

A Cognitive–Ecological Approach to Temporal Self-Appraisals

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We investigate self-appraisals over time using a cognitive–ecological approach. We assume that ecologically, negative person attributes are more diverse than positive ones, while positive person attributes are more frequent than negative ones. We combine these ecological properties with the cognitive process of similarity- and differences-based social comparisons to predict temporal self-appraisals. The resulting cognitive–ecological model predicts that people should evaluate similarities with themselves over time positively, whereas differences would be evaluated more negatively. However, because positive attributes are reinforced over time relative to negative attributes, we predicted an asymmetry to emerge such that distinct attributes of the past self (past differences) would be most negative. Six experiments (total $N = 1,796$) and an integrative data analysis confirmed the cognitive–ecological model's predictions for temporal self-appraisals. However, we found no evidence for motivated self-perception across time. We discuss the implications of these findings for temporal self-appraisal theory and other aspects of self and identity.

Keywords: temporal self-appraisal, temporal comparison, information ecology, self and identity, self-enhancement

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We all have our time machines, don't we? Those that take us back are memories, and those that carry us forward are dreams.

—Über-Morlock, *The Time Machine*

From philosophy to folk beliefs, the subjective progress of time is essential to the concept of the self. In fact, Heidegger (1962) contended that existence and time are one and the same—people are thrown into a stream of possibility, stretched between birth and death by their awareness of having been in the past and their ability to project themselves into the future. Accepting their place in time is a

life-long project for people (Bluck & Levine, 1998; Habermas & Bluck, 2000), and mentally traveling back and forth between memories of the past and dreams of the future is fundamental to how people construct an identity that has purpose, significance, and coherence (McAdams & McLean, 2013; McAdams & Pals, 2006). Here, we examine some basic principles of evaluating oneself over time. We rely on a cognitive–ecological approach to evaluative information processing (Alves et al., 2017a, 2017b, 2019; Fiedler, 2000) to examine the nature and consequences of comparing the self across time. Specifically, we examine how the evaluative information ecology (EvIE; Unkelbach et al., 2019, 2020) shapes self-evaluations based on temporal comparisons.

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Temporal Comparisons

Comparison is a building block of human social life (Festinger, 1954), influencing domains as diverse as stereotyping (Biernat, 2003), person perception (Herr, 1986; Higgins & Lurie, 1983), attitudes (Sherif & Hovland, 1961), and affect (Epstude & Mussweiler, 2009). Broadly speaking, people compare information to an available standard whenever it is perceived, processed, or evaluated (Kahneman & Miller, 1986). And although other mammals engage in comparative thinking and exhibit rudimentary displays of social comparison (Dumas et al., 2017; Keupp et al., 2019; Schmitt et al., 2016; J. Suls et al., 2019), humans are probably exceptional in their ability to compare themselves across time (Suddendorf & Busby, 2003). People have the ability to comparatively consider who they were, who they are, and who they might become (McAdams & McLean, 2013; Ricoeur, 1991). This means that deciding who one is today depends not only on comparisons to relevant others (Festinger, 1954) but also on who one was yesterday (Albert, 1977) or will be tomorrow (Markus & Nurius, 1987; Ryff, 1991). Thus, the function of temporal self-comparison, much like social comparisons with others, is to gain information about

the self that is relevant for judgments of one's abilities, attributes, character, and trajectory in life.

One systematic attempt to describe the rules that govern this functional goal (i.e., the gathering of relevant information about the self over time) was provided by Albert (1977), who translated Festinger's (1954) seminal work on social comparison into a theory of temporal comparison with a primary focus on the nature and consequences of comparing the present self to the past self. In the following sections, we summarize some key points of Albert's temporal comparison theory and review some of the more recent research inspired by his work.

Self-Continuity Motive

Borrowing from Festinger's language, Albert (1977) hypothesized that people compare the present self to the past self to maintain an enduring, coherent, and integrated identity over time. Thus, people would strategically compare with past selves that are consistent with their current selves; that is, to focus on similarities between the present and the (recent) past. A primary thesis from Albert's (1977) work was that the drive for these kinds of comparisons would be particularly strong during times of change when one's sense of an enduring self-concept would be threatened.

These ideas are generally supported by research showing that people rely on their autobiographies as a guide for integrating unexpected events into a coherent story, and as a way to interpret change, especially to maintain continuity (Bluck et al., 2005). When people experience certain events separating a desired future from the present, they appear to be motivated to close this gap in time by pursuing goals that align the present with the future self (Peetz & Wilson, 2013). Other research shows that specific types of past comparisons are utilized when faced with feelings of discontinuity. For instance, people report feeling more nostalgic when self-continuity is threatened, and recalling nostalgic memories can promote self-continuity in the face of those threats (Sedikides et al., 2016).

However, other observations contradict the notion that people are driven by a general need for continuity and that temporal comparisons work to satisfy this need. For instance, when comparing past and future selves, people tend to treat those selves as "others" and exhibit typical actor–observer effects when evaluating them (Pronin & Ross, 2006). If people are motivated to see the self as one coherent whole, one must wonder why past and future selves are experienced as "others." Also, people do expect to change over time, and in particular, expect to change for the better (O'Brien & Kardas, 2016). In fact, explicit self-discontinuity sometimes promotes positive outcomes, as research on the fresh start effect attests (Dai & Li, 2019). When a temporal landmark signifies the beginning of a new period, people tend to be more motivated to pursue new goals, partly because they feel disassociated from the past. People have also been shown to strategically use temporal landmarks—creating temporal discontinuity between the present and the future to maintain a positive self-view (Peetz & Wilson, 2014). These findings suggest that comparing across time can also serve the function of self-enhancement, even at the cost of self-continuity (i.e., when considering differences in the self across time).

Self-Enhancement Motive

Although Albert (1977) was mostly silent on the idea that temporal comparison can serve the purpose of self-enhancement, research inspired by his work has focused on this function. Most people are

inclined to feel good about themselves (Baumeister, 1999; Leary, 1999; Sedikides et al., 2003). This tendency is often described as a motive—people strive to hold themselves in high regard, so much so that they often deceive themselves into believing that they are good even when objective evidence is lacking or contradictory (Ditto & Boardman, 1995; Doosje et al., 1995; Ryff, 1991; Tesser, 1988). These positive illusions come from several sources identified in prior research, from exaggerating perceptions of control (Langer, 1975) to attributing success to oneself and failure to external influences (Mezulis et al., 2004) or engaging in strategic comparisons with others (Corcoran et al., 2011; J. M. Suls & Miller, 1977).

The temporally extended nature of the self interacts in interesting ways with the self-enhancement motive because the question facing individuals might be which self to enhance at what point in time. One way to deal with this problem might be to decide that one has always been good and only focus on those similarities over time; such a strategy would boost and maintain self-regard and satisfy the need for self-continuity. According to other comparison models, such an outcome could be achieved by testing how the present is similar to the past self (Mussweiler, 2003), which would promote including the past self into the present self (Bless & Schwarz, 2010). One could exaggerate the positivity of these stable features and then assimilate them into the present self-concept. However, when considering the temporal nature of the self, people also tend to expect self-improvement (O'Brien & Kardas, 2016). As the presented research suggests, people sometimes feel that they are not, or have not always been good, and will strategically contrast away from negative temporal selves in service of self-enhancement (Peetz & Wilson, 2013, 2014).

Thus, rather than self-enhance by focusing on stable positive qualities of the self over time, people may look for ways that they have changed or will change for the better. This particular self-evaluation has now been covered extensively by temporal self-appraisal theory (Ross & Wilson, 2000, 2003; Wilson & Ross, 2000, 2001), which proposes that people self-enhance by disparaging distant past selves who have little bearing on the present self, specifically, those that are or feel distant in time. Building on the self-enhancement tradition, the theory argues that this process is motivated and sometimes deceptive. Even when no actual improvement has occurred, people seem to assume that their past selves were worse (Wilson & Ross, 2001).

Toward an Alternative Account

There is strong evidence for this motivated self-perception across time. However, we aim to suggest and test an alternative explanation for temporal self-appraisal effects. Specifically, we build on recent insights summarized in the EvIE model (Unkelbach et al., 2019; see also Unkelbach et al., 2020), which describes how the information ecology is structured regarding its evaluative properties. Temporal self-appraisal theory describes a comparative evaluation process across time. We thus combine the ecological properties with the cognitive process of self-comparisons, resulting in a cognitive–ecological model of temporal self-comparisons. In the following, we describe the basic premises of this model and then apply this model to temporal self-appraisals.

The Ecological Side: The Evaluative Information Ecology

The EvIE model suggests two structural properties of positive and negative information: positivity prevalence and negativity diversity.

First, positive information, such as words, traits, behaviors, events, or objects, occurs more frequently than negative information. Positive words are used more frequently in written and spoken language, people usually expect others to behave positively, and the positivity of personality traits strongly correlates with their prevalence (Alves et al., 2017b; Wood & Furr, 2016). In short, the social world is mostly positive most of the time (see Unkelbach et al., 2019, 2020, for summaries). Second, although positive information is more frequent, negative information is more diverse (Alves et al., 2017b). There are more ways to be negative than to be positive, and this greater diversity of negativity is visible at various levels of observation and across many stimulus domains. For example, there are more unique words to describe negative things or negative people, and these negative words are less similar to one another. The same holds true for other stimuli such as faces, affective images, life events, and emotional reactions (Unkelbach et al., 2019). The reasons for liking something (e.g., ice cream) or somebody (e.g., a famous actor) are also highly similar, while there are many reasons to dislike something or somebody (Gershoff et al., 2007; Leising et al., 2013).

The Cognitive Side: Comparisons

These properties have a probabilistic influence on comparison processes. Most notably, the ecological properties create a world where positive attributes are usually shared, whereas negative attributes are usually distinct. The reverse is also true: Shared attributes are usually positive, whereas distinct attributes are usually negative (Alves et al., 2017b, 2018). In other words, attributes that differentiate people, groups, or objects are usually negative, and those that they share are usually positive. We will illustrate this principle in more detail below (see Figure 1). The implication is that any comparison process highlighting distinct rather than shared attributes tends to highlight the negatives, which may result in “biased” attitudes. For example, the fact that novel groups are typically judged based on attributes that differentiate them from familiar groups can explain why people often hold negative attitudes toward out-groups and minorities (Alves et al., 2018). The same holds for comparing people: When two people are compared based on what they share, positive attributes will come to mind, but when compared based on what they do not share, negative attributes will come to mind (Alves et al., 2017a; Unkelbach et al., 2019).

The research program just summarized focuses primarily on social comparison between different individuals or groups. In the current research, we aim to apply this ecological perspective to temporal comparisons of the self and pave the way for new predictions regarding the evaluation of the self across time.

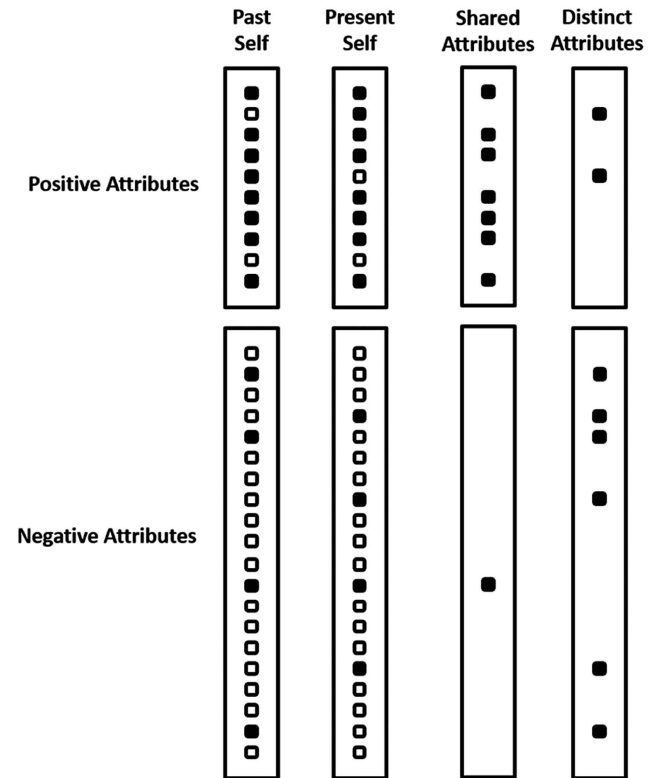
The Information Ecology Across Time

We now apply the EvIE assumptions to temporal comparisons and delineate the implications of these assumptions for the outcomes of temporal comparisons. Crucially, we extend the model by a temporal factor; beyond frequency and diversity, we add a growth component over time. Table 1 summarizes the three principles of the EvIE and how they might extend to the temporal domain.

The novel growth principle assumes that positive attributes of an individual will be reinforced over time, whereas negative attributes will not. From a young age, on average, children are taught what is good and what is bad; positive behaviors and attributes grow

Figure 1

The Frequency and Diversity Principles in the Temporal Evaluative Information Ecology



Note. Boxes represent potential attributes of the self. Shaded attribute boxes are attributes that the self possess. Unshaded boxes are attributes that the self does not possess. There are more potential negative attributes, but the self has more positive attributes. Thus, the attribute vectors are more positive than negative (i.e., positivity prevalence), and there are more ways to be negative (i.e., negativity diversity). Consequently, comparing across time, shared attributes are more positive, and distinct attributes are more negative.

stronger through reward and praise, whereas negative behaviors and attributes are weakened through punishment and lack of reinforcement. This means that people, on average, gain and maintain positive attributes at a greater rate over time relative to negative attributes. It feels good to be good, to learn, and to improve, and it feels bad to fail and decline (Denrell, 2005; Langston, 1994; Nevin & Grace, 2000; Reis et al., 2010; Unkelbach et al., 2019).

The hedonic aspect of temporal self-comparisons is built into the growth principle. People are motivated to perceive self-improvement (O'Brien & Kardas, 2016; Wilson & Ross, 2001). However, people may also perceive improvement without motivation because, most of the time, people actually improve through reinforcement and learning. This possibility leads to an interesting paradox—according to the diversity and frequency principles, focusing on how someone changed over time will bring negative attributes to mind, as differences are typically negative. However, according to the growth principle, focusing on how someone changed over time will bring to mind positive attributes, as positive attributes are reinforced over time. Testing the full range of possible self-comparisons over time is necessary to determine under what

Table 1
Principles of the Temporal Evaluative Information Ecology

Property of information	Description	Social comparison	Temporal comparison
Frequency (positivity prevalence)	Positive attributes are more prevalent than negative attributes	Most of the time, two individuals' similarities are more positive than their differences	Most of the time, an individual's similarities across two points in time are more positive than their differences
Diversity (negativity diversity)	Positive attributes are more alike than negative attributes	Most of the time, two individuals' similarities are more positive than their differences	Most of the time, an individual's similarities across two points in time are more positive than their differences
Growth (improvement)	Positive attributes are reinforced more than negative attributes	n/a	Most of the time, individuals will improve across two points in time

Note. n/a = not applicable.

circumstances those comparisons result in positive or negative evaluations. We elaborate on this in the next section, starting with a more thorough translation of the EvIE model to temporal comparisons.

The Temporal Evaluative Information Ecology

Again, in general, positive attributes are more prevalent and less diverse than negative attributes (see Table 1; frequency and diversity properties). These properties imply that when two people are compared, their shared attributes are likely to be positive, and those that differentiate them are likely to be negative. For temporal self-comparison, it should follow that at any two points in time, attributes that have remained the same over time (i.e., that the present and past self share) are likely to be positive, and attributes that have changed are likely to be negative.

To illustrate this argument, Figure 1 visualizes attributes in the EvIE with a simple attribute present/absent logic (Alves et al., 2017a; Tversky & Kahneman, 1974). The left part illustrates the feature vectors of a person's past and present selves. The vector entails different positive and negative attributes that can either be present (filled boxes) or absent (unfilled boxes) in the past and present selves. For our argument, it is irrelevant whether the feature vectors refer to the self's actual attributes or to a person's mental representation of the same.

The frequency and diversity asymmetries are implemented in the attribute vectors. There are twice as many positive as negative attributes present in the two selves (i.e., positive information is prevalent). The negative attribute vector is twice as long as the positive vector, meaning that the self could have more negative attributes (i.e., negative information is more diverse).

Consequently, any positive attribute has a higher probability of being present in a given self than any negative attribute, here: $p(\text{present}|\text{pos}) = 0.80$; $p(\text{present}|\text{neg}) = 0.20$. This also means that any positive attribute has a higher probability of being shared by past and present selves, here: $p(\text{shared}|\text{pos}) = 0.80 \times 0.80 = 0.64$, than any negative attribute, $p(\text{shared}|\text{neg}) = 0.20 \times 0.20 = 0.04$. Conversely, positive and negative attributes have the same probability of being distinct for either the past or present self, $p(\text{distinct}|\text{pos}) = 0.80 \times 0.20 = 0.16$; $p(\text{distinct}|\text{neg}) = 0.20 \times 0.80 = 0.16$. Hence, positive attributes are more likely shared than distinct (here: 0.64 vs. 0.16), while negative attributes are more likely distinct than shared (here: 0.16 vs. 0.04).

Importantly, the relation between attribute valence and sharedness also exists in the other direction. That is, shared attributes tend to be positive, and distinct attributes tend to be negative. Again, using the base rates of Figure 1, the mean number of shared positive attributes is $10 \times 0 \times 0.64 = 6.40$, and the mean number of shared negative attributes is $20 \times 0.04 = 0.80$. Hence, among shared traits, the positivity prevalence of the ecology (2:1) is amplified among shared attributes (8:1). Among distinct attributes, the mean number of positive attributes is $10 \times 0.16 = 1.60$, and the mean number of negative attributes is $20 \times 0.16 = 3.20$. Hence, the ecological positivity prevalence (2:1) is attenuated among distinct attributes and, for the example of Figure 1's base rates, even reversed (1:2).

In summary, assuming that the information ecology shows positivity prevalence and negativity diversity, it follows that if an attribute is positive, it is likely to be shared between the past and current self. If an attribute is shared between the past and current self, it will likely be positive. Conversely, a negative attribute will likely be a distinct attribute of the past or present self. Moreover, if

an attribute is a distinct attribute of the past or the present self, it is likely to be negative.

Notice that applying these ecological principles to temporal self-comparisons explains the chump-to-champ effect whereby people tend to disparage their past selves (Wilson & Ross, 2001, 2003). People typically evaluate targets based on their differences from existing standards because learning, categorization, and comparison rely primarily on differentiating people, groups, and objects based on their distinct attributes (Alves, 2018; Alves et al., 2020). For example, when people form associations between categories and their attributes, more attention and weight are given to attributes that heighten between-category differences rather than between-category similarities (Krueger & Clement, 1994; Krueger et al., 1989). Distinct attributes tend to define a category (Tversky & Gati, 2004).

Assuming these processes also apply to temporal comparisons, it follows that people evaluate the past self based on how it was different from the present self. This assumption is supported by the actor–observer effects found when people perceive their past selves as “others” (Pronin & Ross, 2006) and that people expect the self to change (i.e., become differentiated) over time (O’Brien & Kardas, 2016). Thus, a focus on differences combined with the properties of the information ecology predicts that people perceive the past self as more negative. Although people are motivated to perceive themselves positively and to improve, consequently disparaging the past self purposefully, this outcome is also predicted by comparisons in a temporal information ecology with the properties outlined in Table 1.

However, the diversity and frequency principles by themselves also predict an unlikely outcome, namely, that distinct attributes of the present self would also be negative (see Figure 1). If people focus on differences to evaluate the present self relative to the past, the EvIE model predicts that people would evaluate their present self less positively. Because prior research showed that the present self is consistently rated more positively than the past self (e.g., Wilson & Ross, 2001), it seems unlikely that this prediction is correct. What keeps present self-evaluations from turning negative, as the EvIE model would predict?

There are at least two possibilities within the EvIE model. First, people may evaluate their present selves on what has remained the same over time (i.e., similarities), making the present self positive. Conversely, people may evaluate their past selves based on changes. They may consider what differentiates the past self from the present, as the flow of time backward might prompt difference testing (Mussweiler, 2003). This difference-based comparison would make the past self negative.

Second, the growth principle may account for the positive view of the present self. This second possibility works without assuming different comparison directions. The growth principle is unique to the temporal EvIE because the target and standard of comparison are not independent in temporal comparisons. In a social comparison between Persons A and B, the attributes of each are drawn independently from a world of possible attributes that each person can possess; the attributes of Person B do not depend on what Person A already possesses and are not a function of any intraindividual processes that are shared between the two. However, this is not the case when comparing the past and present self over time, as the attributes of the present self are a function of the past. Each attribute of the past self has a likelihood of remaining in the present self, and each attribute of the present self is largely influenced by those that already exist in the person.

Again, the growth principle assumes that the present self has more likely kept or gained positive attributes than negative attributes. If the growth principle acts in concert with the diversity and frequency principles, it follows that differences will be negative unless offset by growth over time. A combination of the frequency, diversity, and growth principles would predict that distinct aspects of the present self should be a mix of positive and negative attributes. Depending on how strongly each principle factors into the information ecology, present self-differences could be expected to be more neutral or positive but unlikely to be negative.

The Supplemental Material presents a simulation that models four growth scenarios and how they impact evaluations of the past and the present self as a function of comparing similarities and differences. To summarize the results, the simulation shows that without assuming growth, comparisons based on differences lead to negative evaluations of the present and past selves, while comparisons based on similarities lead to positive evaluation. However, if we assume growth, similarities remain the most positive, but the distinct past becomes more negative, and the distinct present becomes more positive. Thus, assuming growth, the cognitive–ecological model’s predictions coincide with a motivational explanation for negative evaluations of the past self.

The current research tests the prediction of this cognitive–ecological model of temporal self-comparisons. We present six experiments (Experiments 1–6) and an additional integrative analysis (Study 7) that manipulate comparisons between past and present selves and ask participants to generate and evaluate attributes of their selves.

We use the following labels for all following experiments. Comparisons entail a *target* and a *standard* (see Mussweiler, 2003). The target is either the self in the past or the present, while the comparison standard is the self in the present or past. The comparison either focuses on the similarities or differences. For example, we will use the label *past differences* to describe a condition where participants evaluate distinct attributes of the past self relative to the present self. Likewise, the label *present differences* describe a condition in which participants evaluate distinct attributes of the present self relative to the past self. In terms of similarities, we will use *past similarities* to describe a condition in which participants evaluate attributes of the past self that are also shared with the present self. Finally, we will use *present similarities* to describe a condition in which participants evaluate attributes of the present self that are also shared with the past self.

Overview of Hypotheses and Experiments

We derived four hypotheses from the EvIE model’s principles, as shown in Table 1. The exact predictions are based on the simulation in the Supplemental Material assuming growth.

Hypothesis 1: Participants will evaluate shared attributes between the past and present selves most positively (i.e., similarities).

Hypothesis 2: Participants will evaluate distinct attributes of the past self least positively (i.e., past differences).

Hypothesis 3: Participants will evaluate distinct attributes of the present self in between past differences and present similarities (i.e., present differences; due to growth, some distinct attributes will be positive).

Hypothesis 4: Baseline evaluations of the past and present selves will reflect a combination of similarities and differences and fall between past differences and past/present similarities.

We will provide data for these hypotheses by randomly assigning participants to evaluate shared and distinct attributes associated with their past and present selves. We will also vary motivation to self-enhance to test how strongly motives may modulate the temporal comparison process. Finally, we will test how changing the information ecology may modulate the temporal comparison process.

We present six experiments and one integrative data analysis in three parts. In Part 1, Experiments 1–3 test the basic pattern of temporal self-appraisal as predicted by the cognitive–ecological approach when we manipulate the cognitive process. Participants are randomly assigned to evaluate their present or past differences or similarities. Part 2 tests predictions from a motivational account. Experiment 4 manipulates conditions that should promote (e.g., self-enhancement instructions) or inhibit (e.g., self-accuracy instructions) motivation to enhance the present self. Experiment 5 asks participants for self-appraisals for another person, which should exclude a self-enhancement motive. Part 3 then tests manipulations of the ecology. Experiment 6 investigates the case of an evaluative ecology without growth by asking participants to generate and evaluate physical attributes. Study 7 then analyzes the available data as a function of participants' age. As older age implies a potential decline in many attributes rather than growth, this integrative data analysis provides a strong test of the cognitive–ecological approach.

Open Science and Transparency

All participants were from the United States and were recruited from the general population on Mturk or Prolific. Our samples are thereby likely limited by their WEIRDness (Western, educated, industrialized, rich, and democratic). Thus, our results should be interpreted in this context.

We conducted nine experiments in this series. Here, we report six of these experiments (i.e., Experiments 1–6). The [Supplemental Material](#) reports two further experiments; we relegated these to the [Supplemental Material](#) because Experiment S1 only replicates Experiment 1, and Experiment S2's manipulation check failed. Otherwise, these two experiments fully support the presented hypotheses. We do not report one experiment that examined response latencies rather than evaluative ratings of attributes.

The experiments were not preregistered except for Experiment 3 (<https://osf.io/mcdnr/>). We describe the power considerations at the outset of each study.

The data and analysis code for the eight reported experiments (i.e., present article and [Supplemental Material](#)) are available at <https://osf.io/3a72e/>. The raw data are available as CSV files. The analysis code is available in an annotated R file. The Open Science Framework (OSF) project lists the experiments with different numbers, as it incorporates the experiments and simulation from the [Supplemental Material](#). [Supplemental Table S2](#) provides an overview of the order in the OSF project.

Part 1: Similarities Are Positive, Differences Are Negative

Part 1 aims to test the cognitive side of the cognitive–ecological approach. Thus, we manipulated whether temporal self-appraisals

are based on similarities or differences. Experiments 1–3 are thereby testing Hypotheses 1–3 as described above.

Experiment 1: Testing Similarities Versus Differences

We varied the target (i.e., past or present self) and the comparison mode (i.e., similarities vs. differences). Thus, we asked participants to evaluate their past or present selves, as in other temporal self-appraisal research ([Haddock, 2004](#); [Wilson & Ross, 2001](#)). Crucially, however, participants either focused on differences or similarities between the present and past.

According to our reasoning (see also the simulation in the [Supplemental Material](#)), if people are sampling attributes from the EvIE that follows the frequency, diversity, and growth principles, we expect similarities to be most positive (Hypothesis 1), past differences to be most negative (Hypothesis 2), and present differences to fall between present similarities and past differences (Hypothesis 3).

Method

Participants and Design

An a priori power analysis suggested a sample size of $N = 128$ to detect a medium-sized effect with 80% power ($\alpha = .05$, $\beta = 0.80$, $f = 0.25$). As we did not yet know the expected effect size, we aimed for 200 participants, which was the standard sample size in our lab for online studies with unknown effect sizes at the time. The final sample consisted of 194 adults ($M_{\text{age}} = 38.58$, $SD_{\text{age}} = 13.38$) who participated on Amazon Mturk for \$0.50. After providing consent, participants were randomly assigned one of four conditions resulting from the orthogonal combination of target (past vs. present) and comparison (similarities vs. differences). We manipulated both independent variables between participants.

Target Manipulation

In the past condition, we instructed participants to spend a few moments thinking about “how yourself from last year is related to yourself today.” In the present condition, we instructed participants to spend a few moments thinking about “how yourself today is related to yourself from last year.” Participants were then asked to type four words or phrases into separate text boxes that described the target self (i.e., the past or present self) in terms of similarities or differences.

Comparison Manipulation

In the similarities condition, we instructed participants to describe attributes or characteristics of the target self that are also like the standard. In the differences condition, we instructed them to describe characteristics of the target self that are not like the standard. For example, participants in the past/similarities condition read, “How is yourself from last year also like yourself today?”

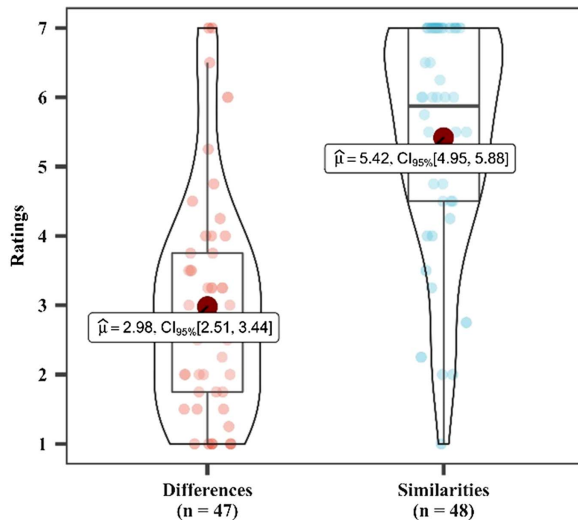
Measures

After describing the target self, participants saw the four attributes they had written previously, and we asked them to rate the valence of each one on a 7-point scale (1 = *extremely negative*, 7 = *extremely positive*; $\alpha = .91$).

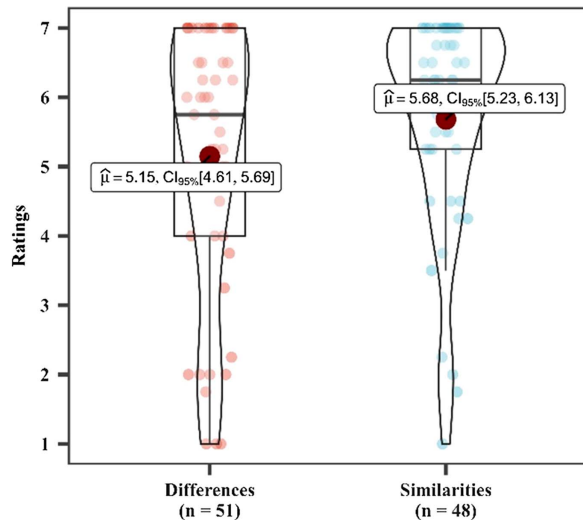
Figure 2

Participants' Attribute Evaluations in Experiment 1 as a Function of Target (Past Self vs. Present Self) and Comparison (Differences vs. Similarities)

Target: Past Self



Target: Present Self



Note. The figure overlays box plots, scatter plots, and violin plots in the four conditions. CI = confidence interval. See the online article for the color version of this figure.

Results

Figure 2 shows participants' ratings as a function of similarities versus differences and present versus past self. The figure suggests that participants evaluated attributes positively except when describing how the past self differed from the present self. Indeed, a one-sample *t* test comparing average attribute ratings to the midpoint of the scale (4 = neutral) showed that overall, participants rated their attributes positively, $M = 4.82$, $SD = 1.97$, 95% CI [4.54, 5.10], $t(193) = 5.80$, $p < .001$.

However, Figure 2 suggests that these ratings were moderated by condition. We analyzed these data using a hierarchical regression model with attribute ratings as the outcome, target and comparison included as predictors in Step 1, and the Target \times Comparison interaction included in Step 2. In Step 1, both main effects were significant. The effect of target, $F(1, 191) = 23.00$, $p < .001$, $\eta_p^2 = 0.11$, indicated that participants rated attributes of the present self more positively ($M = 5.43$, $SE = 0.18$) than attributes of the past self ($M = 4.20$, $SE = 0.18$). The effect of comparison, $F(1, 191) = 34.61$, $p < .001$, $\eta_p^2 = 0.15$, indicated that participants rated similarities more positively ($M = 5.55$, $SE = 0.18$) compared to differences ($M = 4.08$, $SE = 0.18$).

These main effects were qualified by a significant interaction between target and comparison, $F(1, 190) = 15.66$, $p < .001$, $\eta_p^2 = 0.07$. Pairwise comparisons with Tukey's corrections¹ showed that attributes in the past differences condition were rated more negatively compared to all other conditions (past similarities: contrast = 2.44, $p < .001$, $d = 1.02$; present differences: contrast = 0.93, $p < .001$, $d = 1.14$; present similarities: contrast = 2.70, $p < .001$, $d = 0.39$). When looking at ratings of present differences and similarities, present differences were rated less positively, but the effect was not statistically significant ($p = .38$). No other simple effects were significant ($ps > .85$).

Discussion

Experiment 1 supports Hypotheses 1 and 2 and partially Hypothesis 3 as outlined above. In addition, it replicates the typical temporal self-appraisal effect. Participants evaluated attributes of the past self more negatively than the present self's attributes. This effect aligns with a self-enhancement motive and a cognitive-ecological account. However, self-enhancement was only apparent when participants considered how the past self differs from the present self, as predicted by the present cognitive-ecological approach (see Hypothesis 2). Because past research (Wilson & Ross, 2001) did not specify the comparative judgments that factor into past and present self-evaluations, these findings extend the specificity of temporal self-appraisal theory (Albert, 1977).

The data also supported Hypothesis 1, as similarities were rated most positively. Partially supporting Hypothesis 3, present differences were more positive than past differences descriptively, but statistically, present differences were indistinguishable from similarities.

In the Supplemental Material, we report an experiment (Experiment S1) that replicated these data with instructions to compare with the self from 10 years ago instead of 1 year ago. Both main effects and the interaction of target (past vs. present) and comparison (similarities vs. differences) were again significant. Again, we found only partial support for Hypothesis 3, as the difference condition for the present self did not significantly differ from the similarity condition for the present self. The Supplemental Material presents the data in more detail.

So far, the data fit (partially) with both a self-enhancement motive and a cognitive-ecological account. From a cognitive-ecological perspective, the data follow because past differences are accurately negative: Comparisons in a standard ecology based on differences

¹ We apply the Tukey's correction to all subsequent pairwise comparisons.

lead to negative evaluations, as predicted by Alves et al.'s (2017a) "common good" phenomenon (i.e., similarities are positive, differences are negative). Present differences are buffered from this effect because people are actually improving over time, and with a strong enough growth factor, present differences may be primarily positive. These two effects cancel out, making present differences equally positive as similarities, although descriptively less positive.

From a self-enhancement motive perspective, people should be motivated to exaggerate present differences in service of self-enhancement. They might do this by strategically selecting those few present differences that serve this function. In other words, the effect for comparison mode (i.e., similarity vs. differences) in the present self condition may not be located in the rating extremity but in the number of attributes generated. Participants may rate the first four attributes equally positively, but with more sampling, discover negative differences that would factor into their evaluations. Experiment 2 addresses this possibility with a within-subjects design that allows for relative evaluations of similarities and differences and sampling more attributes.

Experiment 2: Within-Participants Attribute Listing Paradigm

Based on the considerations above, Experiment 2 kept the overall structure of varying the comparison target (i.e., past vs. present self) and the comparison (i.e., similarities vs. differences). However, we implemented three changes. Social comparisons involve testing hypotheses about similarities and differences between targets and standards (Mussweiler, 2003), and the two are often intertwined; bringing to mind similarities can also make differences accessible (Medin et al., 1993). In Experiment 1 (and Experiment S1; see Supplemental Material), we manipulated comparison mode between participants; participants considered only differences or similarities. However, when evaluating the target self (e.g., the present), people are likely making relative judgments about their shared and distinct attributes. If differences are more negative than similarities (Unkelbach et al., 2019, 2020), then rating differences relative to similarities within a single target might produce more differentiated ratings, potentially providing full support for Hypothesis 3. To better reflect this process, Experiment 2 manipulated comparison mode within participants and asked participants to list both similarities and differences.

Second, assuming that the effect for the present self might not be in the ratings but in the number of arguments, we asked participants to generate as many attributes as they wanted, up to a maximum of 20. Thereby, we might differentiate better between a motivational and a cognitive-ecological account. If participants are motivated to maximize self-improvement, this new setup provides the opportunity to generate many more negative past differences and many more positive present differences. However, if the principles of the information ecology are factoring into evaluations, then people should naturally pick up on some negative present differences. By allowing participants to list many attributes, we create a greater opportunity for them to find these negative present differences, thereby differentiating the two accounts.

Third, we measured subjective self-continuity to the past self to test whether this variable would moderate self-appraisals. If past self-disparagement in this study is due to participants distancing from the past self in service of self-enhancement, we should find that more negative evaluations of past differences are associated with

lower self-continuity, as shown similarly in past research (Wilson & Ross, 2001). We set the temporal distance at 5 years, in between Experiment 1 (i.e., 1 year) and the replication of Experiment S1 in the Supplemental Material (i.e., 10 years).

Method

Participants and Design

Participants were 400 adults ($M_{\text{age}} = 37.37$, $SD_{\text{age}} = 11.23$) who participated on Amazon Mturk for \$0.70. After providing consent, participants were randomly assigned to conditions in a 2 Between (target: past vs. present) \times 2 Within (comparison: similarities vs. differences) mixed design. Note that a sample size of 400 is well above the required sample needed to detect the interaction effect found in Experiment 1 (and Experiment S1 in the Supplemental Material); however, we also aimed to find evidence not only partial evidence for Hypothesis 3, that is, the interaction, but full evidence (i.e., the contrast between present similarities and differences).

Manipulation

In the past condition, we instructed participants to think about attributes of their past self from 5 years ago relative to their present self. In the present condition, the instructions were similar, except that we instructed participants to think about attributes of their present self relative to their past self from 5 years ago. Then, we instructed all participants to think about both similarities and differences between the target and standard self and to type as many similarities and differences between the two selves as possible in a series of 20 text boxes for each type of comparison. Instructions were clear that participants could type as many attributes or characteristics as they would like, that they did not have to fill all boxes, and that their lists of similarities and differences could be of different sizes.

Measures

After describing similarities and differences of the target self, participants evaluate the overall valence of each list using a 7-point scale (1 = *very negative*, 7 = *very positive*), resulting in an overall rating for similarities and an overall rating for differences. Participants then used a 7-point scale (1 = *strongly disagree*, 7 = *strongly agree*) to indicate their feelings of past self-continuity (e.g., "I feel connected with my past"; "I feel connected with who I was in the past"; $\alpha = .84$). Finally, participants completed demographics, read a debriefing statement, and exited the study.

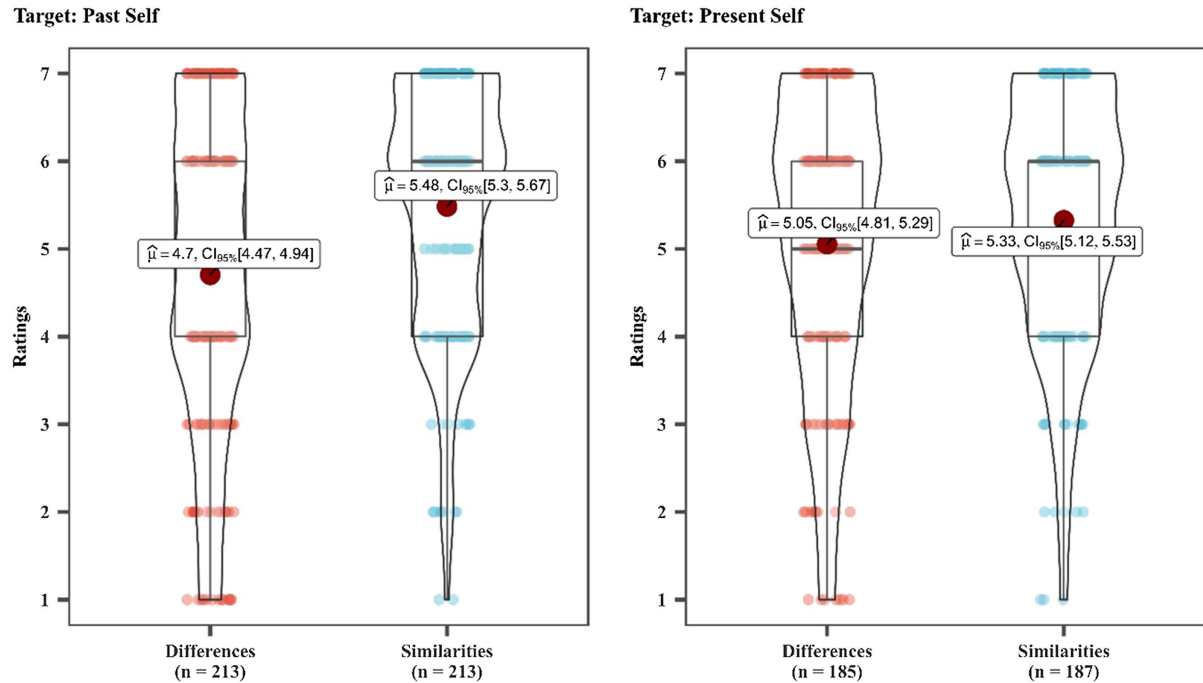
Results

On average, participants listed 4.50 ($SD = 2.30$) similarities and 4.40 ($SD = 2.22$) differences. Figure 3 shows participants' ratings for their chosen attributes across, as a function of comparison target (past self vs. present self) and comparison condition (similarities vs. differences). Consistent with Experiment 1, a one-sample t test comparing average attribute ratings to the midpoint of the scale (4 = *neutral*) showed that overall, participants rated their attributes positively, $M = 5.14$, $SD = 1.20$, 95% CI [5.02, 5.26], $t(397) = 18.87$, $p < .001$. However, ratings were moderated by condition.

Figure 3 shows participants' attribute ratings. We again analyzed the data by testing a hierarchical linear mixed-effects model with

Figure 3

Participants' Attribute Evaluations in Experiment 2 as a Function of Target (Between Participants: Past Self vs. Present Self) and Comparison (Within: Differences vs. Similarities)



Note. The figure overlays box plots, scatter plots, and violin plots in the four conditions. Two participants did not list any differences for the present self. CI = confidence interval. See the online article for the color version of this figure.

averaged attribute ratings (i.e., for similarities and differences) as the outcome, target and comparison included as predictors in Step 1, and the Target \times Comparison interaction included in Step 2. We included a random intercept for participants to account for the repeated evaluations. The main effect of target was not significant, $b = -0.10$, $t(398) = -0.80$, $p = .43$, whereas the effect of comparison was, $b = -0.54$, $SE = 0.10$, 95% CI $[-.74, -.34]$, $t(399) = -5.34$, $p < .001$. Similarities were rated more positively ($M = 5.41$, $SE = 0.08$) than differences ($M = 4.87$, $SE = 0.08$). This main effect was qualified by a significant interaction between target and comparison, $b = -0.51$, $SE = 0.20$, 95% CI $[-.90, -.11]$, $t(398) = -2.52$, $p = .01$. Past differences were rated less positively than similarities (past similarities, contrast = 0.78, $p < .001$, $d = 0.57$; present similarities: contrast = 0.62, $p < .001$, $d = 0.29$). However, past differences were not significantly more negative than present differences (contrast = 0.35, $p = .12$, $d = 0.16$). Present differences were also rated less positively than past similarities (contrast = 0.43, $p = .03$, $d = 0.20$). No other simple effects were significant ($ps > .25$).

Our measure of self-continuity did not significantly differ across target, $t(361.41) = -0.04$, $p = .97$, and the predicted interaction between target and comparison was unchanged when including past self-continuity as a covariate in the model, $b = -0.51$, $SE = 0.20$, 95% CI $[-.90, -.11]$, $t(398) = -2.53$, $p = .01$. Moreover, the self-continuity measure did not significantly correlate with past attribute evaluations, whether evaluations were based on differences, $r(211) = 0.10$, $p = .15$, or similarities, $r(211) = 0.07$, $p = .30$. Subjective feelings of (dis)continuity did not seem to factor into participants' evaluations.

Discussion

Experiment 2 replicates Experiment 1 and confirms that past differences were evaluated less positively than past and present similarities (Hypothesis 2). This finding would follow from motivational self-enhancement and a cognitive-ecological account. However, other aspects of Experiment 2's data align more closely with the cognitive-ecological account. First, present differences in this mixed design were similar in valence to past differences and less positive than past similarities (Hypothesis 3). In other words, ratings of distinct attributes of the present self suggested some present self-derogation. These findings are consistent with an ecology that allows for growth (see simulation data in Supplemental Figure S1's bottom right panel). However, explaining this pattern with a motivational account is more difficult, as present self-derogation is not consistent with self-enhancement.

Second, we found that controlling for past self-continuity did not account for the effect of target and comparison, and continuity was not significantly associated with past self-evaluations. While prior research assumed that distancing the past self from the present is one mechanism driving the temporal self-appraisal effect found in prior research (Wilson & Ross, 2001), we found no evidence for this mechanism here.

Rather, it seems people have a fairly accurate perception of their present and past attributes in an ecology that favors positive over negative attributes, but in which actual improvement is likely occurring. Nevertheless, when given a choice or when conditions are right, participants may be motivated to exaggerate these accurate

perceptions in service of self-enhancement. We examine this possibility in more detail in Experiment 3.

Experiment 3: Adding a Baseline Condition

Experiment 3 was a preregistered experiment (<https://osf.io/mcdnr/>) to further test the hypothesis that past self-differences' negativity drives the temporal self-appraisal effect found in prior research. To better understand how specific comparisons stack up against "natural" appraisals of the self, we included a baseline condition in Experiment 3, in which we instructed participants to evaluate their past and present selves without reference to specific comparisons. Thus, the study was a 3 (comparison: baseline vs. differences vs. similarities) \times 2 (target: past vs. present) mixed design with repeated measures on the second factor. All participants evaluated their present and past selves but either focused on differences or similarities or received no explicit comparison instructions. Experiment 3 is thereby a direct test of Hypothesis 4, as described above.

The new baseline condition more closely matches previous temporal self-appraisal research (Wilson & Ross, 2001), assuming that this condition mixes similarities and differences (see also simulation in the Supplemental Material). This condition allows us to test competing hypotheses: If people disparage past selves in service of self-enhancement, then past self-evaluations in the baseline condition should match past self-evaluations in the differences condition. In other words, without specific instructions to compare the past and present selves, people should still base their past self-evaluations on negative differences in the service of self-enhancement. However, if, instead, self-evaluations are a mix of comparisons based on both similarities and differences, then baseline evaluations of the past self should look more like the average of the past differences and similarities conditions. Based on Experiments 1 and 2, we expected that past differences would be most negative, whereas all other comparative evaluations would be relatively equal and positive. However, when averaged together, evaluations of the self across differences and similarities conditions will match self-evaluations in the baseline condition.

Experiment 3 also allowed participants to consider a past self at any temporal distance that they would do naturally. That is, we did not set a temporal distance when participants were asked to evaluate their past selves. Instead, we measured subjective distance at the end of the study to test whether past selves felt more distant when the resulting evaluation would benefit the present self (e.g., when differences are the focus; Wilson & Ross, 2001). If disparaging the past self is easier when that self feels distant (Wilson & Ross, 2001), then subjective distance should predict more negative evaluations of the past self. Alternatively, the more negative a past self-evaluation, the more subjectively distant that self should feel. Participants in this study had the freedom to evaluate very close or very distant selves, and we were able to test whether their evaluations were associated with subjective distance.

In addition, we asked participants in this study to describe six attributes of their past and present selves, compared to four in Experiment 1 and the average of four attributes provided in the open-ended format in Experiment 2. More attribute ratings allow more reliable estimates of self-evaluations, and allowing participants to generate more attributes also increases the opportunity for self-enhancement by increasing the possible ratio of positive to negative attributes. However, if participants are sampling from an

information ecology as specified in Table 1, then the overall attribute ratings should be similar to Experiments 1 and 2.

Finally, we also asked participants to provide an overall evaluation of their past and present selves along with the individual attribute ratings. This additional measure allows testing whether the effect translates from measures of specific attributes to measures of global self-evaluations.

Method

Participants and Design

For a 2×3 mixed design (r between measures = 0.30; nonsphericity correction = 1), G*Power suggested a sample size of 342 to detect a small interaction effect ($f = 0.10$) at 80% power ($\alpha = .05$), so we recruited 400 participants to account for any exclusions. We recruited participants ($M_{\text{age}} = 29.01$, $SD_{\text{age}} = 10.12$) from Prolific for \$0.80. After providing consent, participants were randomly assigned to conditions in a 2 Within (target: past vs. present) by 3 Between (comparison: baseline vs. differences vs. similarities) mixed experiment.

Manipulation

Participants were first told that the study was looking at how people think about themselves in time; that is, their past and present selves. In the baseline condition, participants were asked to take a moment to think of attributes that describe who they are today/were in the past and to type each of those attributes in six separate text boxes. Each attribute listing task was shown on a separate screen, one for the past self and one for the present self. In the differences condition, participants read the same instructions as in Experiments 1 and 3. In the present condition, they listed six attributes of the present self that are different from the past self, and in the past condition, they listed six attributes of the past self that were different from the present self. The instructions in the similarities condition were similar: Participants listed attributes of the present self that are shared with the past self and attributes of the past self that are shared with the present self. The online survey randomly varied the order of the past versus the present self as target.

Measures

After listing attributes of each target self, participants rated the valence of each attribute using a 7-point scale (1 = *very negative*, 7 = *very positive*). A single-item attention check appeared in this measure. After rating each attribute, participants also evaluated the target selves (i.e., past and present) relative to others on a single item (e.g., "Thinking about who you are today, how do you see yourself overall, relative to most your peers;" "Thinking about who you were in the past, how do you see yourself then overall, relative to most your peers during that time;" 1 = *much more negatively than most*, 7 = *much more positively than most*). After providing the attribute ratings and the overall evaluation, participants indicated how far in the past they were thinking when describing their past selves (1 = *very recent past*, 5 = *very distant past*), completed demographics, and read a debriefing statement.

Results

We excluded participants who failed the attention check or indicated that they did not want their data included in analyses. This left a final sample of 353 participants. Consistent with the prior experiments, a one-sample t test comparing average attribute ratings to the midpoint of the scale (4 = *neutral*) showed that participants rated their attributes positively, $M = 4.95$, $SD = 0.99$, 95% CI [4.85, 5.06], $t(399) = 18.13$, $p < .001$. Participants also evaluated themselves more positively than most of their peers overall (3 = *equal to most*), $M = 4.13$, $SD = 1.23$, 95% CI [4.00, 4.26], $t(399) = 17.29$, $p < .001$. However, attribute ratings and overall evaluations were each moderated by condition.

Attribute Ratings

Figure 4's upper panel shows participants' attribute ratings for their past and present selves in the three comparison conditions. We again analyzed these data with a hierarchical linear mixed-effects model with attribute ratings as the outcome, target and comparison included as predictors in Step 1, and the Target \times Comparison interaction included in Step 2. We decomposed the comparison factor as two dummy-codes testing the baseline versus differences, and baseline versus similarities

conditions. We included a random intercept for participants to account for the repeated attribute ratings of past and present self.

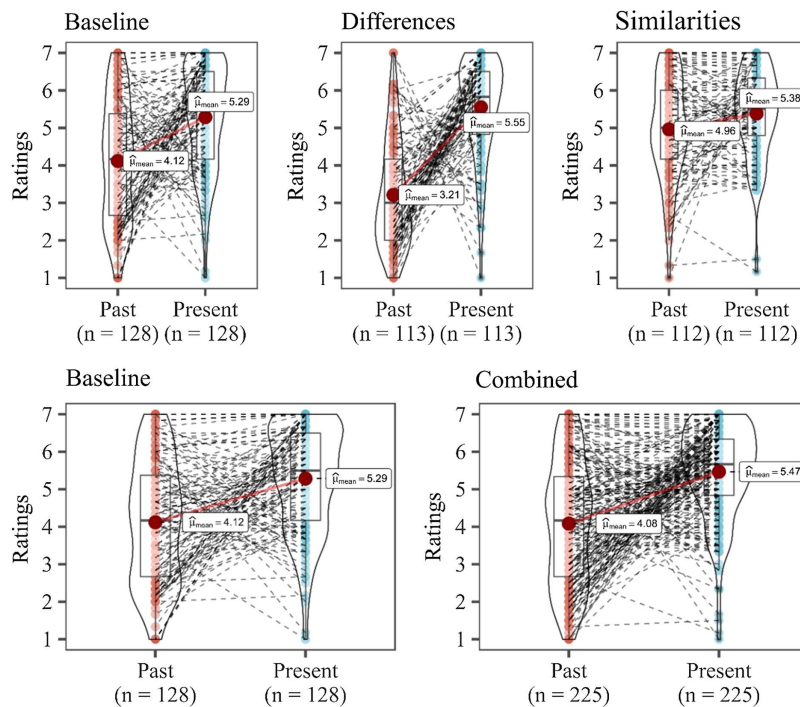
The main effect of target was significant, $b = 1.31$, $t(702) = 11.94$, $p < .001$, such that present selves were rated more positively than past selves (contrast = 1.31, $p < .001$, $d = 0.90$). The two dummy codes, which test the main effect of comparison against the baseline condition, showed that differences were rated more negatively, albeit not significantly so (contrast = 0.32, $p = .05$, $d = 0.26$). Similarities were rated more positively (contrast = 0.47, $p = .001$, $d = 0.38$). Consequentially, similarities were much more positive than differences (contrast = 0.79, $p < .001$, $d = 0.62$).

Importantly, these main effects were qualified by significant two-way interactions between the target and the baseline versus similarities comparison, $b = -0.74$, $SE = 0.26$, 95% CI [-1.25, -0.24], $t(700) = -2.90$, $p = .004$, and the target and the baseline versus differences comparison, $b = 1.17$, $SE = 0.26$, 95% CI [0.67, 1.67], $t(700) = 4.58$, $p < .001$.

In the baseline condition, past self-attributes were more negative than present self-attributes (contrast = 1.17, $p < .001$, $d = 0.70$), replicating the typical temporal self-appraisal effect found in the literature (e.g., Wilson & Ross, 2001). However, this effect was significantly larger in the differences condition (contrast = 2.34, $p < .001$, $d = 0.134$), but significantly smaller, and not statistically

Figure 4
Participants' Attribute Evaluations in Experiment 3 as a Function of Target (Within-Participants: Past Self vs. Present Self) and Comparison (Between: Baseline vs. Differences vs. Similarities)

Attribute Ratings



Note. The upper panel shows the three between conditions separately, and the lower panel combines the data from the similarities and differences conditions. The figure overlays box plots, scatter plots, and violin plots. See the online article for the color version of this figure.

significant, in the similarities condition (contrast = 0.42, $p = .22$, $d = 0.24$). When focused on differences, the past self was also more negative than the past self at baseline (contrast = 0.91, $p < .001$, $d = 0.38$).

To investigate our assumption that the typical temporal comparison effect constitutes a mixture of differences and similarities between the past and present selves, we compared the baseline condition with the combined similarities and differences conditions. Figure 4's bottom panel illustrates this comparison. As the bottom panel suggests, the Target (past vs. present) \times Comparison (baseline vs. combined) interaction was not significant, $p = .35$. For both the baseline (contrast = 1.17, $p < .001$, $d = 0.67$) and combined (contrast = 1.38, $p < .001$, $d = 1.05$) conditions, past attributes were more negative than present attributes. Ratings of the past self (contrast = 0.04, $p > .99$) and present self (contrast = 0.18, $p > .68$) were virtually identical in the baseline and combined conditions. These data are consistent with the assumption that appraisals of past and present selves appear to be a mix of similarities and differences of the self over time.

Overall Evaluations

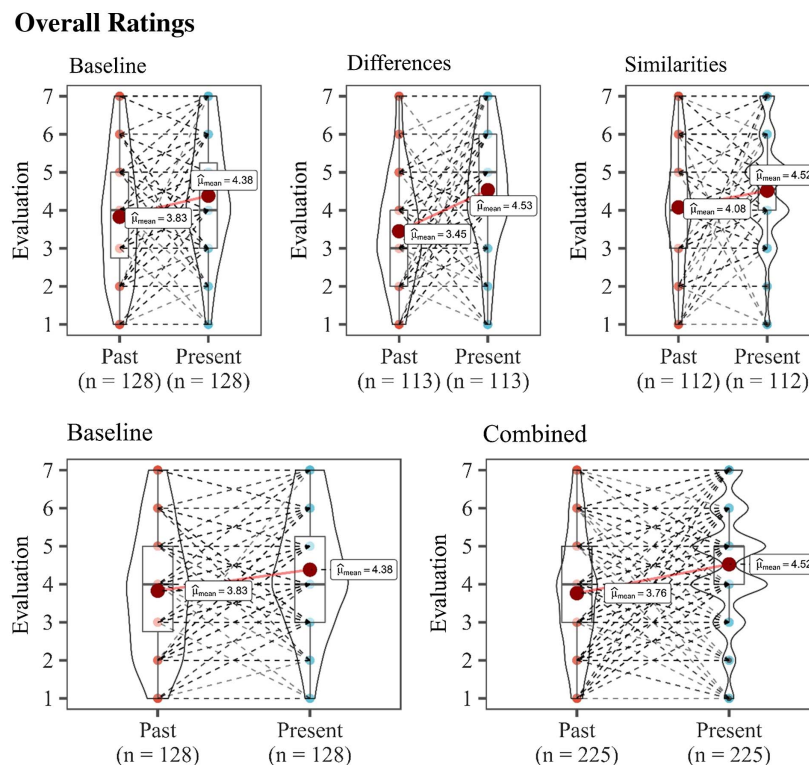
The overall evaluations showed the same pattern as the attribute ratings for the relevant effects. Figure 5 displays the relevant data. We conducted the same analyses with overall evaluations as the

outcome. The main effect of the target was significant, $b = 0.69$, $SE = 0.19$, 95% CI [0.50, 0.88], $t(700) = 7.08$, $p < .001$, such that present selves were rated more positively than past selves (contrast = 0.69, $p < .001$, $d = 0.75$). Two dummy codes reflecting the baseline versus differences and baseline versus similarities comparisons were not statistically significant ($ps = .47$ and 0.22, respectively).

This main effect was again qualified by a significant interaction between target and the baseline versus differences comparison, $b = 0.52$, $SE = 0.23$, 95% CI [0.07, 0.98], $t(350) = -2.90$, $p = .004$ (see Figure 5, top panel). In the baseline condition, past self-evaluations were more negative than present self-evaluations (contrast = 0.55, $p < .008$, $d = 0.37$), replicating the typical temporal self-appraisal effect (Wilson & Ross, 2001). However, this effect was much larger in the differences condition (contrast = 1.08, $p < .001$, $d = 0.68$), but smaller and nonsignificant in the similarities condition (contrast = 0.44, $p < .11$, $d = 0.27$).

Again, when the differences and similarities conditions were combined, the Target \times Comparison interaction was not significant, $p = .31$ (see Figure 5, bottom panel). Past attributes were more negative than present attributes in both the baseline (contrast = 0.55, $p < .004$) and combined (contrast = 0.76, $p < .001$) conditions. Ratings of the past self (contrast = 0.06, $p > .98$) and present self (contrast = 0.14, $p > .83$) were highly similar across the baseline and combined conditions. As with the attribute ratings, overall

Figure 5
Participants' Overall Evaluations in Experiment 3 as a Function of Target (Within-Participants: Past Self vs. Present Self) and Comparison (Between: Baseline vs. Differences vs. Similarities)



Note. The upper panel shows the three between conditions separately; the lower panel combines the data from the similarities and differences conditions. The figure overlays box plots, scatter plots, and violin plots. See the online article for the color version of this figure.

evaluations of past and present selves might be a mix of similarities and differences of the self over time.

Subjective Distance

We also correlated all self-evaluations with subjective temporal distance. We found that subjective distance correlated positively with overall past evaluations, $r = 0.15$, $t(351) = 2.78$, $p = .04$. Participants evaluated their distant past selves more positively than more recent past selves, which is opposite to predictions based on self-enhancement. However, given the correlation's low strength, we will not interpret it further. No other correlations with subjective distance were significant.

We also explored condition main effects and interactions, treating distance as both an outcome variable and a moderator variable. A one-way analysis of variance (ANOVA) testing whether subjective distance was different across the comparison conditions was not significant, $F(2, 350) = 0.02$, $p = .99$. Subjective distance was virtually identical across conditions and reflected a moderate degree of subjective distance ($M = 3.36$, $SD = 0.93$). This means that more negative past self-evaluations in the differences condition is unlikely due to participants distancing from their past selves. Including subjective distance as a moderator variable in the Comparison \times Distance interaction models showed no significant effects either. Distance did not moderate the baseline versus differences comparison, the baseline versus similarities comparison for past and present attribute ratings, or overall evaluations ($ps > .21$). Finally, all significant two-way interactions reported in the previous section that showed a stronger past self-disparagement effect in the differences condition compared to the similarities condition remained significant when including distance as a covariate. Thus, we found no evidence that subjective distance influenced the temporal self-appraisal effects found here.

Discussion

Experiment 3 replicates the findings from Experiments 1 and 2 with several additional key insights. First, the target effect in the baseline condition replicates prior research that the past self is evaluated more negatively than the present self when no explicit comparison is made salient (Wilson & Ross, 2001). This result is relevant in terms of convergent validity. Participants evaluated their past selves more negatively.

However, the present data align with the suggested cognitive-ecological explanation for this self-disparagement, namely that the effect might be a function of the comparison mode, independent from motivation to increase the self-worth of the present self. First, in the baseline condition, self-evaluations were statistically indistinguishable from the combination of similarity and difference judgments between the past and present selves. People in the baseline condition were free to bolster their present selves by disparaging their past selves to the same degree as people in the differences condition, but they did not do so. This suggests that temporal self-appraisals are driven by evaluative comparison processes, at least to the same degree, beyond motivational forces.

In addition, subjective distance had virtually no influence on evaluations of the past self. Past work showed that subjective distance manipulations moderate the past self-disparagement effect (Wilson & Ross, 2001), with more distance leading to greater

disparagement of the past self. We did not manipulate distance but measured it. However, we found no effect in Experiment 3 of distance, as well as the other studies prior. Participants were free to choose a temporal self that could also be objectively distant; they had the degree of freedom to disparage past selves in the service of self-enhancement. Nevertheless, feeling far from the past self did not translate into more negative evaluations of the past self.

Taken together, Experiments 1–3 provide data consistent with the mechanism that temporal self-appraisals follow from the interaction of social comparisons with the evaluative ecology. We consistently find the influence of comparison mode in interaction with the target. The motive to self-enhance by disparaging the past might also be at work. However, we argue that a more basic cognitive-ecological explanation also describes the temporal self-appraisal process. Motives may act on top of evaluative processes to override, attenuate, or exacerbate the default patterns, but we argue that the phenomenon itself is probably more basic. To further test this idea, the next section manipulates motivation in various ways and tests whether it moderates the basic pattern.

Part 2: Investigating Motives as a Moderator

In Part 2, we aim to manipulate the motivation to self-enhance, testing if it moderates the temporal evaluative asymmetry found in Part 1. If motivation to enhance the present self explains the past self-disparagement effects, then these effects should be exacerbated by motivation to self-enhance and attenuated when those motivations are not as strong. Moreover, self-enhancement motives should produce stronger present self-praise when participants are focused on distinct attributes of the present self (i.e., differences) because exaggerating present differences would be a viable self-enhancement strategy.

There are several ways to manipulate the motivation to self-enhance. In Part 1, we already presented some evidence (or lack thereof) based on temporal distance. However, temporal distance is an indirect way to manipulate the influence of motivation. This approach needs the additional assumption that it is easier to disparage the past self if it is farther away, and for our case, that it should mainly occur for the differences conditions. If participants evaluate their selves based on similarities, disparaging the past would negatively influence the evaluation of the present self.

In Part 2, we first summarize the evidence for temporal distance. As Part 1 already suggested, we find no effects of temporal distance on evaluations of the self. We then move to two experiments in which we directly manipulated self-enhancement motivations.

Manipulating and Measuring Temporal Distance

As discussed above, if motivation to self-enhance is a viable explanation for the temporal self-appraisal asymmetry, then greater distance to the past self should cause more disparaging. However, for the cognitive-ecological approach, subjective distance should not matter as the resulting asymmetry would arise from accurate perceptions of past and present attributes regardless of the distance between the past and present selves.

In Part 1, we measured self-continuity in Experiment 2 and subjective distance in Experiment 3. Although motivation should drive people to distance themselves from their past selves to see improvement, especially when the past self is negative in the previous differences conditions, we found no evidence that this occurred.

However, the lack of evidence might be due to measurement problems.

We also observed no difference when we compared temporal distance across experiments. Experiment 1 instructed participants to compare with the self from 1 year ago. Experiment S1 replicated Experiment 1 with the instruction to compare with the self from 10 years ago (see above, Figure 2 and Supplemental Figure S2). Please note that we relegated Experiment S1 to the Supplemental Material not due to methodological problems but because it only replicates Experiment 1 without substantial new evidence. Nevertheless, it allows a comparison of temporal distance across experiments.

In Experiment 1, participants evaluated the past self relatively negatively in the differences condition, $M = 2.98$, 95% CI [2.51, 3.44]. Experiment S1, when evaluating a self from 10 years ago, yielded a similar result, $M = 3.22$, 95% CI [2.81, 3.68]. As the confidence intervals suggest, these means do not differ statistically. An analogous pattern is visible when we compare the similarities conditions: In Experiment 1, the past self was much more positive when considering similarities, $M = 5.42$, 95% CI [4.95, 5.88]. Again, Experiment S1, when evaluating a self from 10 years ago, yielded a similar result, $M = 5.36$, 95% CI [4.99, 5.74]. As the confidence intervals suggest, these means do not differ statistically. Similarly, both experiments showed no differences when participants evaluated their present self positively compared to differences from the past from 1 year ago (Experiment 1), $M = 5.15$, 95% CI [4.61, 5.69], and 10 years ago, $M = 5.49$, 95% CI [5.03, 5.96]. Finally, the means also do not differ statistically when participants evaluated their present selves, comparing similarities from the past from 1 year ago (Experiment 1), $M = 5.68$, 95% CI [5.23, 6.13], and 10 years ago, $M = 5.80$, 95% CI [5.44, 6.16]. In short, across experiments, temporal distance did not matter for the present paradigm.

The Supplemental Material also reports Experiment S2. In this experiment, we manipulated the subjective distance to the past self within the same experiment while keeping the objective distance the same. We found no effect of this manipulation on participants' evaluations. However, different from Experiment S1, Experiment S2 has two drawbacks. First, it was not powered to detect a potential three-way interaction of target self (present vs. past), comparison (similarities vs. differences), and distance (near vs. far). Second, the items that should serve as a manipulation check failed to show a difference between distance conditions. Thus, Experiment S2 does not allow conclusions regarding the role of temporal distance on self-evaluations.

The following Experiment 4 addresses these shortcomings and aims to directly manipulate motivation by asking participants to be accurate or to self-enhance.

Experiment 4: Self-Enhancement Versus Self-Accuracy

As argued above, temporal distance is a rather indirect way to manipulate the motivation to self-enhance. A potentially more direct way would be a focus on self-enhancement versus self-accuracy. If people aim to report accurate evaluations of themselves, we should expect to see a pattern of temporal self-appraisal of negative past differences, slightly less positive present differences, and mostly positive similarities. Again, this pattern follows if we assume the constituents of the temporal evaluative ecology (see Table 1).

If, however, people are instructed to present the best possible evaluation of themselves, we should see that past differences are most

negative and present differences are most positive, as this pattern would highlight the greatest degree of improvement. At the very least, past differences should be more negative under instructions to self-enhance than instructions to be accurate, as the self-enhancement motive should lead to greater past self-disparagement (Wilson & Ross, 2001). Experiment 4 therefore employed instructions that should lead to a focus on self-enhancement or accuracy.

Method

Participants, Design, and Procedure

Participants were 300 adults ($M_{\text{age}} = 37.16$, $SD_{\text{age}} = 11.02$) who participated on Amazon Mturk for \$0.50. Although this sample size still falls short of what would be required to detect a medium-sized three-way interaction with 80% power, the more direct manipulation of the self-enhancement motive should lead to a stronger effect.

After providing consent, participants were randomly assigned to the conditions of a 2 (motive: enhancement vs. accuracy) \times 2 (target: past vs. present) \times 2 (comparison: similarities vs. differences) between-participants experiment. In the enhancement condition, participants were instructed to "imagine that you are applying for a job and are being asked to create a profile of your personal attributes and characteristics." They were told that their personal profile would be the first thing the hiring committee would see, so they should try to create the best personal profile they could. They were also told that each hiring committee member would see their profile. These instructions were meant to encourage participants to engage in self-enhancement.

In the accuracy condition, participants were instructed to "imagine that you are doing a self-awareness exercise and are being asked to create a profile of your personal attributes and characteristics." They were told that their personal profile would determine how the self-awareness exercise would look, so they should try to create the most accurate personal profile they could. They were also told that they would be the only person who would see their profile. These instructions were meant to increase the drive for accuracy and reduce the drive for self-enhancement relative to the enhancement condition. After being assigned to the motive conditions, participants were assigned to the same target and comparison conditions as in the previous experiments. Participants considered a past self from 1 year ago and typed four attributes of the target self in four separate text boxes.

Measures

After describing the target self, participants saw the four attributes they had typed previously and rated the valence of each one on a 7-point scale (1 = *extremely negative*, 7 = *extremely positive*; $\alpha = .93$). At the end, we also measured closeness to the past self with three items (e.g., "How close do you feel to who you were 1 year ago?" 1 = *not at all close*; 5 = *very close*). After completing the measures, participants read a debriefing statement and exited the study.

Results

Overall, as established by now, participants evaluated their attributes positively, $M = 5.21$, $SD = 1.92$, 95% CI [4.98, 5.42], $t(299) = 10.90$, $p < .001$. However, attribute ratings were moderated by condition. A three-way ANOVA predicting ratings from target,

comparison, motive, factors, as well as their interactions showed a main effect of target, $F(1, 292) = 70.86, p < .001, \eta_p^2 = 0.19$; participants rated present self-attributes more positively ($M = 5.94, SE = 0.13$) than past self-attributes ($M = 4.42, SE = 0.13$).

The effect of comparison was also significant, $F(1, 292) = 77.64, p < .001, \eta_p^2 = 0.20$; participants rated similarities more positively ($M = 5.94, SE = 0.13$) compared to differences ($M = 4.42, SE = 0.12$). There was no main effect of motive on ratings, $F(1, 292) = 0.11, p = .74, BF(10) = 0.19$.

The main effects were qualified by a significant two-way interaction between target and comparison, $F(1, 292) = 31.20, p < .001, \eta_p^2 = 0.09$. Neither other two-way interactions were significant, $p_s > .16, BF(10) < 0.51$, nor was the three-way interaction, $p = .90, BF(10) = 0.13$. Figure 6 shows the attribute ratings collapsed across the motive conditions.

The simple effects from the Target \times Comparison interaction showed that participants evaluated past differences more negatively compared to all other conditions (vs. past similarities: contrast = 2.53, $p < .001$; vs. present differences: contrast = 2.52, $p < .001$; vs. present similarities: contrast = 3.09, $p < .001$). No other simple effects were statistically significant ($p_s < .11$).

Supplemental Analyses

As in prior studies, we also measured closeness to the past self with three items (e.g., "How close do you feel to who you were 1 year ago?" 1 = *not at all close*; 5 = *very close*) at the end of the study. A two-way ANOVA with target, comparison, and the Target \times Comparison

interaction as factors was used to test whether closeness differed across conditions. As would be expected, participants felt further from their past selves in the differences condition ($M = 3.00, SE = 0.08$), compared to the similarities condition ($M = 3.89, SE = 0.08$), $F(1, 296) = 58.56, p < .001, \eta_p^2 = 0.16$. Closeness did not differ significantly across the target conditions, $F(1, 296) = 0.15, p = .70$, and the interaction was not significant, $F(1, 296) = 1.89, p = .17$.

Finally, treating closeness as a continuous predictor in a Target \times Comparison \times Closeness interaction did not reveal a significant result, $\beta = -0.04, SE = 0.34, t(292) = 0.20, p = .84, BF(10) = 0.16$. Moreover, including closeness as a covariate did not influence the Target \times Comparison interaction, which remained significant, $F(1, 291) = 30.04, p < .001, \eta_p^2 = 0.09$.

Discussion

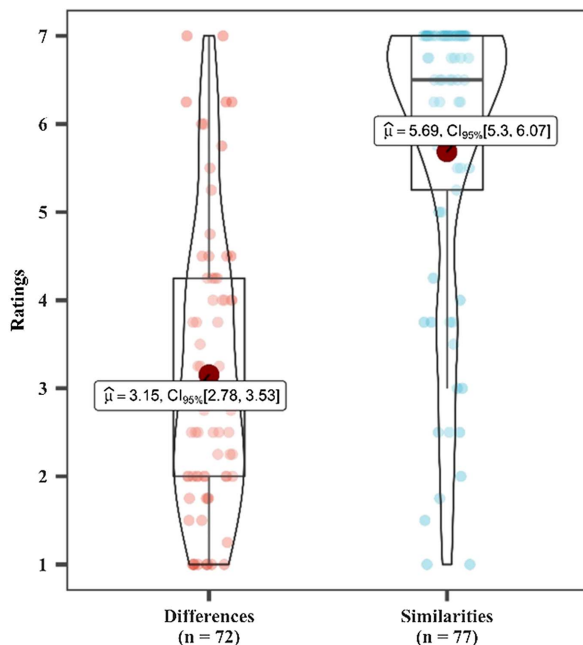
Once again, past differences were evaluated most negatively compared to all other target/comparison combinations. This asymmetry was not influenced by our instructions that aimed to activate self-enhancement or self-accuracy motives. The Bayes factors for the two- and three-way interactions, including this variable, favored the null hypothesis.

When examining only a two-way interaction between target and motivation, no significant moderation of the target effect was observed ($p = .12$), and descriptively, the most positive ratings were given to the present self in the accuracy condition. Descriptively, the patterns of means across the two motivation conditions in Experiment 4 appear to be almost identical. When considering the

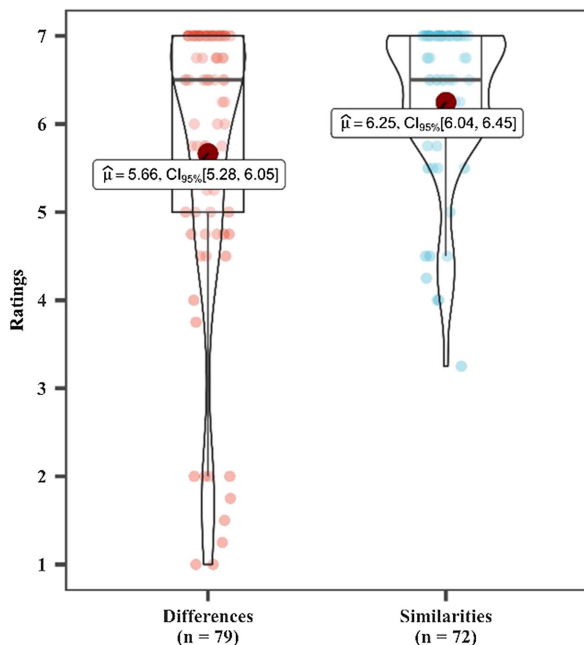
Figure 6

Participants' Attribute Evaluations in Experiment 4 as a Function of Target (Past Self vs. Present Self) and Comparison (Differences vs. Similarities)

Target: Past Self



Target: Present Self



Note. The data are collapsed across the manipulation of self-enhancement versus accuracy motives. The figure overlays box plots, scatter plots, and violin plots. CI = confidence interval. See the online article for the color version of this figure.

data together with Experiments 1–3, motivation may not strongly factor into the temporal self-appraisal processes in our paradigm.

Of course, it is possible that this manipulation was not strong enough to influence participants' ratings or that our measures and manipulations have been ineffective. It may be that self-enhancement via past self-derogation is such an ingrained process that it happens almost inevitably, despite variation in temporal distance, subjective distance, and activation of different motives. As long as the self is the target, the drive to derogate the past self may trump situational factors that would otherwise influence appraisals.

Experiment 5 presents our final attempt to show that the negative evaluation of the past self, at least in the present setup, might follow from motivational forces. To do so, we changed the comparison target from the self to an acquaintance.

Experiment 5: Evaluating an Acquaintance

People are less likely to derogate others' past selves (Wilson & Ross, 2001), presumably because the motivation to derogate the past self of another person should be low. There would be little advantage for the self to see others as improving over time, and in fact, one could imagine that misperceiving others as better than they are could serve as a disadvantage; the negative consequences of trusting in nonexistent positive attributes and abilities of others could be large. However, if temporal appraisals lead to accurate perceptions of stability and change in the self and others over time, and we assume that the temporal ecologies' constituents (frequency, diversity, and growth) underlie those appraisals, then we should expect temporal appraisals of others to follow the same pattern as temporal appraisals of the self. That is, if others possess more positive than negative attributes and typically improve at the same rate as oneself, then the evaluative asymmetry found in Experiments 1–4 should be evident to the same degree when evaluating others. Experiment 5 tests this pattern by changing the target from the self to an acquaintance.

Method

Participants and Design

Participants were 199 adults ($M_{\text{age}} = 33.50$, $SD_{\text{age}} = 7.81$) who participated on Amazon Mturk for \$0.50. This sample size allowed us to detect a similarly sized interaction effect as obtained in the previous experiments with 80% power ($\alpha = .05$). After providing consent, participants were randomly assigned to the same 2 (target: past vs. present) \times 2 (comparison: similarities vs. differences) between-subjects conditions as before. However, different from before, participants were told that we were interested in how they think about others and were asked to bring to mind an acquaintance they had known for at least 1 year. Participants then wrote that person's name in a text box, indicated the duration of the relationship with that acquaintance in months, and generated four attributes consistent with their assigned conditions.

Measures

After describing the acquaintance, participants saw the four attributes they had generated and rated the valence of each one on a 7-point scale (1 = *extremely negative*, 7 = *extremely positive*; $\alpha = .85$). After completing the tasks and measures, participants read a debriefing statement and exited the study.

Results

We excluded 26 participants who did not follow instructions to describe an acquaintance that they had known for more than 1 year. The final sample consisted of 173 adults ($M_{\text{age}} = 33.84$, $SD_{\text{age}} = 9.71$, 59% male). On average, participants had known their acquaintance for 4.05 years ($SD = 4.16$).

Figure 7 shows the attribute ratings as a function of target (past vs. present) and comparison (similarities vs. differences). Overall, participants' evaluations of their acquaintance's attributes were positive, $M = 5.18$, $SD = 1.73$, 95% CI [4.92, 5.44], $t(171) = 8.95$, $p < .001$, against the mean of the scale. Similar to the prior experiments, the comparison conditions moderated the ratings. A two-way ANOVA predicting ratings from target, comparison and the Target \times Comparison interaction revealed an effect of target, $F(1, 168) = 17.77$, $p < .001$, $\eta_p^2 = 0.09$, such that present attributes were rated more positively ($M = 5.62$, $SE = 0.16$) than past attributes ($M = 4.62$, $SE = 0.17$). The effect of comparison was also significant, $F(1, 168) = 29.58$, $p < .001$, $\eta_p^2 = 0.14$, such that similarities were rated more positively ($M = 5.76$, $SE = 0.16$) compared to differences ($M = 4.48$, $SE = 0.17$).

The main effects were qualified by an interaction between target and comparison, $F(1, 168) = 6.29$, $p = .01$, $\eta_p^2 = 0.03$. Past differences were evaluated more negatively compared to all other conditions (vs. present differences: contrast = 1.59, $p < .001$, $d = 0.72$; vs. past similarities: contrast = 1.87, $p < .001$, $d = 0.90$; vs. present similarities: contrast = 2.29, $p < .001$, $d = 1.08$). Present differences were also evaluated more negatively than present similarities, although the effect was smaller and not significant at standard α levels (contrast = 0.70, $p = .05$, $d = 0.33$). No other simple effects were statistically significant ($ps > .22$).

Supplemental Analyses

We also tested whether the duration of knowing the acquaintance influenced the temporal appraisal effect. When including duration as a covariate in the ANOVA from above, the interaction between target and comparison became stronger, $F(1, 164) = 8.11$, $p = .005$. Including duration as a continuous predictor of ratings in a Target \times Comparison \times Duration interaction did not reveal a significant effect, $\beta = 0.01$, $SE = 0.01$, $t(161) = 0.04$, $p = .97$.

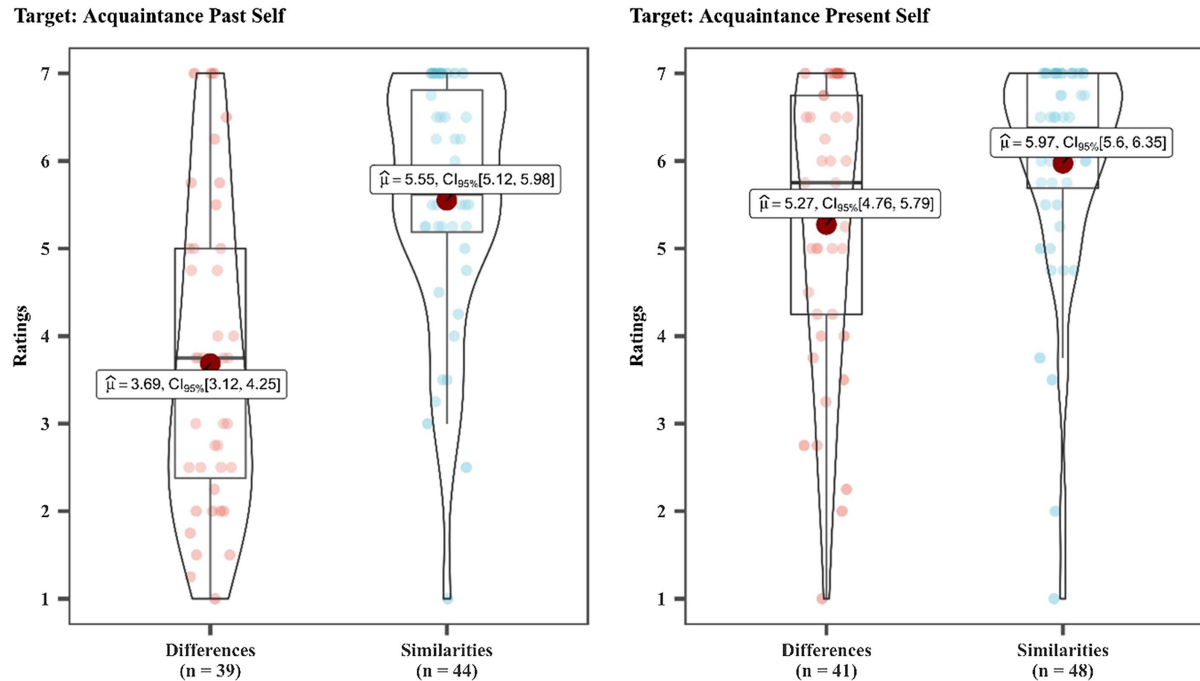
Discussion

Experiment 5 shows that past differences of an acquaintance are also evaluated negatively compared to all other target/comparison pairs. Even when evaluating an acquaintance, the pattern of results resembles those from Experiments 1–4 when participants evaluated themselves. This finding would be surprising under a motivational account of temporal appraisal effects. However, it aligns with the present cognitive-ecological approach, suggesting that self and other temporal comparison effects arise from a similar process in a consistent temporal information ecology (see also the simulation in the Supplemental Material).

Obviously, we cannot rule out motivation to self-enhance. For example, one explanation of these findings is that participants were still motivated to enhance the acquaintance in a way that would reflect positively on themselves, something akin to basking in reflected glory (Cialdini et al., 1976).

Figure 7

Participants' Evaluations of an Acquaintance's Attributes in Experiment 5 as a Function of Target (Acquaintance Past Self vs. Acquaintance Present Self) and Comparison (Differences vs. Similarities)



Note. The figure overlays box plots, scatter plots, and violin plots. CI = confidence interval. See the online article for the color version of this figure.

However, based on the presented five experiments and the data in the [Supplemental Material](#), we believe that there is good evidence to assume that negative evaluations of the past follow from the structure of the information ecology. This structure predicts that similarities are positive and differences are negative (see [Alves et al., 2017a](#)). In addition, people indeed become better over time. Thus, comparisons of a person over time, whether the self or someone else, produce evaluations that enhance the present, but these evaluations need not be motivated.

Part 2 investigated motivation, which should influence the temporal self-appraisals if they are driven by motives to self-enhance. We did not find evidence for motivated processes. However, Part 2 largely argued with the absence of evidence. Part 3 will provide evidence for the influence of the ecology on temporal self-appraisal, showing that known properties of the ecology influence temporal self-appraisals.

Part 3: Examining the Ecology as a Moderator

Our explanation of the temporal self-appraisal effects found in the last five experiments is that positive attributes are more prevalent and less diverse than negative attributes ([Alves et al., 2017b, 2019; Unkelbach et al., 2019](#)), and that the self improves over time, which creates an asymmetry in temporal self-appraisals. Past differences are more negative than similarities, but present differences are not. Although there was some evidence that present differences were evaluated more negatively than similarities, the effects were rather weak. However, these effects do not support a motivated self-

perception, as people should evaluate present differences positively to enhance the self. Instead, we suspect these evaluations are accurate: The present self has the benefit of growth and improvement, effectively blocking the probabilistic necessity that present differences would be negative under the frequency ([Alves et al., 2017a](#)) and diversity principles ([Koch et al., 2016](#)).

One test that derives from the cognitive-ecological approach is to change the ecology, an approach we also employed in other investigations (e.g., [Alves et al., 2018; Unkelbach et al., 2008](#)). Please note that we have manipulated the cognitive side by asking for similarities and differences so far. In Experiments 6 and Study 7, we now manipulate the constituents of the applicable information ecology. Namely, we will ask participants to evaluate aspects of themselves that are not likely to improve at all stages of life and may even begin to decline past middle age. In other words, we use ecologies where the growth principle (see [Table 1](#)) does not apply.

Experiment 6: Comparing Physical Attributes

In Experiment 6, we focus on physical attributes, as physical attributes are likely to be stable or decline as people become older. When people bring to mind physical attributes, we should not expect to see the same asymmetry found in previous studies if those findings are due to cognitive-ecological perceptions. Under the cognitive-ecological model, we should find a main effect, such that differences are evaluated more negatively than similarities. Conversely, under the motivated self-perception model, people should disregard the

reality that physical attributes typically decline over time and instead exaggerate negative past differences and positive present differences. Thus, Experiment 6 creates an information ecology that implies decline, not growth, and thus allows us to test the cognitive-ecological account.

Method

Participants and Design

Participants were 303 adults ($M_{\text{age}} = 34.80$, $SD_{\text{age}} = 10.17$) who participated on Amazon Mturk for \$0.50. As before, this sample size allowed us to detect a similarly sized interaction effect as obtained in the previous experiments with 80% power ($\alpha = .05$). After providing consent, participants were randomly assigned to the same 2 (target: past vs. present) \times 2 (comparison: similarities vs. differences) between-participants conditions. However, participants in this experiment were told that we were “interested in how people think about physical aspects of themselves, such as their physical characteristics, fitness, health, and so on.” Participants described the target self by typing four physical attributes in separate text boxes.

Measures

After describing themselves, participants were shown the four attributes they had generated and were instructed to rate the valence of each one on a 7-point scale (1 = *extremely negative*, 7 = *extremely positive*).

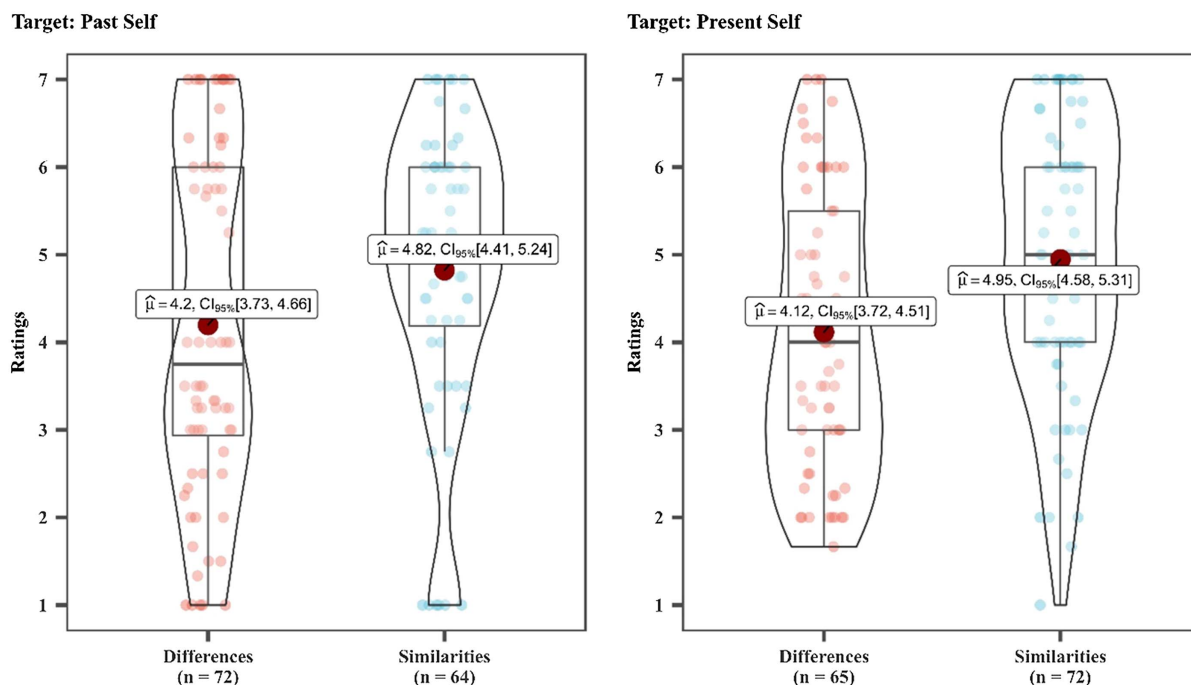
After completing the tasks and measures, participants read a debriefing statement and exited the study. Two research assistants blind to condition and hypotheses first coded each attribute to ensure adherence to the study instructions (1 = *physical attribute*, 0 = *nonphysical attribute*, -99 = *unsure*). Agreement between raters was high ($\kappa = 0.80$, $z = 27.93$, $p < .001$). We removed attributes that did not adhere to the instructions (i.e., were not coded by both raters as physical attributes) and created an average evaluation for the remaining attributes using participants' evaluations. A total of 273 participants were retained in this final data set, meaning that 30 of the original 303 participants did not produce a single physical attribute, as determined by the two raters.

Results

Overall, participants' evaluations of physical attributes were positive, $M = 4.52$, $SD = 1.74$, 95% CI [4.32, 4.73], $t(272) = 4.97$, $p < .001$, suggesting that even physical attributes are more positive than negative and thus adhere to the frequency principle. As in past studies, these ratings were moderated by condition. Figure 8 presents the physical attribute ratings as a function of target and condition. Figure 8 suggests that, and different from before, only the main effect of comparison was significant, $F(1, 269) = 12.36$, $p < .001$, $\eta_p^2 = 0.04$. Similarities were rated more positively ($M = 4.88$, $SE = 0.15$) than differences ($M = 4.16$, $SE = 0.15$). The main effect of target, $F(1, 273) = 0.09$, $p = .77$, and the Target \times Comparison interaction, $F(1, 269) = 0.24$, $p = .62$, were not significant.

Figure 8

Participants' Evaluations of Physical Attributes in Experiment 6 as a Function of Target (Past Self vs. Present Self) and Comparison (Differences vs. Similarities)



Note. The figure overlays box plots, scatter plots, and violin plots. CI = confidence interval. See the online article for the color version of this figure.

Discussion

As expected from a cognitive–ecological approach, Experiment 6 did not show an interaction between the target and comparison conditions. The only significant effect that emerged when participants evaluated physical traits was the main effect of comparison, such that differences were rated less positively than similarities. This experiment supports the ecological approach; in an ecology that cannot show growth up from a certain age point, only the typical main effect of comparison mode remains that differences are less positive than similarities (i.e., the “common good” phenomenon; [Alves et al., 2017a](#)). On the other hand, from a motivated self-perception account, there is little reason to assume that participants are not motivated to enhance their physical attributes (e.g., to perceive themselves in good health and physical standing).

Thus, the more likely explanation is that people are reporting an accurate perception of the self over time. Because physical attributes tend to improve in early life but stabilize and even decline later in life, present differences will also tend to be negative. Although physical attributes of the present self are more positive than negative overall, the statistical necessity that differences are negative (see [Figure 1](#)) is not buffered by continued growth through middle and later life. As physical attributes should become relatively more negative in middle and later life, the growth component is no longer present (see [Table 1](#)), and only the “common good” phenomenon remains. The previous interaction of comparison mode and target is likely due to the combination of positivity prevalence with factual growth.

Experiment 6 thereby suggests a further test. As growth is most likely negatively accelerated (i.e., older people should show less growth than younger people), the observed interaction in the previous studies should vary as a function of participant age. Study 7 addresses this implication by combining relevant data from the prior experiments and examining temporal self-appraisal effects across the lifespan.

Study 7: Temporal Self-Appraisal Across the Lifespan

Our proposed growth principle is supported by systematic reviews of the developmental trajectory of self-evaluations over time. For instance, self-esteem generally improves through adolescence and early adulthood but rapidly declines in older age ([Robins & Trzesniewski, 2005](#)). Others have suggested that this rise and fall of favorable self-evaluation coincides with a stark increase in physical and cognitive abilities through early and middle adulthood, as well as new opportunities related to career, financial, relational security, status, and so on ([Demo, 1992](#)). However, these improvements and opportunities also decline in late adulthood and old age, as do favorable self-evaluations. In sum, through processes of reinforcement, learning, and true developmental change, people are likely to improve over time for much of their lives, with decline being common in older age.

Thus, as the growth principle becomes weaker or even reverses for older adults, the cognitive–ecological approach predicts that negative evaluations of past self-differences should become weaker and negative evaluations of present self-differences should become stronger (i.e., due to a negatively accelerated growth curve). In these predicted directions, evidence for moderation by age would provide evidence that temporal self-appraisals reveal mostly accurate perceptions of self-attributes over time.

Such a result is also not predicted by a motivational account. A motivational account would still predict that older adults practice past self-disparagement. Otherwise, one would need to assume that older adults have less motivation to self-enhance, despite perceiving little improvement, and even decline, from their past selves ([Fleeson & Heckhausen, 1997](#); [Ryff, 1991](#)).

Alternatively, older adults would need to choose present attributes that still improve with age and thereby positively impact self-worth, for instance, wisdom or compassion, and derogate the past self on these dimensions to perceive improvement (see [Wilson & Ross, 2001](#)). However, if the data for older adults aligns with Experiment 6, then the cognitive–ecological account would be supported.

Method

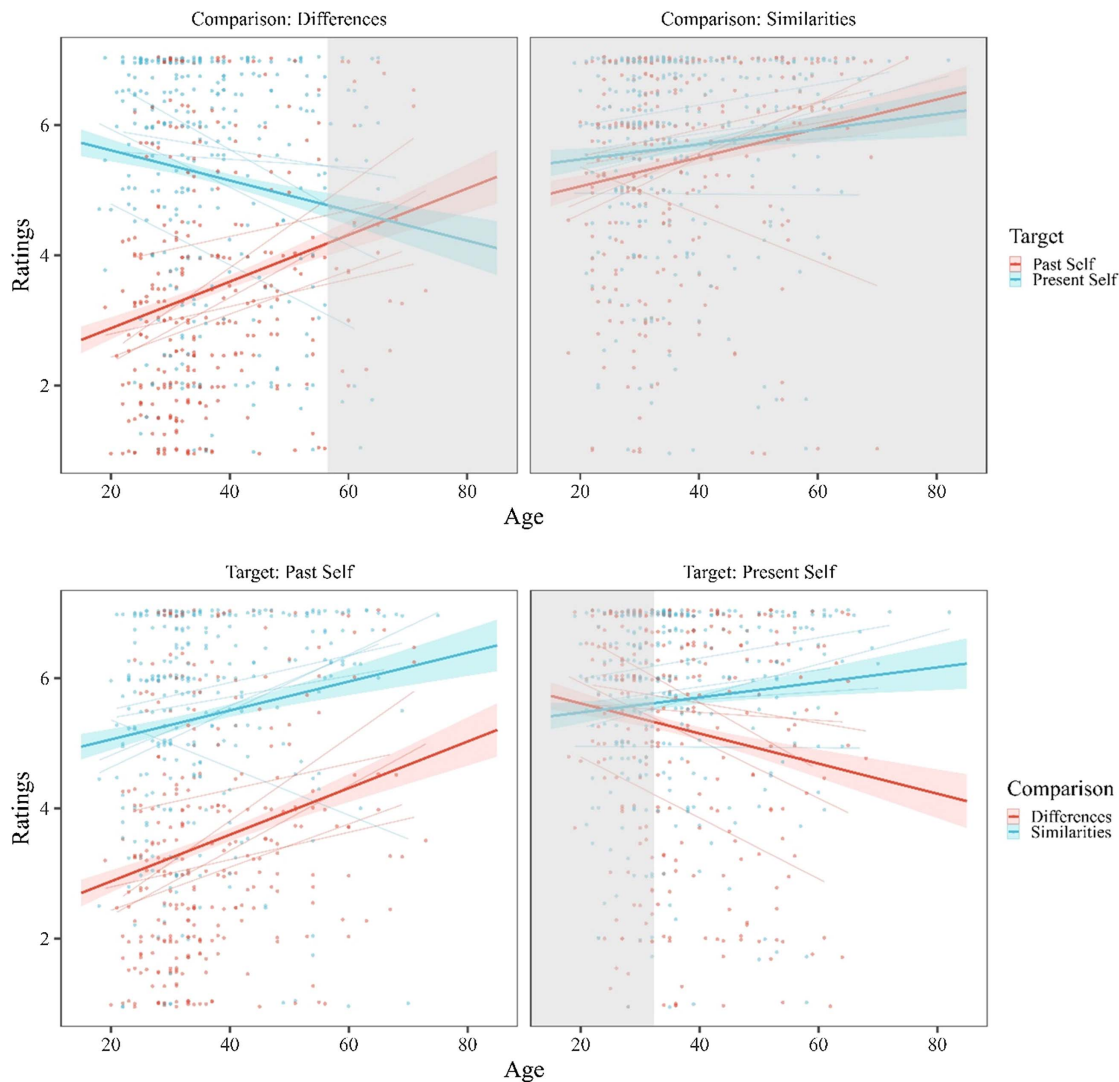
We combined the data from the experiments in which participants evaluated self-attributes in a between-subjects design and where we had age data. These were Experiments 1, 4, 5, and 6. In addition, we included Experiment S1, which we relegated to the [Supplemental Material](#), not for methodological reasons but for reasons of space. The combined sample included 1,214 participants ($M_{\text{age}} = 36.91$, $SD_{\text{age}} = 11.61$). We used a mixed-effects regression model to test the hypothesis that the evaluative asymmetry found consistently in prior studies would be particularly apparent for younger adults. We included mean attribute ratings as the outcome and target, comparison, and age as predictors, with all two- and three-way interactions. We included a random intercept for ratings across studies to account for between-study variations.

Results

[Figure 9](#) presents the regression results for age. The top panel shows the attribute ratings split by comparison (similarities vs. differences), and the bottom panel shows the attribute ratings split by target (past self vs. present self; see below for more details). [Figure 9](#) suggests that we found the predicted three-way interaction between target, comparison, and age, $b = 0.049$, $SE = 0.02$, $t(1209.62) = 3.04$, $p = .002$. Including the three-way interaction increased model fit significantly over a model including only main effects, $\chi^2(4) = 87.85$, $p < .001$, and a model including only main effects and two-way interactions, $\chi^2(1) = 9.21$, $p = .002$.

We decomposed the three-way interaction by first calculating Johnson–Neyman significance regions for the Target \times Comparison interaction across participant age. The interaction was only significant for participants younger than 52.78 years old ($p < .05$), suggesting that the interaction (or evaluative asymmetry) found in prior studies is stronger for younger participants in the sample. Further decomposition of this interaction shows that the past self-disparagement effect was not significant in the similarities condition and only significant ($p < .05$) for participants younger than age 56.42 in the differences condition ([Figure 9](#), top panel; the nonshaded areas). In other words, disparagement of the past self only occurred for younger participants when evaluating differences. We also examined in which conditions and at what age the differences-are-negative effect was significant. When focused on the present self, differences were more negative for participants older than 32.30 ($p < .05$), but when focused on the past self, differences were more negative for the entire range of ages in the combined sample (see [Figure 9](#), bottom panel).

Figure 9
Participants' Attribute Evaluations as a Function of Age



Note. Comparison of attributes in Study 7 as a function of target (past self vs. present self) and comparison (differences vs. similarities). To highlight the three-way interaction, the top panel splits the data by comparison, and the bottom panel by target. Nonshaded areas reflect ages where differences across target are significant at $p < .05$. Nonshaded areas reflect ages where differences across comparison are significant at $p < .05$. See the online article for the color version of this figure.

A final interpretation of the three-way interaction was made by looking at the simple slopes of age on ratings within the target and comparison conditions. Present self-ratings became more negative with age when focused on differences, simple slope = -0.02 , $SE = 0.01$, $p < .01$, but more positive when focused on similarities, simple slope = 0.03 , $SE = 0.01$, $p < .01$. Past self-ratings did not change significantly with age when focused on similarities, simple slope = 0.01 , $SE = 0.01$, $p = .18$, whereas present self-ratings became more positive with age when focused on similarities, simple slope = 0.02 , $SE = 0.01$, $p = .01$.

Discussion

The results from the combined data follow the predictions from the temporal EvIE model. For younger adults, past differences are

overwhelmingly negative relative to all other comparisons. As age increases, these negative evaluations became less pronounced; indeed, past differences became more positive and present differences more negative over the lifespan. Overall, older adults evaluate all differences as more negative. Although older adults could choose to derogate only past selves or praise only present selves, they did not do so in this study.

As age is our proxy for potential growth, and growth is the component of the EvIE that is central for temporal self-appraisals, the data support the moderation of the basic effect by the ecology. One might add assumptions to explain these data from a motivational perspective. However, we believe that a cognitive-ecological approach provides the most parsimonious explanation.

General Discussion

People are motivated by a desire to feel good about themselves. So, it is understandable that a theory of temporal self-appraisal would apply this core aspect of the self to explain the observed effects of temporal comparisons. However, as we have argued and now shown, effects of temporal self-appraisal may follow directly from basic cognitive and ecological aspects of comparative judgment. Because people evaluate targets based on their distinct features relative to some standard and because distinct features of those targets are statistically likely to be negative in the typical evaluative ecology, the resulting evaluation is also likely to be negative (Alves et al., 2017a, 2018). We show that the same principles apply beyond comparisons of targets to comparisons of the self over time.

The present research departed from prior research in one important way. We explicitly asked participants to generate relative judgments of past and present selves, whereas, in past research, participants did not, although they could have been making relative judgments nevertheless (Wilson & Ross, 2001). This is important because our method allows us to examine how people perceive their distinct present self-attributes. A person guided by a motive to self-enhance would not want to perceive the present self as less positive, but we find some evidence that this is the case when reality constrains the kinds of information being evaluated (Experiments 6 and Study 7).

Similarly, when evaluating an acquaintance or when prompted to make accurate (vs. enhanced) self-evaluations, present self-differences were more positive than past self-differences. Moreover, other motivational variables did not seem to moderate this effect. Together, our findings match what would be expected from basic comparison processes occurring in an information ecology where positive attributes are more frequent and negative attributes are more diverse (Unkelbach et al., 2019, 2020). When positive attributes are more frequent and more similar, the self will be more negative (or less positive) on average when evaluated based on its differences (see Figure 1). This outcome is less pronounced for the present self because of a third property of the temporal information ecology: Positive information is reinforced over time, leading to actual growth. This third principle balances negative present differences with positive ones.

Changing the Ecology Versus Changing Motivation

The presented data align with the cognitive–ecological approach for two reasons. First, we consistently found that the cognitive process (i.e., comparisons based on similarities or differences) has the predicted outcome, replicating a “common good” phenomenon over time (see Alves et al., 2017a). Second, when we changed the assumed properties of the ecology (Experiment 6 and Study 7), we observed the predicted changes in the outcomes of temporal self-appraisal. When participants evaluated physical attributes, which should show no growth when people get older, the typical asymmetry in temporal self-appraisal was replaced with a main effect, such that differences of both the past and present selves were evaluated less positively. Similarly, older adults evaluated past and present attributes less positively when we combined all samples. Indeed, there was a trend for older adults to evaluate past differences more positively than present differences—a reversal of the asymmetry found for younger adults.

This finding aligns with prior research. In tests of the EvIE, reversing the information ecology (e.g., to make negative information

more frequent than positive information) was also shown to produce consistent changes to the consequences of social comparison. For instance, although focusing on differences in an ecology where positive information was frequent, participants evaluated new individuals from an outgroup negatively, as the new individuals are evaluated based on their differences. However, those same individuals were evaluated positively when the negative information was frequent in the information ecology (Alves et al., 2018).

These findings do not disprove the influence of self-enhancement motives. For example, one explanation might be that motivation to self-enhance is reduced when evaluating physical characteristics or when one is getting older. However, physical health is considered one of many “ulterior” interests that are “relevant to virtually all experiences that bear on the well-being of the self” (Alicke & Sedikides, 2009; p. 7). Moreover, research has shown that the self-enhancement motive does indeed apply to physical traits and attractiveness (Alicke & Sedikides, 2009; Bleske-Rechek et al., 2008; Epley & Whitchurch, 2008; Gabriel et al., 1994). It is reasonable to predict that participants would be motivated to enhance their physical attributes when given the chance to select and evaluate physical characteristics that they have gained over time (i.e., present differences). We found no evidence for such motivated comparison processes.

Thus, we believe the more plausible explanation for the findings of Experiment 6 and Study 7 is that the properties of the temporal information ecology are different for physical attributes and older adults. It is a biological inevitability that our physical attributes decline throughout the lifespan and begin as early as our 20s and 30s (Hall et al., 2017; Thompson et al., 2014). Thus, as people get older, improvement begins to slow down, and perhaps the ecology reverses completely under some circumstances (e.g., in extreme old age or when one contracts a terminal illness). Without the growth principle acting to reinforce and add positive attributes (and remove negative attributes) to the ecology, the evaluative asymmetry found in Experiments 1–5 disappears.

To summarize our claims based on these data, we propose that the evaluative ecology is both a constraint and an affordance. When reality constrains self-enhancement, evaluations are more negative. When reality affords self-enhancement, evaluations are more positive. We have outlined a model in which a single cognitive process (comparison) interacts with features of the world (positivity prevalence, negativity diversity, growth) that can explain the full range of evaluations that result from temporal self-appraisals. Thus, reality (i.e., the ecology) may have a stronger influence on temporal self-appraisals than previously thought.

Implications for Self-Continuity

Self-continuity, or the feeling that one’s present self is connected with past and future selves, is often viewed as a precursor to psychological health and well-being, shown to be associated with successful long-term relationships and a supporter of life satisfaction, to name just a few (Sani, 2010). For this reason, people need to maintain self-continuity (Bluck & Alea, 2008), which implies that self-continuity is something that people can construct themselves, a self-perception that people need for positive psychological functioning. Our current model suggests, however, that the link between self-continuity and positive psychological outcomes could be a natural result of evaluations of the self over time in an

information ecology with the properties specified above (see Table 1). When asked to consider if oneself is continuous and stable over time, some people may test the hypothesis “How have I stayed the same?” and look for similarities in the self over time. This evaluation is likely to bring to mind positive self-attributes.

People may also focus on the attributes first rather than the comparison. Making a judgment about self-continuity could start with selecting an important or defining attribute and testing whether that attribute has remained a defining characteristic over time. If most people are positive most of the time, selecting positive traits to test this hypothesis will likely result in a heightened sense of continuity.

Thinking about self-continuity as an interaction between temporal self-comparison and the temporal EvIE might lead to novel hypotheses. For instance, it should be the case that self-continuity is associated with less positive outcomes in an evaluative ecology that favors negative information. Indeed, if things have always been bad, looking for similarities should bring to mind mostly negative information, making self-continuity a negative experience. Future research may incorporate aspects of the temporal EvIE into the study of self-continuity to gain more insight into its source and relation to psychological well-being. For instance, younger adults report lower self-continuity and self-concept clarity than older adults but are more likely to use their autobiographies to develop a sense of continuity (Bluck & Alea, 2008). How does chronic focus on similarities and differences shape these trends, and How would these comparisons interact with changes to the EvIE? Very little is known about these basic cognitive–ecological foundations of self-continuity.

The Growth Principle

The growth principle sets a temporal information ecology apart from a standard ecology: Positive attributes are reinforced over time. Consider the attributes of a person as if they are arranged in a network, with some attributes being highly connected (i.e., similar) and others being highly disconnected (i.e., dissimilar; see Dalege et al., 2017, 2018, 2019). In such a network, similar and connected attributes would reinforce one another, whereas dissimilar and disconnected attributes would not. For instance, being considerate might also reinforce being caring because the respective behaviors are similar and tend to co-occur. In contrast, two dissimilar attributes, such as careless and fearful, would not reinforce each other to the same degree, as the two tend not to co-occur. When considered in a network, the similarity between attributes is directly related to how “activated” those attributes are. This will apply not only to how those attributes manifest in behavior (e.g., acting considerate also makes one caring) but also to how salient they are in cognition (e.g., thinking about how one is considerate also brings to mind how one is caring). Over time, this positive attribute network grows in strength and size because activating positive attributes that one possesses now (either through behavior or in cognition) is likely to activate closely related positive attributes that one does not yet possess. Although this idea is speculative and theoretical, similar principles have been shown to operate at the level of attitudes (Dalege et al., 2017, 2018, 2019).

These ideas are currently limited by a lack of empirical evidence. We strongly believe that positive attributes are reinforced over time, as discussed in the introduction. However, we do not know whether this follows from the diversity principle or, for example, forces outside the individual or even forces (e.g., motivation) inside the

individual. Future research may test whether positive attributes strengthen and grow over time because these attributes are more similar to one another. Additionally, it should be confirmed that new positive attributes that individuals gain are highly contingent on one or more existing positive attributes. New statistical methods and tools would allow us to test these predictions using attribute network models. In future research, measures of network strength for both positive and negative attributes could be used to predict variability in temporal self-appraisal effects.

The growth principle also predicts that, for much of one’s life, the diversity of positive attributes should shrink over time. This principle could explain why self-concept clarity, or the feeling that one’s self-concept is clearly and confidently defined, is so strongly associated with positive self-regard (Campbell et al., 1996) and increases with age (Bluck & Alea, 2008). Over time, positive attributes tend to group tightly into a strongly connected attribute cluster. These attributes would be more accessible in the self-concept and, because they reinforce one another, would be judged more confidently and clearly as part of one’s self. More research is needed to understand better what these attribute networks look like across the lifespan and how they relate to temporal self-appraisal and other aspects of the self, such as clarity and continuity.

Finally, the growth principle must have boundaries; people will not improve over time *ad infinitum*. As Study 7 suggested, many attributes will stabilize or even decline again over time. This is self-evident for physical attributes but might also be true for psychological attributes. Thus, a negatively accelerated or even an inverse U-shape function seems a potential candidate to model growth as the third structural property, beyond frequency and diversity, in a temporal ecology.

Limitations

We need to acknowledge several limitations of the presented research. First, we proposed a cognitive–ecological model for temporal self-appraisal. In this model, motivation is not necessary to explain the results—both present the previous (e.g., Wilson & Ross, 2001). However, we did not create experimental conditions in which a motivational explanation and a cognitive–ecological explanation make opposing predictions. Rather, we only have experiments in which one explanation predicts a certain outcome, while the other is largely silent about the outcome. Thus, the absence of evidence does not disprove a motivational explanation, and a complex process such as temporal self-assessment most likely incorporates several cognitive, ecological, and motivational processes and their interactions.

Second, as stated above, our results are restricted by our samples. We relied exclusively on online participants from the United States. At the moment, it is an open question whether the results will generalize to other settings and other cultures.

Finally, we used the label “temporal appraisals.” However, we only investigated appraisals of the present and the past. Extending the present cognitive–ecological model to comparison with future selves at various levels of age seems a promising venue. However, at the moment, the data are limited to comparison with past selves.

Conclusion

We set out to explain the self-enhancement function of temporal comparison based on basic cognitive principles (i.e., comparisons based on similarities and differences) and known properties of the

information ecology (i.e., positivity prevalence, negativity diversity, and growth). Although people are motivated to see themselves as better today than in the past, people do not need to be motivated to arrive at this self-evaluation. Because positive information is more similar, frequent, and reinforced over time, we argued and showed that evaluations of the self based on differences from the past self will typically result in a relatively positive evaluation of the present self. This result appears to be uninfluenced by factors that would increase or decrease the motivation to self-enhance but is influenced by factors that change the properties of the information ecology. The present research offers a novel and important extension to temporal self-appraisal theory and provides a parsimonious account of how people arrive at self-evaluations that favor the present self.

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