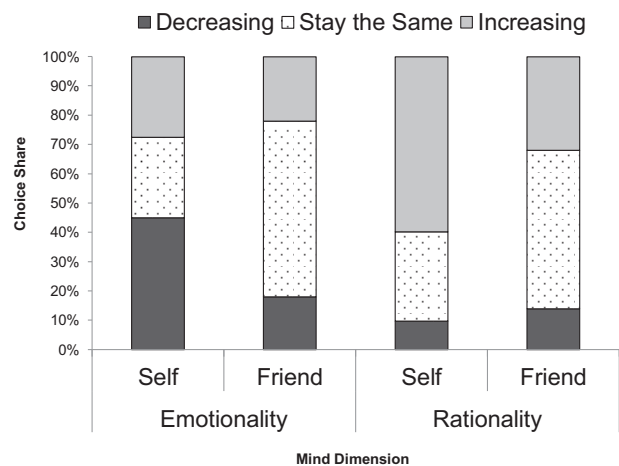


Figure 2. Results of Study 2. Percentage of participants in each condition who chose either “decreasing,” “stay the same,” or “increasing” regarding the change in emotions and rationality across a 2-year period within themselves or within a friend.

Holm, 1979); the reported  $p$  values reported maintain significance at the .05 level according to this procedure.

In perceiving emotional change, most participants thought their own emotionality will decrease (45.1%)—significantly more than those who thought that it will increase (27.5%) or stay the same (27.5%):  $B = .50$ ,  $p = .038$ , Wald = 4.29. Conversely, most participants thought their friend's emotionality will stay the same (60.0%)—significantly more than those who thought that it will decrease (18.0%:  $B = -1.20$ ,  $p < .001$ , Wald = 20.07) or increase (22.0%:  $B = -1.00$ ,  $p < .001$ , Wald = 16.20). Hence, most participants perceived their own emotionality as declining over time, but perceived the emotionality of a friend as remaining constant across the same period.

As predicted, the opposite effect emerged in perceiving rational change. Most participants thought their own rationality will increase (59.8%)—significantly more than those who thought that it will decrease (9.8%:  $B = 1.81$ ,  $p < .001$ , Wald = 28.09) or stay the same (30.4%:  $B = .68$ ,  $p = .002$ , Wald = 9.42). Conversely, most participants thought their friend's rationality will stay the same (54.0%)—significantly more than those who thought that it will increase (32.0%:  $B = -.52$ ,  $p = .019$ , Wald = 5.50) or decrease (14.0%:  $B = -1.35$ ,  $p < .001$ , Wald = 20.26). Hence, most participants perceived a friend's rationality as staying constant over time, but perceived their own as proliferating.

These findings extend Study 1 in important ways. First, they replicate the basic pattern of “emotional pasts” and “rational futures” using a different design and dependent measure: Participants explicitly predicted change via forced choice. Second, they reveal a critical moderator. The patterns emerge only when evaluating self-change and not when evaluating a friend's trajectory across the same period. In fact, most people thought that others' capacities will essentially remain unchanged. This observation suggests the effect (at least partly) reflects an optimism-based perception of self-improvement, as proposed.

### Summary: Studies 1 and 2

Studies 1 and 2 directly assessed how people construct the minds of past and future selves. Across student and nonstudent samples, different time frames, and open-ended and forced-rating measures, the same effect emerged: Participants saw more emotionality and less rationality in past selves, but equidistant future selves were viewed in opposite ways. This converging evidence supports the hypothesis. Further, Study 2 showed that the patterns do not merely reflect a more general belief that the past is emotional and future is rational, but specifically that one's *self* is changing along this trajectory.

The next studies mark a departure from Studies 1 and 2 in the types of methods and approach employed. Specifically, Studies 3 and 4 go beyond direct reports of past and future capacities and explore downstream implications for how bringing to mind past or future selves may influence one's preferences (Study 3) and behaviors (Study 4) in the present.

### Study 3: Preferences for Emotional Versus Intellectual Enrichment

If past selves are viewed as emotional experiencers, then inducing people to feel connected and similar to their pasts (“What

would my past self do?”) should lead them to seek emotional enrichment (i.e., make more emotional choices and prefer feeling-related content). By the same logic, inducing people to feel connected and similar to their futures (“What would my future self do?”) should lead them to seek intellectual enrichment (i.e., make more rational choices and prefer thinking-related content). Study 3 tested these possibilities. In doing so, this study sought to use the mind perception of self as a novel framework for understanding and predicting differences in real-time choice.

### Method

**Participants.** In individual sessions, 190 undergraduates (50.5% women; 66.8% White;  $M_{\text{age}} = 19.47$ ,  $SD_{\text{age}} = 1.73$ ) completed the study for course credit.

**Procedure.** In a between-subjects design, participants completed a study ostensibly about role-playing and imagination. They were randomly assigned to *past*, *present* (control), or *future* conditions. To begin the study, “past” participants were told to think about the type of person they were from about a year ago, and “future” participants were told to think about the type of person they will be about a year from now. They were asked to reflect on this other self and spend a minute forming a mental image of this person with their eyes closed. Importantly, at no point were participants given any specific details or boundaries, in order to prevent demand (e.g., “reflect on how you used to *feel* or *think*”); they were armed only with their freely generated images of their past self or future self.

Next, participants were asked to “role-play” as this past or future self and perform subsequent tasks as if this other self had come into the lab. This role-playing design was adapted directly from established work on how people think about themselves over time (e.g., O'Brien, 2015; Pronin & Ross, 2006). Because participants are never instructed how to act or what to specifically imagine in their other selves, their behavioral responses serve as a manifest proxy for their perceptions of mind. For the actual role playing task, participants were shown a list of movies and were asked to choose which ones they prefer.

Movie materials were adapted from prior work on preferences for “should” versus “want” entertainment content (Williams & LeBoeuf, 2014). The list was divided between 10 prototypical “thinking” movies that had been released on DVD during the preceding few years, and 10 similar “feeling” movies. “Thinking” movies were defined as follows:

These types of movies are typically serious, thoughtful, and intellectual, like documentaries, art films, and foreign films. They may not be a rollicking good time, but they provide enrichment and intellectual stimulation. In short: people tend to watch these movies for more rational reasons.

Examples included *The Reader*, *Milk*, and *Doubt*. Conversely, “feeling” movies were defined as follows:

These types of movies are typically fun, funny, or frivolous, like a comedy, romance, or action flick. They are very enjoyable to watch in the moment, but are somewhat forgettable after the fact. In short: people tend to watch these movies for more emotional reasons.

Examples included *Star Trek*, *The Hangover*, and *Duplicity*. A picture of the cover art and a brief plot description were provided

for each movie. Participants were explicitly told that both categories of movies should be viewed as equally valuable and desirable, but were simply meant for different types of occasions. Thus, the paradigm was meant to signify a trade-off between intellectual enrichment versus emotional enrichment.

Participants were then asked, “Assuming you had enough free time right now, which type of movie would you choose?” and chose either the “thinking” or “feeling” category. It was also made clear that their choice was not limited to the movies indicated on the list, and that the list was simply meant to provide possible examples. Afterward, “past” and “future” participants rated how difficult it was to role-play as their other self (1 = *not at all*, to 7 = *very*), how difficult it was to imagine their other self (1 = *not at all*, to 7 = *very*), and how far away their other self feels from the current moment (1 = *not very far*, to 7 = *very far*). These measures served to account for relevant differences caused by the manipulation beyond rationality and emotionality.

## Results and Discussion

Data were submitted to binary logistic regression analyses, with condition as the predictor variable (“past,” “present,” or “future”) and movie choice (“thinking” or “feeling”) as the dependent variable.

In terms of the control group, participants generally preferred “feeling” movies (68.9%) to “thinking” movies (31.1%). Shifts in these figures based on the past–future manipulation mark the relevant points of comparison, rather than comparing against chance. As expected, there was an overall effect of condition,  $B = -.86$ ,  $p < .001$ , Wald = 17.66. In line with the hypothesis, role-playing as one’s future self diminished the default preference, with about a 20% shift in preference away from emotional enrichment and toward intellectual enrichment (feeling = 46.9%; thinking = 53.1%),  $B = -.92$ ,  $p = .014$ , Wald = 6.06. Conversely, role-playing as one’s past self enhanced it, with about a 14% shift in preference toward emotional enrichment and away from intellectual enrichment (feeling = 83.1%; thinking = 16.9%),  $B = .80$ ,  $p = .064$ , Wald = 3.43. Not surprisingly, then, difference in preference between past and future conditions was highly significant,  $B = -1.72$ ,  $p < .001$ , Wald = 17.11.

Finally, for control variables, “past” and “future” participants did not differ by difficulty in role-playing ( $M_{\text{past}} = 3.02$ ,  $M_{\text{future}} = 3.08$ ;  $p = .83$ ), difficulty in imagination ( $M_{\text{past}} = 2.94$ ,  $M_{\text{future}} = 3.14$ ;  $p = .47$ ), or subjective distance ( $M_{\text{past}} = 3.43$ ,  $M_{\text{future}} = 3.11$ ;  $p = .28$ ). The difference between past–future conditions in movie choice remained when entering these variables as covariates in the model,  $B = -1.83$ ,  $p < .001$ , Wald = 17.65.

These results highlight downstream consequences of Studies 1 and 2 for changing real-time preferences. Because past selves seem to have stronger emotional capacities, people who are induced to act like their past selves come to prefer emotional, feeling-based content more than they normally would. Conversely, bringing to mind to rational future selves makes people seek rational, thinking-based content more than otherwise.

## Study 4: To Complete or Quit a Task

The final study explored another potential consequence of people’s associations for “emotional pasts” and “rational futures,” here in terms of a more behavioral outcome.

One effective source of motivation to complete a given task comes from trying to assimilate with positive role models: People

often bring to mind the positive attributes of others as a standard from which to emulate what to do, gauge how much energy to exert, and determine the ideal course of action (Aspinwall, 1997; Lockwood, Jordan, & Kunda, 2002; Taylor & Lobel, 1989; Wood, 1989). In Study 4, this logic was applied to the self over time. In line with the hypothesis, using one’s past self as an assimilative role model should facilitate behavior in some tasks (i.e., emotional ones, whereby the goal is to feel or enjoy) but not others (i.e., rational ones, whereby the goal is to reason or exert self-control). However, the opposite should occur when using one’s future self as a guide.

## Method

**Participants.** Two hundred twenty-four people (57.1% women; 79.0% White;  $M_{\text{age}} = 34.09$ ,  $SD_{\text{age}} = 10.58$ ) completed an online task for \$1.00 via Amazon’s Mechanical Turk.

**Procedure.** Participants were randomly assigned into a 2 (task: fun or self-control)  $\times$  2 (role model: past or future self) between-subjects design in a study about motivation. For the main part, all participants completed a slideshow task. Participants were told they would view a series of nature photos one by one, and all saw the same photos in the same order. Under each, they were given a choice to “Show me another one!” or “End this slideshow task; move me to the rest of the survey.” It was made clear that participants could go as long as they wished without affecting payment. They were unaware of a ceiling, but the slideshow was capped at 10 before ending automatically (even if they clicked “Show me another one!” at the 10th photo). There were five wildlife photos and five still-life photos.

**Task manipulation.** The purpose of the task, however, varied across participants (see Table 1). Some participants thought the task was about enjoyment (*fun* condition). Specifically, they were instructed: “This task is somewhat boring, but it is designed to assess your capacity for emotionality (i.e., feelings and enjoyment; being reactive). The more photos you choose to click through, the higher your ‘fun’ score.” They were asked to simply look at each photo (e.g., “Look at the stripes on this tiger!”). Under each photo was a text box in which they were instructed to type “ok” after they had “sufficiently enjoyed” it, and under the text box was the choice (i.e., to see another photo or to end the slideshow). The target measure was how many photos participants clicked through before opting out of the slideshow. Other participants thought the task was about critical thinking (*self-control* condition). They were instructed: “This task is somewhat boring, but it is designed to assess your capacity for rationality (i.e., concentration and thinking skills; being proactive). The more photos you choose to click through, the higher your ‘self-control’ score.” They were asked to make a difficult calculation about the contents in the photo (e.g., “How many stripes do you see on this tiger?”). Under the photo was a text box in which they were instructed to type their actual answer, and under the text box was the choice. Again, the target measure was how many photos they viewed before choosing to move on. Otherwise, the actual slideshow was identical for all participants.

**Role model manipulation.** Critically, before knowing about or completing the slideshow task, participants completed the very first part of the study. They were asked to reflect on the positive attributes of either their “past self: who you recall being over the



Table 1  
Materials Used in Study 4

| Photo description                          | Category   | Source                            | Fun task   | Self-control task  |
|--|------------|-----------------------------------|--|--|
| 1. A group of boats parked on the beach    | Still life | http://tinyurl.com/study4-photo1  | "Look at the boats on this beach!"                   | "How many boats do you see on this beach?"                   |
| 2. Fish swimming in the ocean              | Wildlife   | http://tinyurl.com/study4-photo2  | "Look at the different types of fish in this ocean!" | "How many different types of fish do you see in this ocean?" |
| 3. Sun shining through trees in the forest | Still life | http://tinyurl.com/study4-photo3  | "Look at the trees in this forest!"                  | "How many trees do you see in this forest?"                  |
| 4. A tiger laying in the leaves            | Wildlife   | http://tinyurl.com/study4-photo4  | "Look at the stripes on this tiger!"                 | "How many stripes do you see on this tiger?"                 |
| 5. A vase filled with colored tulips       | Still life | http://tinyurl.com/study4-photo5  | "Look at the different colors in this photo!"        | "How many different colors are in this photo?"               |
| 6. A group of ladybugs on a rock           | Wildlife   | http://tinyurl.com/study4-photo6  | "Look at all the black dots on these ladybugs!"      | "How many total black dots on these ladybugs are there?"     |
| 7. Houses on an Italian cliff              | Still life | http://tinyurl.com/study4-photo7  | "Look at all the distinct houses!"                   | "How many distinct houses do you see?"                       |
| 8. A group of penguins in the snow         | Wildlife   | http://tinyurl.com/study4-photo8  | "Look at how many penguins are in this photo!"       | "How many penguins are in this photo?"                       |
| 9. Dewdrops on a green leaf                | Still life | http://tinyurl.com/study4-photo9  | "Look at the many dewdrops on this leaf!"            | "How many dewdrops are on this leaf?"                        |
| 10. A butterfly perched on a flower        | Wildlife   | http://tinyurl.com/study4-photo10 | "Look at all the white dots on this butterfly!"      | "How many white dots are on this butterfly?"                 |

Note. All participants were presented with the following photos, one by one in the order given in the table. The task for each photo varied across condition.

last few years," or their "future self: who you imagine being over the next few years." To get into the mind-set, they were asked to write open-ended responses to this prompt:

What do you think are the benefits to feeling connected to your future (past)? When might it actually be good for you to "act like" your future self (past self)? If you brought to mind your future self (past self) as a role model for motivating yourself today, in what types of tasks would that help? What, exactly, is your future self (past self) good at?"

After writing, participants were instructed to keep this other self in mind as a guide in performing subsequent tasks in the study (e.g., "Think about what she would motivate you to do, for better or for worse"). At that point, participants were informed about the slideshow task and completed it as described.

Finally, at the end of the entire study, participants rated how difficult it was to imagine their other self (1 = *very easy to imagine*, to 7 = *very difficult to imagine*), the detail level of the mental image of their other self (1 = *not at all detailed*, to 7 = *very detailed*), and how far away their other self seemed (1 = *they feel very close to me now*, to 7 = *they feel very far from me now*). As in Study 3, these measures served to account for potential differences caused by the manipulations beyond their intended effects.

Results and Discussion

One participant reported confusion because the photos did not load properly. Excluding this participant does not meaningfully affect the results, so the entire sample was retained. Data were submitted to a univariate MANOVA, with Task and Role Model as fixed factors. Number of trials completed before quitting was the dependent variable.

There was no effect of role model ( $p = .43$ ), and an incidental effect of task such that participants completed more "fun" tasks ( $M = 5.92$ ) than "self-control" tasks ( $M = 4.06$ ),  $F(1, 220) = 19.91, p < .001, \eta^2 = .08$ . Importantly, this effect was qualified by a predicted interaction with role model,  $F(1, 220) = 12.45, p < .001, \eta^2 = .05$  (see Figure 3). For the fun version of the task, participants motivated by their past self completed more trials

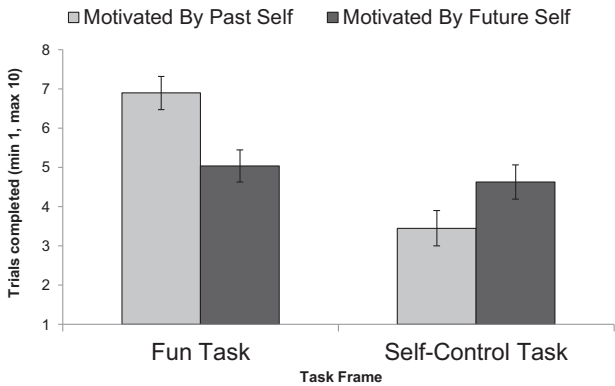


Figure 3. Results of Study 4. Mean number of photo trials completed by participants across conditions before opting to end the slideshow altogether. Error bars  $\pm 1$  SEM.

( $M = 6.90$ ,  $SD = 3.57$ ) than did participants motivated by their future self ( $M = 5.03$ ,  $SD = 3.43$ ),  $F(1, 220) = 9.95$ ,  $p = .002$ ,  $\eta^2 = .04$ . However, for the self-control version of the task, future-motivated participants ( $M = 4.63$ ,  $SD = 2.97$ ) completed more trials than past-motivated participants ( $M = 3.45$ ,  $SD = 2.74$ ),  $F(1, 220) = 3.52$ ,  $p = .06$ ,  $\eta^2 = .016$ .

Finally, for control variables, “past” versus “future” participants did not differ by level of detail ( $M_{\text{past}} = 5.31$ ,  $M_{\text{future}} = 5.25$ ;  $p = .75$ ), difficulty in imagination ( $M_{\text{past}} = 2.88$ ,  $M_{\text{future}} = 2.80$ ;  $p = .77$ ), or subjective distance ( $M_{\text{past}} = 4.10$ ,  $M_{\text{future}} = 4.16$ ;  $p = .78$ ). There were effects of task, however, such that “self-control” participants felt their other selves were harder to imagine ( $M = 3.13$ ) than “fun” participants ( $M = 2.56$ ),  $F(1, 220) = 5.63$ ,  $p = .018$ ,  $\eta^2 = .02$ , and farther away ( $M = 4.47$ ) than “fun” participants ( $M = 3.79$ ),  $F(1, 220) = 8.93$ ,  $p = .003$ ,  $\eta^2 = .04$  (detail ratings did not differ,  $M_{\text{selfcontrol}} = 5.02$ ,  $M_{\text{fun}} = 5.35$ ;  $p = .48$ ). Importantly, when entering these items as covariates in the model, all results were essentially identical: The critical interaction remained significant,  $F(1, 217) = 11.45$ ,  $p = .001$ ,  $\eta^2 = .05$ , as did the reported contrasts for the fun task,  $F(1, 217) = 8.98$ ,  $p = .003$ ,  $\eta^2 = .04$ , and for the self-control task,  $F(1, 217) = 3.35$ ,  $p = .068$ ,  $\eta^2 = .015$ .

These results further support the hypothesis while also highlighting downstream consequences. Bringing to mind one’s future self improved performance on a rational-related task (i.e., people earned a higher “self-control score”). But this did not universally help. Rather, when the same task allegedly assessed emotionality, people who brought to mind their past selves actually outperformed future-motivated people (i.e., they earned a higher “fun score”). These findings show that people’s associations for “emotional pasts” versus “rational futures” have differential consequences for influencing behavior in the present, in accord with the perceived mind of the “self” by whom we guide our actions.

## General Discussion

Many people spend many moments mentally traveling through time, journeying beyond immediate experience to retrace what once was and entertain what might be. Six studies revealed that the type of person awaiting our arrival depends on which direction we embarked. When thinking about their pasts, people see someone who is more capable of emotionality and less capable of rationality. But when thinking about an equidistant future, people see someone who is more capable of acting rationally and less emotional.

## Theoretical Insights

These findings make two central contributions. First, at the conceptual level, they extend the mind perception literature—which to date has focused on how people perceive others’ mental capacities across space—to how people perceive their own minds in time. Mapping out what our past and future selves more broadly “look like” affords a unique perspective on more traditional intertemporal frameworks. Take, for instance, the classic discounting dilemma between smaller rewards now versus larger rewards at a later date, whereby many people exhibit present bias. An impressive body of work explores various facets of this tendency, in particular how the process is affected by features of the future date

itself (e.g., if the date is described concretely, people exhibit less present bias; Peters & Büchel, 2010; Trope & Liberman, 2000), features of the reward (e.g., future rewards seem less vivid and are assigned less subjective value; Kable & Glimcher, 2007; Kassam, Gilbert, Boston, & Wilson, 2008), and features of the judgment context (e.g., visceral drives; Loewenstein, 1996). But this dense literature has mostly overlooked the fact that part of our vision of a future event includes the self who actually experiences it. To the extent that our other selves are perceived as having a different kind of *mind* than ours today (regardless of how clearly one can envision this self; e.g., Hershfield et al., 2011), then features of the perceived “actor” in distant experiences may also play a critical role.

For example, one reason why people discount future rewards might be because the rewards seem less applicable to the person who actually gets to cash in; a few extra dollars next year may not matter to the future self if we think she can easily find success and reap benefits elsewhere. Similarly, people may prefer instant (but worse) payoffs because they rest on the perception that their future selves are better equipped to handle the cost (“I’ll just take the money now, and my rational future self will figure it out”). These possibilities suggest that a novel debiasing strategy in delay discounting could be to change how people perceive their *trajectory of mind*, over and above the features of the event, the reward, or the judgment context. Appreciating that one’s rationality might not necessarily be greater next year, for example, could lead people to save more on behalf of a future self who seems just as in need of rewards and resources as one’s current self.

## Practical Implications

The second contribution is at the practical level. These findings reveal broader labels for what “worse” and “better” actually mean in terms of self-improvement: Our belief in becoming better over time specifically means becoming more rational people. This observation provides a parsimonious framework that integrates many individual findings on domain-specific optimism and achievement (e.g., “Last year I failed at math, but next year I’ll pass”; Buehler, Griffin, & Ross, 2002; Chambers & Windschitl, 2004; M. Ross & Newby-Clark, 1998; Weinstein, 1980). Such studies have concluded the future seems bigger and brighter than the past, but a closer look reveals a near-exclusive focus on rational-related domains. People think their futures will be “more”—to the extent they predict having more mastery (Taylor, 1983), willpower (Helzer & Gilovich, 2012), and autonomy (Ryff, 1991), and more drive and purpose (Albert, 1977; Pavot, Diener, & Suh, 1998; Sedikides & Hepper, 2009). Even one of the most influential frameworks, Wilson and Ross’s (2001) temporal self-appraisal theory, posits that people view their “positive traits” as rising over time—but nearly all the traits included in these studies are rational (e.g., independence, self-reliance, seriousness about school, self-motivation). The current article provides a more nuanced interpretation. Perceptions of one’s past and future are not more or less in general, but sensitive to the perceived parameters of past and future *minds*.

Studies 3 and 4 revealed how this nuance informs present behavior, in important and asymmetric ways. On the one hand, rational-related pursuits (e.g., to fight pain, stick to a plan, resist temptation; to seek intellectual enrichment) may be boosted by

encouraging connection with the future ("How would my future self react?"). Indeed, bringing to mind future selves facilitated intellectual choices and self-control behavior. This is consistent with many recent studies that emphasize the value of the future self: Feeling close to the future has been widely touted as an effective means of enhancing health, wealth, and decision making (e.g., Bartels & Rips, 2010; Bartels & Urminsky, 2011; Hershfield et al., 2011; Monroe, Ainsworth, Baumeister, & Vohs, 2014; Taylor & Gollwitzer, 1995; van Gelder, Hershfield, & Nordgren, 2014). On the other hand, *emotion-related* pursuits (e.g., to savor a vacation, meal, leisure; to seek emotional enrichment) may actually be boosted by encouraging connection with one's past ("How would my past self react?"); bringing to mind past selves facilitated emotional choices and enjoyment-related behavior. This insight—and Study 4 in particular—is not predicted by the extant literature, which, by default, would assume that feeling connected to one's future should improve performance on *any* task in the present (and certainly not undermine it). That it does not reveals the need for a better understanding of the potential costs of the future self versus potential benefits of the past self. Given the prevalence of goal pursuit failures, for self-control (Baumeister, Heatherton, & Tice, 1994; Fishbach & Ferguson, 2007) as well as savoring (Schooler, Ariely, & Loewenstein, 2003), exploring the trade-offs of past versus future connection may afford a novel solution. The current findings suggest that goal-directed choices and behavior may be facilitated by employing a "fit" between the task at hand and one's temporal orientation, and not by relying on a future-oriented motivation alone.

## Future Directions

An asymmetry between "emotional pasts" versus "rational futures" invites many valuable avenues for follow-up work. In terms of individual differences, naturally past-oriented people could be more in touch with their emotional side, but naturally future-oriented people could be more in touch with their rational side (Zimbardo & Boyd, 1999). In addition, there may be important boundaries to the patterns like negative mood (e.g., people who are depressed perceive their futures much differently than others; Alloy & Ahrens, 1987), bringing to mind conditions that violate the patterns (e.g., a 70-year-old who imagines future cognitive impairment would likely not predict he will be more rational: Okun, Dittburner, & Huff, 2006), or if people have reason to believe that they have or have not changed over time (M. Ross, 1989). Other work should continue to test problematic implications. For example, a student who believes in a rational tomorrow may be *more* inclined to procrastinate today, assuming her future self is better able to do the work. In a converse way, this perception may blind people to past decisions they would prefer to not repeat: A struggling dieter could have failed an exercise plan because of a poor trainer or book, but may blame their past emotional mind and return to the same unhelpful advice.

Other avenues could more finely test alternate accounts of the observed effect. For example, one might argue that the stark distinction between emotions and rationality as presented here is overly simplistic. This dual-process approach has faced a number of critiques, not least because the functions of each dimension are known to dynamically influence one another (Evans, 2008; Evans & Stanovich, 2013; Keren & Schul, 2009; Osman, 2004; Scherer, 2011). To this point, the current article was designed to tap into people's general

beliefs about the dimensions rather than their objective functionalities. On few occasions were participants forced to make a choice between the two (i.e., they could have just as easily given high or low ratings to both), but the predicted asymmetry still emerged. And participants in Study 1b were not provided any comparison point and the effect remained. Nonetheless, future work could fruitfully expand the mappings of past and future minds to include more diverse traits, characteristics, and capacities.

Finally, more research is needed to further examine underlying mechanisms. Although Study 2 demonstrated that the patterns are indeed specific to thinking about the self, more studies could shed light on the extent to which this result actually reflects a self-improvement motive. For example, if the patterns are rooted in the belief that one's future will be better—in this case, more rational—then inducing people to value their emotions more highly (or devalue their rationality) should attenuate the effect. Moreover, the patterns may look different when judging more diverse types of "others," or among cultures in which rationality is not viewed as better than emotionality. Nonetheless, the current studies do rule out a number of other candidates. For example, people's ratings could simply be correct, if they thought of an objectively more emotional past life stage (e.g., adolescence) and more rational future life stage (e.g., working adulthood: Damon & Eisenberg, 1998). This account, however, does not fit the current studies, which find the patterns among participants of older age groups and using short time frames (e.g., people in their mid-30s who thought about only 1 or 2 years across time). Another possible explanation might reflect other or more general phenomenological asymmetries between thinking about past versus future moments, or broader beliefs about external change in the world (see Van Boven, Kane, & McGraw, 2009). Again, however, the current research sought to account for many of these possible differences (e.g., perceived distance from the present; difficulty in generating past vs. future images) and still observed the effect. Most telling is Study 2, which showed that the asymmetry does not emerge when thinking about a friend. This result cannot be explained by more general differences between thinking about the past versus the future, given that tense was held constant and differences were still observed *within* past and *within* future conditions. Ultimately, however, follow-up work should valuably explore the role of various potential drivers of the general pattern, which appears quite robust.

## Concluding Thoughts

If the present "barely has time to exist," then all that remains of a life are mere perceptions of moments gone by and of those still to pass. Understanding how we think about our past and future selves has been of central interest in psychology as far back as James's (1890) concept of the specious present and Lewin's (1943) life-space framework, and extends to contemporary research into topics such as affective forecasting, temporal distance, and autobiographical recall. The current article was an attempt to bridge this rich tradition with an equally impressive literature on how people think about the minds of others, which thus far has focused on mind perception across space but not across time.

When looking back to the past, we see a person who is generally more emotional and less rational, but waiting in the future is someone generally more rational and less emotional. This asymmetry reveals theoretical as well as practical insights into a number of psychological domains. At a conceptual level, it represents the first exploration of

how the interpersonal rationality–emotionality framework extends to intrapersonal processes, mapping out the mind perception of self over time. In doing so, it not only integrates many findings on intertemporal thinking, but also suggests how perceptions of the past and future can differentially shape our experiences in the ever fleeting here and now.

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(Appendix follows)

## Appendix

### Stimulus Materials

Measures used in Study 1c. All participants completed all measures, but were randomly assigned to rate either their past or future self 1 year in the distance. For the scenarios, participants estimated how intensely their other self would respond on scales from 1 (*not much*) to 7 (*a lot*). For global assessments, each item began with the phrase "In general . . .," and participants responded on scales from 1 (*not at all*) to 7 (*very*).

#### Emotion-Related Scenarios

1. You get stung by a bee and feel pain.
2. You take a nap and feel pleasure.
3. You crave your favorite food and feel desire.
4. You scream at the sight of a bug and feel fear.
5. You get into a fight with a friend and feel rage.
6. You turn on your favorite movie and feel joy.

#### Rational-Related Scenarios

1. You are tempted by a guilty pleasure but need to exhibit self-control.
2. You are in a dilemma and need to act morally.
3. You need to make careful and detailed plans ahead of time.
4. You need to give a public speech and communicate your words powerfully.
5. You need to rely on your memory.
6. You need to organize your thoughts clearly and think independently.

#### Global Assessments of Emotionality

1. How emotional was your past self? (will your future self be?)
2. How reactive was your past self? (will your future self be?)
3. How sensitive was your past self? (will your future self be?)
4. How easily moved was your past self? (will your future self be?)
5. How swayable was your past self? (will your future self be?)

#### Global Assessments of Rationality

1. How rational was your past self? (will your future self be?)
2. How proactive was your past self? (will your future self be?)
3. How strong-minded was your past self? (will your future self be?)
4. How in-charge was your past self? (will your future self be?)
5. How cognitively skilled was your past self? (will your future self be?)

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#### Correction to Yu et al. (2015)

In the article "Dynamics of Postdecisional Processing of Confidence," by Shuli Yu, Timothy J. Pleskac, and Matthew D. Zeigenfuss (*Journal of Experimental Psychology: General*, 2015, Vol. 144, No. 2, pp. 489–510. <http://dx.doi.org/10.1037/xge0000062>), the paragraph before the **Conclusion** section states: "To investigate when this occurs, we simulated **Model 8** using the best fitting parameters for each participant in Study 2 and extended the IJT duration." "Model 8" should be "Model 1."

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